ELEMENT ENVIRONMENTAL
S O L U T I O N S

February 1, 2021

Mr. Timothy Holman
Director of Facilities
Pennsbury School District
134 Yardley Avenue
Fallsington, PA 19058

RE: IEQ/IAQ and Mold Evaluation in Oxford Valley Elementary School – Classrooms C24, C25 and C26
File Number 1040.0012 Task 10

Dear Mr. Holman:

Element Environmental Solutions, Inc. (E2S) was contracted to conduct an Indoor Air Quality (IAQ) evaluation of Classrooms C24, C25 and C26 and an adjacent space (hallway) of the Oxford Valley Elementary School located at 430 Trenton Road, Fairless Hills, Pennsylvania. This evaluation was intended to determine if there were any significant sources of airborne mold spores and of mold growth located specifically in Classroom C26 but also potentially in Classrooms C25 and C24, which could expose susceptible occupants to potential mold allergens.

This evaluation included analysis of samples for total airborne mold spores, suspected surface mold if any, and carpet dust mold. Direct Read IAQ/IEQ parameters (carbon dioxide (CO_2), carbon monoxide (CO), temperature (°F) and % relative humidity (% RH)) from the same interior locations as the airborne mold spore samples were also recorded. All samples were submitted with appropriate chain of custody paperwork to certified laboratory (EMSL Analytical, Inc.) for analysis.

The general air quality results and findings of the investigation are summarized below and in **Table 1** "IAQ Evaluation Analytical Results" for each parameter referenced above. Laboratory Analytical reports are included in **Appendix A** and evaluation procedures and reporting criteria are found in **Appendix B**. A synopsis of findings was reported to the District upon receipt of the lab samples.

Sampling Summary

Robert Pfromm, CIH (E2S Technical Manager, IAQ), performed a visual inspection of the evaluation areas (Classrooms C24, C25 and C26), and an adjacent space (the hallway) on January 27, 2021, for airborne mold spores, suspect surface mold growth and carpet dust mold spores. Total airborne mold spore count samples were collected in several locations including Room C26 (room air), Room C26 (ceiling HVAC supply vent), Room C25 (room air), Room C25 (ceiling HVAC supply vent), Room C24 (room air), Room C24 (ceiling HVAC supply vent), the hallway at Room C25 (the middle room) and directly outside of the of the building at Room C25.

A composite carpet dust sample was collected from a wall to wall carpeted area in each of the three classrooms for mold spore evaluation.

The airborne mold spore results and general air quality results and findings of the initial investigation are detailed below and in **Table 1** "IAQ Evaluation Analytical Results". Laboratory Analytical reports are included in **Appendix A (Mold).**

Airborne Mold spore Samples

Airborne mold spore samples were sampled using Zefon ® Airocell spore trap cassettes and a Zefon ® Biopump sampler calibrated at 15 lpm flow. Samples were collected for 5 minutes for a total air volume of 75 liters. The cassettes were labeled and sealed in Ziplock® type bags and chain of custody paperwork was prepared and when sampling was completed the samples were delivered to EMSL lab's Plymouth Meeting, Pa facility.

Tape Lift Mold samples

Tape lift surface mold samples were collected using EMSL biotape tape lift samplers. Suspected surface mold growth is sampled by peeling the protective cover off the sampling tape and carefully applying the sticky side of the sampler tape to the suspected mold. The tape lift sampler was then applied to a microscope slide, and the tape lift samplers were labeled and sealed in ziplock type bags and chain of custody paperwork was prepared and when sampling was completed the samples were delivered to the labs Plymouth Meeting, Pa facility.

Carpet Dust Mold

A composite carpet dust sample collected from multiple locations in each of the 3 classrooms using a mini-vac procedure that collected fine particulate including mold spores from the carpet. The sample is collected using a 25 mm PCM sampling cassette with a 0.8 micron pore size, and the vacuum source is a high volume sampling pump with a flow rate of approximately 15 LPM. The actual sampling procedure requires aggressively rubbing the surface of the carpet with the open face of the sampling cassette while the pump is running, alternating the direction of rubbing by 90°. Because of the multiple locations, the actual area sampled is an estimate at best and is generally not critical for this initial evaluation which is slightly more qualitative than quantitative.

Results Summary

In the order of sampling: **Room C26** had a low moderate total count of airborne **mold** spores but was predominantly Aspergillus/Penicillium which indicates a potential problem with the room air (sample OV-1/27-01A). The HVAC supply vent air sample from Room C26 (OV-1/27-02A) had a lower total count but was still predominantly Aspergillus/Penicillium. The carpet dust sample for C26 (OV-1/27-03C) indicated a probable source with a High spore density for Aspergillus and a Medium spore density for

Cladosporium with a Rare spore density for all other molds, identified. Two tape lift samples (OV-1/27-04T and -05T) indicated an additional mold source of Aspergillus on the teacher's desk.

Room C24 had a low trace level total count of airborne **mold** spores but was still predominantly Aspergillus/Penicillium in the room air sample (OV-1/27-06A), but this sample had such low spore counts, it did not indicate any problem. The HVAC supply vent air sample from Room C24 (OV-1/27-07A) had a very low trace level total count of Cladosporium. The carpet dust sample for C24 (OV-1/27-08C) indicated a probable mold source with a High spore density for Aspergillus and for Cladosporium and with a Rare spore density for all other molds identified. No surface samples (tape lifts) were collected as no apparent or suspected surface mold was observed in Room C24.

Room C25 had a low total count of airborne **mold** spores and was predominantly Aspergillus/-Penicillium which indicates a potential problem with the room air (sample OV-1/27-09A). The HVAC supply vent air sample from Room C25 (OV-1/27-10A) had a very low trace level total count of Aspergillus/Penicillium. The carpet dust sample for C25 (OV-1/27-12C) indicated a probable source with a High spore density for Aspergillus and a Rare spore density for all other molds. One tape lift sample (OV-1/27-11T) indicated an additional source on the teacher's desk.

