



June 2, 2023

Brent Paul
Director of Facility Operations
Lake Oswego School District

Via email: paulb@loswego.k12.or.us

Regarding: Indoor Air Quality Report
Oak Creek Elementary School
55 Kingsgate Road
Lake Oswego, Oregon 97035
PBS Project 21600.023 Phase 0012

Dear Mr. Paul:

On May 16, 2023, PBS Engineering and Environmental Inc. (PBS) performed indoor air quality testing services at the Oak Creek Elementary School located at 55 Kingsgate Road in Lake Oswego, Oregon. Testing and investigation services were provided in response to staff concerns about a possible indoor fungal amplification, which staff believe was caused by a previous water intrusion event.

The indoor air quality investigation included the following scope items:

- Visually inspect interior building materials and conditions
- Collect and analyze airborne fungal particulate samples
- Take moisture readings of accessible building finishes

Below is a summary of our findings.

VISUAL OBSERVATIONS AND INSPECTION

Oak Creek Elementary School is a multi-level wood and masonry-framed building in Lake Oswego, Oregon. Interior finishes in the investigated areas consist of carpet, gypsum board walls, and both suspended and concealed grid ceiling tile systems. Conditioned air is provided by above ceiling heating, ventilation, and air conditioning (HVAC) equipment.

PBS understands that prior to PBS' visit, a rainstorm had caused water to enter classrooms 24, 25, and 45, which are on the lower floor of the building. In classrooms 25 and 45, the carpet was wet up to approximately 8 feet from the exterior wall. In classroom 24, water impacted the lay-in ceiling tiles and collected inside of light fixtures. It is understood that the school district replaced impacted ceiling tiles and used dehumidifiers and fans to dry out carpets. At the time of PBS' visit, all finishes described as being previously impacted by the water intrusion were dry.

PBS did not observe any noticeable odors in any of the study areas. PBS also did not note excessive staining on the carpets, walls, or ceilings. However, minor staining to lay in ceiling tiles was noted in classroom 24. Above ceiling conditions were also observed to be odor, stain, and debris free.

AIRBORNE FUNGAL PARTICULATE SAMPLING

PBS collected six airborne fungal particulate samples using Allergenco impactor cassettes and a high-volume vacuum pump. Four samples were collected inside the building and two were collected outdoors to establish background conditions. Each sample was collected at a flow rate of 15 liters per minute for 5 minutes (75 liters) from an elevation of approximately 4 feet above ground level. The samples were submitted to Lab/Cor, Inc., in Seattle, Washington, for fungal and nonfungal particulate identification under chain of custody.

Table 1 below summarizes the findings of this phase of the investigation.

Table 1. Air Sample Laboratory Results: Fungal

Sample Number	Location	Fungal Spore Concentration*	Concentration Breakdown	
S1	Classroom 24	55	20	Ascospores, non-specified
			20	Basidiospores - like
			10	Aspergillus/ Penicillium-like
S2	Classroom 25	20	10	Basidiospores - like
			5	Ascospores, non-specified
			5	Cladosporium
S3	Classroom 45	30	20	Basidiospores - like
			5	Ascospores, non-specified
			5	Aspergillus/ Penicillium-like
S4	Classroom 23	10	10	Basidiospores
S5	Exterior; South Elevation	1,165	510	Ascospores, non-specified
			435	Basidiospores - like
			135	Acremonium - like
			55	Cladosporium
			15	Ganoderma
			5	Cercospora - like
			5	Hyphal Fragments
			5	Myxo./Periconia/Smuts/Rusts
S6	Exterior; South Elevation	705	305	Basidiospores - like
			280	Ascospores, non-specified
			110	Cladosporium
			10	Hyphal Fragments

*Spore concentrations are presented in total count per sample.

In reviewing airborne fungal spore data, two main considerations in each sample are the total number of spores and the relative proportions of the various spore types. These two considerations are then compared for samples collected from indoor test areas and for samples collected outdoors or from control areas. Based on review of the laboratory data, concentrations of fungal spores in the samples collected indoors were overall significantly lower than the concentrations observed in the samples collected outdoors. Additionally, the predominant fungal types found in the indoor samples were consistent with the types found outdoors. Based on these results, there does not appear to be a significant or measurable fungal concern in the indoor test areas.

Please refer to the attached laboratory reports for more detailed information regarding the results of these analyses.

MOISTURE METER READINGS

PBS utilized a Delmhorst BD-2100 2 pin moisture meter to check moisture levels in gypsum walls and ceiling tiles in classrooms 24, 25, and 45. Generally speaking, gypsum should have a moisture content of less than 1%; anything above 1% can be a sign of a potential issue. PBS did not observe any moisture readings above 1% in any of the finishes tested.

CONCLUSIONS

- Indoor airborne fungal particulate levels were found to be acceptable and were below levels found outdoors. Evidence of an airborne indoor fungal amplification was not identified.
- No active water intrusions were noted and finishes within the scope of the investigation were observed to be dry.
- No odors were noted in any of the investigated spaces.

LIMITATIONS OF SCOPE

This study was limited to the tests and locations as indicated above. The site as a whole may have other environmental concerns that will not be characterized by this study. The findings and conclusions of this work are not scientific certainties, but probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent conditions on the site or adjoining sites beyond those detected or observed by PBS.

PBS respectfully submits these results of our indoor air quality investigation. Please feel free to contact me at 503.349.6861 or sean.grabiner@pbsusa.com with any questions or comments.