Two additional airborne mold spore samples were collected for comparison as a standard procedure. One (sample OV-1/27-13A) was collected **in the hallway** near the door to Room C25 (the middle of the three rooms) and had similar proportions to the airborne mold in Room C26 but a much lower total count and lower individual spore counts (but it was also predominantly Aspergillus/Penicillium). The second comparison sample (sample OV-1/27-14A) was collected **outside the building near Room C25** and had no collected spores which only occurs in the winter after a period of colder temperatures and/or after it snows (with substantial coverage of the ground).

For the **Direct Read Parameters**, the maximum recommended CO_2 level was 1117 ppm (outside concentration of 417 ppm plus 700 ppm) and the room air samples were all just slightly more than the outside sample of 417 ppm. With full occupancy, these results would indicate too much fresh air is being introduced, however as occupancy ranged from a high of 3 adults in C26 to 2 adults and one small student in Rooms C25 and C24, it is unclear if the amount of fresh air would be adequate for a classroom with normal occupancy.

The temperatures were within the acceptable IAQ range only for one location (C24) and Rooms C26, C25 and the hallway were cooler than the lower end of the acceptable range. CO was very low trace levels in all locations which was very good. As is common in schools during the heating season and especially when it is very cold outside, the % RH was very low (20.7 % to 32.8 %), which is the primary source of complaints in heated buildings during the winter. The dry air affects the mucus membranes of the sinuses, eyes, and lips by drying them and can cause discomfort for regular skin. Interestingly, the highest humidity (32.8 %) was found in the room with the most surface mold growth centered on the teacher's wooden desk.

Results

Table 1: IAQ Evaluation Analytical Results.

Parameter >>>		Total Airborne Mold Spore Counts	Carbon Dioxide (CO2)	Carbon Monoxide (CO)	Temperature	% RH
Units >>>		Counts or C or S/m3	ppm	ppm	°F	%
Recommended Max. IAQ Level or Acceptable Range >>>			1117	< 9	69 to 78	30 to 60
Sampling Location	Sample ID					
Room C26 – Center of Room	OV-1/27-01A	1,300	567	0.7	68.8	32.8
Room C26 – Supply Vent	OV-1/27-02A	850	NS	NS	NS	NS
Room C24 – Center of Room	OV-1/27-06A	50	456	0.8	70.4	21.6
Room C24 – Supply Vent	OV-1/27-07A	10	NS	NS	NS	NS
Room C25 – Center of Room	OV-1/27-09A	960	482	0.6	66.9	20.7
Room C25 – Supply Vent	OV-1/27-10A	40	NS	NS	NS	NS
Hallway @ Rooms C24, C25, C26	OV-1/27-13A	290	498	0.2	64.7	27.2
Outside the building @ Room C25	OV-1/27-14A	0	417	0.3	42.8	34.7

Notes:

Result Units - ppm = parts/million; C or S/M^3 = Counts or Spores/Meter^3. NS = Not Sampled
CO_2 recommended limit is outside ppm + 700 ppm. % RH and Temp. are all ASHRAE recommended levels. CO is a LEED recommended level.

Airborne Mold Spores

OV-1/27-01A (Room C26 - Center of Room)

The total airborne mold spore count for sample OV-1/27-01A was 1,300 C or S/m^3, and the predominant mold was Aspergillus/Penicillium with a low moderate count of 1,000 C or S/m^3, with Cladosporium at a low count of 300 C or S/m^3, and no additional mold genera were collected. The airborne concentration of Aspergillus/Penicillium at the time of sampling would be likely to produce minimal to no allergy or asthma symptoms and the Cladosporium would be unlikely to produce any. It is notable that anytime Aspergillus/Penicillium (and several other mold genera) are predominant even with lower spore counts, these results generally indicate a potential source for that particular mold is in the room, but limited activity in a room can keep the airborne counts lower and may hide the significance of the predominant mold genus. Anytime that significant growth is found in the carpet (as here) it is very likely that airborne counts would be much higher with increasing numbers of people walking around the room (on the carpet).

OV-1/27-02A (Room C26 – Supply Vent in ceiling)

The total airborne mold spore count for sample OV-1/27-02A was 850 C or S/m^3, and the predominant mold was Aspergillus/Penicillium with a low count of 550 C or S/m^3, with Cladosporium at a low count of 300 C or S/m^3, and no additional mold genera were collected. This sample has less potential to produce allergy or asthma symptoms than the room air sample. The configuration of the HVAC system was unknown as to whether there was significant recirculation of room air which could account for the

presence of the 2 molds and the numbers found. These results do not necessarily indicate any growth in the HVAC system and both of the mold genera found were also found in the carpet dust samples of Rooms C26 and C24.

OV-1/27-06A (Room C24 - Center of Room)

The total airborne mold spore count for sample OV-1/27-06A was a very low trace count of 50 C or S/m^3, and the predominant mold was Aspergillus/Penicillium with a very low trace count of 40 C or S/m^3, with Cladosporium at an even lower trace count of 10 C or S/m^3, and no additional mold genera were collected. The airborne concentration of Aspergillus/Penicillium and Cladosporium were both at the detection limit for the method at the time of sampling and would produce no allergy or asthma symptoms. These results were so low that they did not immediately indicate a potential source in the room, however the carpet dust samples indicated there was. Anytime that significant growth is found in the carpet (as here) it is very likely that airborne counts would be much higher with increasing numbers of people walking around the room (on the carpet).

OV-1/27-07A (Room C24 – Supply Vent in ceiling)

The total airborne mold spore count for sample OV-1/27-07A was a very low trace count of 10 C or S/m^3, and the predominant (only) mold was Cladosporium at a very low trace count of 10 C or S/m^3, and no additional mold genera were collected. The airborne concentration of Cladosporium was at the detection limit for the method at the time of sampling and would produce no allergy or asthma symptoms.

OV-1/27-09A (Room C25 - Center of Room)

The total airborne mold spore count for sample OV-1/27-09A was 960 C or S/m^3, and the predominant mold was Aspergillus/Penicillium with a low count of 760 C or S/m^3, and four additional mold genera at trace counts of 40, 40, 80, and 40 C or S/m^3, for Basidiospores, Cladosporium, Curvularia and Myxomycetes, respectively and no additional mold genera were collected. The airborne concentration of Aspergillus/Penicillium at the time of sampling would be likely to produce minimal to no allergy or asthma symptoms and the other genera found would be very unlikely to produce any.

OV-1/27-10A (Room C25 – Supply Vent in ceiling)

The total airborne mold spore count for sample OV-1/27-10A was a very low trace count of 40 C or S/m^3, and the predominant (only) mold was Aspergillus/Penicillium at a very low trace count of 40 C or S/m^3, and no additional mold genera were collected. The airborne concentration of Aspergillus/Penicillium was at the detection limit for the method at the time of sampling and would produce no allergy or asthma symptoms.

OV-1/27-13A (the Hallway at Room C25)

The total airborne mold spore count for sample OV-1/27-13A was 290 C or S/m^3, and the predominant mold was Aspergillus/Penicillium with a very low count of 200 C or S/m^3, and three additional mold

genera at trace counts of 40, 40, and 10 C or S/m^3, for Basidiospores, Cladosporium, and Stachybotrys, respectively and no additional mold genera were collected. The airborne concentration of Aspergillus/Penicillium at the time of sampling would be likely to produce no allergy or asthma symptoms and the other genera found would be very unlikely to produce any. Stachybotrys is usually a significant concern, however the concentration of 10 C or S/m^3, for Stachybotrys, is at the limit of detection and this mold is more likely to be a residual spore that entered the building sometime in the past. Growth of Stachybotrys requires a cellulosic material (paper, cardboard, straw, and similar), kept wet (not damp or just high humidity) for extended periods (1 to 2 weeks not several days) to mature and release spores. No wet conditions like those noted were observed during the sampling site visit, however there could be some potential locations elsewhere in the building. A visual inspection for active or extended wet areas from plumbing water leaks, water intrusion, condensation or other potential moisture sources might be warranted.

OV-1/27-14A (Outside the building, near Room C25)

The total airborne mold spore count for sample OV-1/27-14A was a result of None Detected. This sample would produce no allergy or asthma symptoms. Outside results of None Detected are a rare result, and only possible in the winter, when conditions are cold and dry, or there is substantial snow cover.

Floor Dust Mold Spore Sample Results

Surface Mold Samples Spore Density Definitions: Rare: 1 to 10 spores/area analyzed, Low: 11 to 100 spores/area analyzed, Medium: 101 to 1000 spores/area analyzed, High: >1000 spores/area analyzed). Floor Dust samples were collected using a mini-vac procedure.

OV-1/27-03C (Room C26 - Carpet Dust)

The mold results for sample OV-1/27-03C were from a composite sample from multiple representative locations on the carpet and results include a “High” spore density for Aspergillus (not Aspergillus/Penicillium, the carpet dust had structures allowing specific identification of Aspergillus. The results also included a “Medium” spore density for Cladosporium; a “Low” spore density for Myxomycetes and “Rare” spore density for five (5) additional mold genera as follows: Ascospores, Basidiospores, Curvularia, Epicoccum, and Pithomyces. Counts of “Low” spore density usually do not indicate growth, but Medium and High spore density usually does indicate growth. The “Rare” counts are generally considered to indicate spores that have settled out of the air or are minimal residuals from past growth or air that had entered the building when windows and doors were opened or on occupants, their clothing and backpacks and do not usually indicate current growth on the carpet where sampled. The carpet does appear to be a contributing source and possibly the source of airborne contamination and the recommendation is for removal (see Recommendations).

OV-1/27-08C (Room C24 - Carpet Dust)

The mold results for sample OV-1/27-08C were from a composite sample from multiple representative locations on the carpet and results include a “High” spore density for Cladosporium and Aspergillus (not Aspergillus/Penicillium, the carpet dust had structures allowing specific identification of

Aspergillus). The results also included a "Low" spore density for Myxomycetes and "Rare" spore density for five (5) additional mold genera as follows: Ascospores, Basidiospores, Chaetomium, Epicoccum, and Rust. Counts of "Low" spore density usually do not indicate growth, but High spore density usually does indicate growth. The "Rare" counts are generally considered to indicate spores that have settled out of the air or are minimal residuals from past growth or air that had entered the building when windows and doors were opened or on occupants, their clothing and backpacks and do not usually indicate current growth on the carpet where sampled The carpet does appear to be a contributing source and possibly the source of airborne contamination and the recommendation is for removal (see Recommendations).

OV-1/27-12C (Room C25 - Carpet Dust)

The mold results for sample OV-1/27-12C were from a composite sample from multiple representative locations on the carpet and results include a "High" spore density for Aspergillus (not Aspergillus/Penicillium, the carpet dust had structures allowing specific identification of Aspergillus). The results also included "Rare" spore density for nine (9) additional mold genera as follows: Ascospores, Basidiospores, Chaetomium, Cladosporium, Curvularia, Epicoccum, Myxomycetes, Pithomyces, and Rust. Counts of High spore density usually do indicate growth. The "Rare" counts are generally considered to indicate spores that have settled out of the air or are minimal residuals from past growth or air that had entered the building when windows and doors were opened or on occupants, their clothing and backpacks and do not usually indicate current growth on the carpet where sampled. The carpet does appear to be a contributing source and possibly the source of airborne contamination and the recommendation is for removal (see Recommendations).

Tape Lift Surface Mold Samples

Tape Lift Surface Mold Samples Spore Density Definitions: Rare: 1 to 10 spores/area analyzed, Low: 11 to 100 spores/area analyzed, Medium: 101 to 1000 spores/area analyzed, High: >1000 spores/area analyzed). Tape lift samples were collected using an EMSL Lab supplied tape lift sampler.

OV-1/27- 04T (Room C26 – Leg Area of Desk)

The sampled surface of the vertical wood sides of the leg area of the wooden teacher's desk had suspected visible mold growth and was found to have a "High" spore density of Aspergillus, (not Aspergillus/Penicillium, the collected mold on the tape lift had structures allowing specific identification of Aspergillus). No other mold genera were identified in the sample. This amount of growth on a wood surface indicates the presence of high % RH (well over 60% RH) for days not hours. The desk does appear to be a source of airborne contamination and the recommendation is for removal (see Recommendations).

OV-1/27- 05T (Room C26 – the Bottom of Both Drawer Areas of the Teacher's Desk)

The sampled surface of the underside of the wood drawer area of the wooden teacher's desk had heavy suspected visible mold growth and was found to have a "High" spore density of Aspergillus, (not Aspergillus/Penicillium, the collected mold on the tape lift had structures allowing specific identification of Aspergillus). Only one other mold genera were identified in the sample (a Rare spore

density for Myxomycetes). This amount of growth on a wood surface indicates the presence of high % RH (well over 60% RH) for days not hours. The desk does appear to be a source of airborne contamination and the recommendation is for removal (see Recommendations).

OV-1/27- 11T (Room C25 – the Bottom of One Drawer Area of the Teacher's Desk)

The sampled surface of the underside of one of the wood drawer areas of the wooden teacher's desk had heavy suspected visible mold growth and was found to have a "High" spore density of Aspergillus, (not Aspergillus/Penicillium, the collected mold on the tape lift had structures allowing specific identification of Aspergillus). No other mold genera were identified in the sample. This amount of growth on a wood surface indicates the presence of high % RH (well over 60% RH) for days not hours. The desk does appear to be a Source of airborne contamination and the recommendation is for removal (see Recommendations).

No visible mold was observed in Room C24 therefore no tape lifts samples were obtained

Direct Read Parameters

In addition to the mold sampling, the following direct read IAQ parameters were sampled (using Direct Read instrumentation) carbon dioxide (CO_2), carbon monoxide (CO), temperature (°F) and % relative humidity (%RH), any of which could negatively affect the indoor air quality. CO_2 and CO readings were well below their maximum recommended values and were excellent, respectively. It is important to remember that the classrooms were basically unoccupied (only 2 to 3 people were present in any of the rooms during sampling), so full normal occupancy CO_2 results in these rooms could be considerably different.

Only Room C24 was within the recommended temperature range of 69 to 78 °F (it was 70.4 °F) and the other locations were all cooler than the recommended low end of the recommended temperature range. The % RH reading for Room C26 was just within the low (dry) end of the acceptable % RH range of 30 to 60 % RH. All of the other % RH results were well below the acceptable range of 30 to 60 % RH with readings ranging from 20.7% to 27.2 %. Low % RH is the primary source of complaints in heated buildings during the winter, as it can lead to dry eyes, sinuses and lips and other discomfort. The dry eyes and dry sinuses discomfort can when it is very dry, seem to indicate a potential upper respiratory infection, which it is not.

On the positive side, mold cannot grow at these low humidity levels, unless there is a continuous slow water leak or a large short-term water leak (plumbing or structural). In either case, wintertime continuous slow leaks and large short-term leaks are usually more readily noticed and corrected before significant mold growth can occur, unlike spring, summer and fall high humidity issues, which tend to become apparent due to mold growth. All Direct Read results are included in Table 1. The conditions measured on 1/27/21, would not have supported mold growth.

Conclusions and Recommendations

The presence of elevated spore density mold growth (of Aspergillus, a significant allergen and for specific species, a potential human pathogen) on surfaces (desks) and the carpet indicates a need for corrective actions to eliminate the growth in those two areas (C26 and C25 for the desk's) and all three rooms for the carpet. This will eliminate the potential for a significant airborne exposure from existing mold, if the mold on the desks or the carpet had been disturbed. **The air sampling results indicated that there was no significant hazard from the mold spores becoming airborne with the minimal room occupancy.** Fortunately, the airborne counts at the time of sampling were generally low to very low and the low % RH levels were preventing any current additional mold growth.

The desks are old, and it is probably easier (and potentially cheaper) to remove and dispose of the wooden teacher's desks. E2S would recommend that the known mold growth areas on the desks (the leg area in C26 and the underside of the drawer areas in C26 and C25 be HEPA vacuumed and the desks be carried right out the exit door in the classrooms to the outside for disposal.

For the carpets, there should be some initial cleaning before removal as follows: the furnishings should be removed from the room to clear the carpet for removal; the carpets should be aggressively HEPA vacuumed with a vacuum cleaner that has a motorized cleaning head with brushes to remove as much dust and loose spores as possible.

The carpet should then be sprayed with a mold sanitizer (such as Sporicidin® or an equivalent product) to dampen it all the way to the slab. After a brief wait to let the sanitizer work (30 min. would be more than enough), the carpet can be pulled up (at least some of the carpet appeared to be carpet squares) and bagged for removal from the building. If any of the carpet is not squares, it should be cut into sections, rolled up and placed into large plastic bags for removal from the building and disposal. After the carpet is gone the floor slab should be vacuumed again and mopped with the sanitizer and allowed to dry (dehumidifiers are recommended to ensure rapid drying).

After the floor is dry any necessary preparation can be done to ready the floor for a new surface (E2S does not recommend replacing the carpet with more carpet as the cause of the humidity that allowed the mold to grow in the first place is yet to be determined).

The humidity may have been due to excessive amounts of fresh air being introduced through the HVAC system or room temperatures kept too cool which can lead to higher % RH values. There are guideline values based on the number of people in the room to determine the amount of fresh air needed, so adjustments can be made, tested and adjusted. If the HVAC system has the capability, CO_2 sensors in the returns or in the room can control the fresh air introduction system, so that little or no humid outside air is added to the room when it is not needed. Slightly warmer temperatures can also make a significant difference in the room % RH.

If and when corrective actions are implemented, it would be prudent to perform some follow-up IAQ sampling to evaluate the effectiveness of the corrective actions implemented.

Thank you for the opportunity to present Element Environmental Solutions (E2S) as a partner in your environmental management efforts. Should you have questions or require additional information, please contact me.

Sincerely,
E2S, Inc.

Robert A. Pfromm, CIH
Technical Manager, IAQ

Appendix A

Mold Spore Results

EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

http://www.EMSL.com / plymouthmeetinglab@emsl.com

EMSL Order: 182100366
Customer ID: ELES42
Customer PO: 1040.0012T10
Project ID:

Attention: Robert Pfromm, CIH
Element Environmental Solutions, Inc.
61 Willow Street
PO Box 921
Adamstown, PA 19501

Project: Pennsbury SD - Oxford Valley ES - 1040.0012T10

Phone: (717) 484-5111
Fax:
Collected Date:
Received Date: 01/27/2021 02:18 PM
Analyzed Date: 01/28/2021

Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	182100366-0001			182100366-0002			182100366-0006		
Client Sample ID:	01/27/01A			01/27/02A			01/27/06A		
Volume (L):	75			75			75		
Sample Location:	Rm C26 - Center of Rm			Rm C26 - Supply Vent			Rm C24 - Center of Rm		
Spore Types	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	24	1000	76.9	13	550	64.7	1	40	80
Basidiospores	-	-	-	-	-	-	-	-	-
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	6	300	23.1	6	300	35.3	1*	10*	20
Curvularia	-	-	-	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**30**	**1300**	**100**	**19**	**850**	**100**	**2**	**50**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	42	-	-	42	-	-	42	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	2	-	-	1	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

No discernable field blank was submitted with this group of samples.

Kevin Ream, Laboratory Manager
or other Approved Signatory

Initial report from: 01/29/2021 11:27 AM

For information on the fungi listed in this report, please visit the Resources section at www.emsl.com

EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

http://www.EMSL.com / plymouthmeetinglab@emsl.com

EMSL Order: 182100366
Customer ID: ELES42
Customer PO: 1040.0012T10
Project ID:

Attention: Robert Pfromm, CIH
Element Environmental Solutions, Inc.
61 Willow Street
PO Box 921
Adamstown, PA 19501

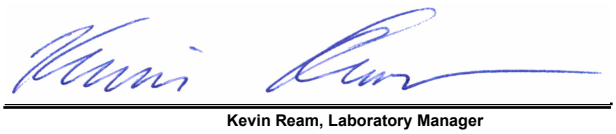
Project: Pennsbury SD - Oxford Valley ES - 1040.0012T10

Phone: (717) 484-5111
Fax:
Collected Date:
Received Date: 01/27/2021 02:18 PM
Analyzed Date: 01/28/2021

Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	182100366-0007			182100366-0009			182100366-0010		
Client Sample ID:	01/27/07A			01/27/09A			01/27/10A		
Volume (L):	75			75			75		
Sample Location:	Rm C24 - Supply Vent			Rm C25 - Center of Rm			Rm C25 - Supply Vent		
Spore Types	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-	-	-	-
Aspergillus/Penicillium	-	-	-	18	760	79.2	1	40	100
Basidiospores	-	-	-	1	40	4.2	-	-	-
Bipolaris++	-	-	-	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-	-	-	-
Cladosporium	1*	10*	100	1	40	4.2	-	-	-
Curvularia	-	-	-	2	80	8.3	-	-	-
Epicoccum	-	-	-	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-	-	-	-
Myxomycetes++	-	-	-	1	40	4.2	-	-	-
Pithomyces++	-	-	-	-	-	-	-	-	-
Rust	-	-	-	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-	-	-	-
Stachybotrys/Memnoniella	-	-	-	-	-	-	-	-	-
Unidentifiable Spores	-	-	-	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-	-	-	-
Total Fungi	**1**	**10**	**100**	**23**	**960**	**100**	**1**	**40**	**100**
Hyphal Fragment	-	-	-	-	-	-	-	-	-
Insect Fragment	-	-	-	-	-	-	-	-	-
Pollen	-	-	-	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	42	-	-	42	-	-	42	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	1	-	-	2	-	-	2	-
Fibrous Particulate (1-4)	-	1	-	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-	-	1	-

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.



Kevin Ream, Laboratory Manager
or other Approved Signatory

No discernable field blank was submitted with this group of samples.

Initial report from: 01/29/2021 11:27 AM

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EMSL Analytical, Inc.

5221 Militia Hill Road Plymouth Meeting, PA 19462

Tel/Fax: (610) 828-3102 / (610) 828-3122

http://www.EMSL.com / plymouthmeetinglab@emsl.com

EMSL Order: 182100366
Customer ID: ELES42
Customer PO: 1040.0012T10
Project ID:

Attention: Robert Pfromm, CIH
Element Environmental Solutions, Inc.
61 Willow Street
PO Box 921
Adamstown, PA 19501

Project: Pennsbury SD - Oxford Valley ES - 1040.0012T10

Phone: (717) 484-5111
Fax:
Collected Date:
Received Date: 01/27/2021 02:18 PM
Analyzed Date: 01/28/2021

Test Report:Air-O-Cell(™) Analysis of Fungal Spores & Particulates by Optical Microscopy (Methods MICRO-SOP-201, ASTM D7391)

Lab Sample Number:	182100366-0013			182100366-0014		
Client Sample ID:	01/27/13A			01/27/14A		
Volume (L):	75			75		
Sample Location:	Hallway At C24, 25, 26			Outside At Rm C25		
Spore Types	**Raw Count**	**Count/M³**	**% of Total**	**Raw Count**	**Count/M³**	**% of Total**
Alternaria (Ulocladium)	-	-	-	-	-	-
Ascospores	-	-	-	-	-	-
Aspergillus/Penicillium	4	200	69	-	-	-
Basidiospores	1	40	13.8	-	-	-
Bipolaris++	-	-	-	-	-	-
Chaetomium	-	-	-	-	-	-
Cladosporium	1	40	13.8	-	-	-
Curvularia	-	-	-	-	-	-
Epicoccum	-	-	-	-	-	-
Fusarium	-	-	-	-	-	-
Ganoderma	-	-	-	-	-	-
Myxomycetes++	-	-	-	-	-	-
Pithomyces++	-	-	-	-	-	-
Rust	-	-	-	-	-	-
Scopulariopsis/Microascus	-	-	-	-	-	-
Stachybotrys/Memnoniella	1*	10*	3.4	-	-	-
Unidentifiable Spores	-	-	-	-	-	-
Zygomycetes	-	-	-	-	-	-
Total Fungi	**7**	**290**	**100**	**-**	**None Detect**	**-**
Hyphal Fragment	1	40	-	-	-	-
Insect Fragment	-	-	-	-	-	-
Pollen	-	-	-	-	-	-
Analyt. Sensitivity 600x	-	42	-	-	42	-
Analyt. Sensitivity 300x	-	13*	-	-	13*	-
Skin Fragments (1-4)	-	3	-	-	1	-
Fibrous Particulate (1-4)	-	1	-	-	1	-
Background (1-5)	-	1	-	-	1	-

++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.

Kevin Ream, Laboratory Manager
or other Approved Signatory

No discernable field blank was submitted with this group of samples.

Initial report from: 01/29/2021 11:27 AM

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http://www.EMSL.com / plymouthmeetinglab@emsl.com

EMSL Order: 182100366
Customer ID: ELES42
Customer PO: 1040.0012T10
Project ID:

Attention: Robert Pfromm, CIH
Element Environmental Solutions, Inc.
61 Willow Street
PO Box 921
Adamstown, PA 19501
Project: Pennsbury SD - Oxford Valley ES - 1040.0012T10

Phone: (717) 484-5111
Fax:
Collected Date:
Received Date: 01/27/2021
Analyzed Date: 01/28/2021

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Bulk Samples (EMSL Method MICRO-SOP-200)

Lab Sample Number: / Client Sample ID: / Sample Location:	182100366-0003 01/27/03C Rm C26 - Carpet Dust	182100366-0008 01/27/08C Rm C24 - Carpet Dust	182100366-0012 01/27/12C Rm C25 - Carpet Dust		
Spore Types	Category	Category	Category		
Alternaria (Ulocladium)	-	-	-		
Ascospores	Rare	Rare	Rare		
Aspergillus/Penicillium	-	-	-		
Basidiospores	Rare	Rare	Rare		
Bipolaris++	-	-	-		
Chaetomium	-	Rare	Rare		
Cladosporium	*Medium*	*High*	Rare		
Curvularia	Rare	-	Rare		
Epicoccum	Rare	Rare	Rare		
Fusarium	-	-	-		
Ganoderma	-	-	-		
Myxomycetes++	Low	Low	Rare		
Pithomyces++	Rare	-	Rare		
Rust	-	Rare	Rare		
Scopulariopsis/Microascus	-	-	-		
Stachybotrys/Memnoniella	-	-	-		
Unidentifiable Spores	-	-	-		
Zygomycetes	-	-	-		
Aspergillus	*High*	*High*	*High*		
Hyphal Fragment	-	-	-		
Insect Fragment	-	-	Rare		
Pollen	-	Rare	-		

Category: Count/per area analyzed - Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000

- Denotes Not Detected.
++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.
* = Sample contains fruiting structures and/or hyphae associated with the spores.

Kevin Ream, Laboratory Manager
or other Approved Signatory

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Initial report from: 01/29/2021 11:27 AM

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http://www.EMSL.com / plymouthmeetinglab@emsl.com

EMSL Order: 182100366
Customer ID: ELES42
Customer PO: 1040.0012T10
Project ID:

Attention: Robert Pfromm, CIH
Element Environmental Solutions, Inc.
61 Willow Street
PO Box 921
Adamstown, PA 19501
Project: Pennsbury SD - Oxford Valley ES - 1040.0012T10

Phone: (717) 484-5111
Fax:
Collected Date:
Received Date: 01/27/2021
Analyzed Date: 01/28/2021

Test Report: Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, and Other Particulates from Tape Samples (EMSL Method MICRO-SOP-200)

Lab Sample Number:	182100366-0004	182100366-0005	182100366-0011		
Client Sample ID:	01/27/04T	01/27/05T	01/27/11T		
Sample Location:	Rm C26 - Leg Area of Desk	Rm C26 - Bottom of Desk	Rm C25 - Bottom of Desk		
Spore Types	Category	Category	Category		
Alternaria (Ulocladium)	-	-	-		
Ascospores	-	-	-		
Aspergillus/Penicillium	-	-	-		
Basidiospores	-	-	-		
Bipolaris++	-	-	-		
Chaetomium	-	-	-		
Cladosporium	-	-	-		
Curvularia	-	-	-		
Epicoccum	-	-	-		
Fusarium	-	-	-		
Ganoderma	-	-	-		
Myxomycetes++	-	Rare	-		
Pithomyces++	-	-	-		
Rust	-	-	-		
Scopulariopsis/Microascus	-	-	-		
Stachybotrys/Memnoniella	-	-	-		
Unidentifiable Spores	-	-	-		
Zygomycetes	-	-	-		
Aspergillus	*High*	*High*	*High*		
Hyphal Fragment	-	-	-		
Insect Fragment	-	-	-		
Pollen	-	-	-		

Category: Count/per area analyzed - Rare: 1 to 10 Low: 11 to 100 Medium: 101 to 1000 High: >1000

- Denotes Not Detected.
++ Includes other spores with similar morphology; see EMSL's fungal glossary for each specific category.
* = Sample contains fruiting structures and/or hyphae associated with the spores.

Kevin Ream, Laboratory Manager
or other Approved Signatory

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Initial report from: 01/29/2021 11:27 AM

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OrderID: 182100366

EMSL ANALYTICAL, INC.
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182100366
EMSL Order Number (*Lab Use Only*):

EMSL ANALYTICAL, INC
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

Company : Element Environmental Solutions, Inc.	**EMSL-Bill to:** ☒ Same ☐ Different **If Bill to is Different please note in Comments****
Street: 61 Willow Street PO Box 921	*Third Party Billing requires written authorization from third party*
City: Adamstown / **State/Province: PA**	**Zip/Postal Code: 19501** / **Country: USA**
Report To (Name): Robert Pfromm, CIH	**Fax #:**
Telephone #: 717-484-5111	**E-mail Address:** IAQ@e2s.us bob@e2s.us
Project Name/ Number: PENNSBURY SD. OXFORD VALLEY ES - 1040.0012 T10	
Please Provide Results: ☐ Fax ☒ E-mail	**PO#** 1040.0012 T10 **State Samples Taken:** PA

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☑ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

**Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide. TATs are subject to methodology requirements*

Non Culturable Air Samples (Spore Traps)

- **M001** Air-O-Cell
- **M049** BioSIS
- **M030** Micro 5
- **M173** Allegro M2
- **M003** Burkard
- **M174** MoldSnap
- **M004** Allergenco
- **M043** Cyclex
- **M176** Relle Smart
- **M032** Allergenco-D
- **M002** Cyclex-d
- **M130** Via-Cell
- **M172** Versa Trap

Other Microbiology Test Codes

- **M041** Fungal Direct Examination
- **M005** Viable Fungi ID and Count
- **M006** Viable Fungi ID and Count (Speciation)
- **M007** Culturable Fungi
- **M008** Culturable Fungi (Speciation)
- **M009** Gram Stain Culturable Bacteria
- **M010** Bacterial Count and ID – 3 Most Prominent
- **M011** Bacterial Count and ID – 5 Most Prominent
- **M013** Sewage Contamination in Buildings
- **M014** Endotoxin Analysis
- **M015** Heterotrophic Plate Count
- **M180** Real Time Q-PCR-ERMI 36 Panel
- **M018** Total Coliform (Membrane Filtration)
- **M020** Fecal *Streptococcus* (Membrane Filtration)
- **M210-215** *Legionella* Detection
- **M026** Recreational Water Screen
- **M027** Mycotoxin Analysis
- **M029** *Enterococci*
- **M019** Fecal Coliform
- **M133** MRSA Analysis
- **M028** *Cryptococcus neoformans* Detection
- **M120** *Histoplasma capsulatum* Detection
- **M033-39** Allergen Testing
- **M044** Group Allergen (Cat, Dog, Cockroach, Dustmites)
- **Other** See Analytical Price Guide

Preservation Method (Water):

Name of Sampler: Robert Pfromm **Signature of Sampler:** Robert Pfromm

Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
OV-1/27-01A	RM C26 - CENTER OF RM	AIR	M001	75L	1/27/21
-02A	" " SUPPLY VENT	"	"	"	"
-03C	" " CARPET DUST	DUST	M041	—	"
-04T	" " LEG AREA OF DESK	TAPE	"	—	"
-05T	" " BOTTOM OF "	"	"	—	"
-06A	RM C24 - CENTER OF RM	AIR	M001	75L	"
-07A	" " SUPPLY VENT	"	"	"	"
-08C	" " CARPET DUST	DUST	M041	—	"
-09A	RM C25 - CENTER OF RM	AIR	M001	75L	"
-10A	" " - SUPPLY VENT	"	"	"	"

Client Sample # (s): OV-1/27-01A → -14A **Total # of Samples:** 14

Relinquished (Client): Robert A Pfromm **Date:** 1-27-21 **Time:**

Received (Client): **Date:** 1-27-21 **Time:** 2:18

Comments:

EMSL ANALYTICAL, INC.
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182100366
EMSL Order Number (*Lab Use Only*):

EMSL ANALYTICAL, INC
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Sample Location	Sample Type	Test Code	Volume/Area	Date/Time Collected
OV-1/27-11T	RM C25 – BOTTOM ~~UNDER~~ OF DESK	M041 ↔ TAPE	—	1/27/21
OV-1/27-12C	" " - CARPET DUST	DUST	M041	—	"
-13A	HALLWAY @ C24, 25, 26	AIR	M001	75L	"
-14A	OUTSIDE at RM C25	"	"	"	"

****Comments/Special Instructions**

1040,0012 T10 E25

Page 2 of 2 pages

Appendix B

Procedures and Reporting Criteria

Sampling Methods & Results Evaluation Criteria

Evaluation Procedures

The total spore count air samples were collected using Zefon Airocell ® cassettes and a Zefon Biopump® calibrated to sample 15 lpm for 5 minutes at each location. Airborne mold spore air samples are usually collected for short periods (generally 3 to 10 minutes depending on the sampling area's conditions). Longer sampling periods and higher volumes of air can lead to samples obscured by collected dust or spore overcrowding, which could limit the lab's ability to count and identify the collected spores. All samples were sealed, labeled and submitted with appropriate chain of custody paperwork for lab analysis by an American Industrial Hygiene Association (AIHA) accredited microbiology laboratory.

The following parameters were sampled using direct read instrumentation:

- carbon dioxide
- carbon monoxide
- temperature
- % relative humidity

All of which could negatively affect the indoor air quality.

Allergen (Mold) Sampling

Criteria

If airborne mold spores are found in the interior samples, they generally should be the same varieties and similar proportions to those found in the outside samples and should be less than about 25% of the outside count. If windows in the area were open for ventilation this can result in similarity or equality between the indoor and outdoor samples collected on an Airocell cassette (an impaction sampler that uses a calibrated sampler to evaluate 15 lpm of air for a specific amount of time, usually 3 to 5 minutes). The Airocell cassette interior samples are forwarded to a certified lab for microscopic analysis and are compared to exterior samples. During the spring, summer and early fall it is not unusual to have outdoor spore counts in excess of twenty to forty thousand spores or counts per cubic meter of air (C or S/m^3). Alternatively, in late fall, winter and early spring, cold temperatures and snow cover can result in very low outside counts.

Under normal conditions, if varieties of mold are found that are not present in the outside samples, they may be artifacts having entered the building with normal air exchange when different varieties of mold were more numerous outside, or they could indicate localized mold growth occurring outside near an entry point (such as a window or a fresh air intake for an HVAC system) that did not directly affect the primary outside samples, or they could indicate mold growth occurring in a hidden or distant location within the building. If the third scenario is suspected, similar mold varieties will usually be noted in samples collected closer to the unknown source with results usually higher the closer to the source. If mold spores are found in substantially higher number than the outside sample, or elevated counts appear for varieties not found outside, then this could indicate some mold growth in the vicinity of the collected sample and a careful visual inspection is in order. Some specific varieties of mold can

indicate problems, for example: the presence of Stachybotrys and/or Chaetomium can indicate very wet conditions may be occurring at a prime mold food source such as drywall, cellulose ceiling tile, paper products including cardboard or carpeting.

For carpet or floor dust mold spore evaluation, dust is collected using a “mini-vac” procedure with a high volume air pump acting as the suction source and a 25 mm X 0.8 micron pore size membrane filter cassette as the collection medium. For actual suspected surface mold, sampling is performed using an EMSL Biotape® tape lift sampler to collect spores and mold structure for identification. Analysis is performed by direct microscopic examination and identified mold spores are quantified as follows: The concentrations used to describe surface mold density are as follows: “Rare” = 1 to 10 Spores/area, “Low” = 11 to 100 spores/area, “Medium” =101 to 1000 spores/area and “High” = > 1000 spores. Obviously, the actual area of the mold growth is important, as a spot of mold ½ inch in diameter will have a “High” spore density result but will not be a significant hazard or concern, but several square feet or larger of surface growth could be extremely serious.

Direct Read Results

Carbon Dioxide

Carbon Dioxide (CO_2) levels are measured as an indicator of adequate ventilation.

Criteria

The OSHA Permissible Exposure Limit (PEL) for carbon dioxide is 5,000 ppm.

The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommended guideline for IAQ purposes is site specific. The limit is calculated as the amount of CO_2 outside the building at the time of sampling plus 700 ppm.

It should be noted that exceeding the ASHRAE maximum CO_2 level does not necessarily indicate a hazard, the primary effect of exceeding the guideline value is that odors are more noticeable.

Carbon Monoxide

Carbon Monoxide (CO) levels are measured to evaluate possible intrusion of combustion exhaust.

Criteria

The Occupational Safety and Health Administration Permissible Exposure Limit (OSHA PEL) for carbon monoxide is 50 ppm.

The National Institute of Occupational Safety and Health Recommended Exposure Limit (NIOSH REL) is 35 ppm.

The American Council of Governmental Industrial Hygienists Threshold Limit Value (ACGIH TLV) is 25 ppm.

The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) recommended guideline for IAQ purposes is 9 ppm.

Temperature

Occupant comfort may be affected by temperatures that are either too cold or too warm.

Criteria

Based on calculations the ASHRAE 55-2010 Standard provides an acceptable temperature range for normal occupancy interior applications during the summer season of 73 to 78.5 °F; these values are for occupied, temperature controlled buildings. Note the different ranges for different humidity levels. As the % RH values frequently exceeded the 60% value and the building was unoccupied during the remediation, a full 69 to 78 °F range was used.

RECOMMENDED RANGES OF TEMPERATURE AND RELATIVE HUMIDITY

Relative humidity	Winter Temperature	Summer Temperature
30%	68.5°F – 75.5°F	74.0°F – 80.0°F
40%	68.0°F – 75.0°F	73.5°F – 80.0°F
50%	68.0°F – 74.5°F	73.0°F – 79.0°F
60%	67.5°F – 74.0°F	73.0°F – 78.5°F

Recommendations apply for persons clothed in typical summer and winter clothing, at light, mainly sedentary, activity.

Source: Adopted from ASHRAE Standard 55-1992, Thermal Environmental Conditions for Human Occupancy

Relative Humidity (% RH)

Relative humidity in excess of 60% contributes to the potential for increased microbial growth, which in turn may aggravate allergic conditions or in extreme cases create biological hazards. Values near the 60% RH level are more common in the cooling season (summer) and values lower than 30% RH are very common in the heating season (winter). Interior humidity can shift quickly depending on the outside conditions and the operation of HVAC equipment. Low Humidity is more likely to produce comfort related issues than higher humidity levels. These comfort issues include irritation from drying of skin, eyes, and mucus membranes (sinuses, mouths, lips).

Criteria

Relative humidity affects occupant comfort when it is either too high or too low. The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) recommended range for interior comfort is 30 to 60% RH.