Sincerely,

 Digitally signed
by Sean Grabiner
Date: 2023.06.02
13:53:06 -07'00'

Sean Grabiner, CSP
Project Manager

Attachments: Laboratory Reports

NV, Air, Fungal ID Final Report

Job Number: 230474

Client: PBS Engineering + Environmental

**Address: 4412 South Corbett Ave
Portland, OR 97239**

Project Name: Oak Creek ES

Project No.: 21600.023 / 0012

PO Number:

Sub Project:

Reference No.:

Report Number: 230474R01

Report Date: 5/22/2023

Enclosed please find results for samples submitted to our laboratory. A list of samples and analyses follows:

Lab/Cor Num.	Client Sample Number	Analysis	Analysis Notes	Date Sampled:	Date Received:
230474 - S1	S1	NV, Air, Fungal ID		5/16/2023	5/18/2023
230474 - S2	S2	NV, Air, Fungal ID		5/16/2023	5/18/2023
230474 - S3	S3	NV, Air, Fungal ID		5/16/2023	5/18/2023
230474 - S4	S4	NV, Air, Fungal ID		5/16/2023	5/18/2023
230474 - S5	S5	NV, Air, Fungal ID		5/16/2023	5/18/2023
230474 - S6	S6	NV, Air, Fungal ID		5/16/2023	5/18/2023

Nonviable Air Air samples follow preparation and analysis techniques outlined in Method 5 of the laboratory SOP; this method is based on guidelines from the Pan-American Aerobiology Association Standardized Protocol and ASTM Method 7391-09. Samples were collected using either an Air-O-Cell, Cyclex-D, Allergenco-D, or M2 Multi-Mold nonviable air sampling cassette. Characteristic morphologies were observed by optical microscopy at a magnification of 600x. For each individual particle type observed, data was reported in particles per cubic meter of air (m3).

Due to various factors that influence uncertainty (media type, particle loading, staining, instrumentation and other variable aspects of the method), only the first two figures reported are considered to be significant. The area analyzed on each sample is 20%.

Disclaimer The results reported relate only to the samples tested or analyzed; the laboratory is not responsible for data collected by personnel who are not affiliated with the laboratory. Results reported in both structures/cm3 and structures/mm2 are dependent on the sample volume and area. These parameters are measured and recorded by non-laboratory personnel and are not covered by the laboratory's accreditation. Interpretation of these results is the sole responsibility of the client.

If further clarification of these results is needed, please call us. Thank you for allowing the staff at Lab/Cor, Inc. the opportunity to provide you with the analytical services.

Sincerely,



Derk Wipprecht
Laboratory Supervisor

Nonviable Air - Final Report

Job Number: 230474

Client: PBS Engineering + Environmental

Project Name: Oak Creek ES

Project No.: 21600.023 / 0012

Reference No.:

Report Number: 230474R01

Date Received: 5/18/2023

Lab/Cor ID:	S1			S2		
Sample No.:	S1			S2		
Sample Measure:	75 L			75 L		
Media Type:	Fungal-AllergencoD			Fungal-AllergencoD		
Analyst - Analysis Date:	DW - 5/22/2023			DW - 5/22/2023		
MRL:	67			67		
Scope - Magnification:	Olympus BHS - 600			Olympus BHS - 600		
Notes:						
Fungal Identification	Raw Count*	Total Count**	Total/m³	Raw Count*	Total Count**	Total/m³
Acremonium - like						
Ascospores, non-specified	4	20	267	1	5	67
Aspergillus/ Penicillium-like	2	10	133			
Basidiospores - like	4	20	267	2	10	133
Cercospora - like						
Cladosporium				1	5	67
Ganoderma						
Hyphal Fragments						
Myxo./Periconia/Smuts/Rusts	1	5	67			
Summary Total:	11	55	734	4	20	267

* - Raw Counts per 20% of Sample

** - Total Count per Sample

Nonviable Air - Final Report

Job Number: 230474

Client: PBS Engineering + Environmental

Project Name: Oak Creek ES

Project No.: 21600.023 / 0012

Reference No.:

Report Number: 230474R01

Date Received: 5/18/2023

Lab/Cor ID:	S3			S4		
Sample No.:	S3			S4		
Sample Measure:	75 L			75 L		
Media Type:	Fungal-AllergencoD			Fungal-AllergencoD		
Analyst - Analysis Date:	DW - 5/22/2023			DW - 5/22/2023		
MRL:	67			67		
Scope - Magnification:	Olympus BHS - 600			Olympus BHS - 600		
Notes:						
Fungal Identification	Raw Count*	Total Count**	Total/m³	Raw Count*	Total Count**	Total/m³
Acremonium - like						
Ascospores, non-specified	1	5	67			
Aspergillus/ Penicillium-like	1	5	67			
Basidiospores - like	4	20	267	2	10	133
Cercospora - like						
Cladosporium						
Ganoderma						
Hyphal Fragments						
Myxo./Periconia/Smuts/Rusts						
Summary Total:	6	30	401	2	10	133

* - Raw Counts per 20% of Sample

** - Total Count per Sample

Nonviable Air - Final Report

Job Number: 230474

Client: PBS Engineering + Environmental

Project Name: Oak Creek ES

Project No.: 21600.023 / 0012

Reference No.:

Report Number: 230474R01

Date Received: 5/18/2023

Lab/Cor ID:	S5			S6		
Sample No.:	S5			S6		
Sample Measure:	75 L			75 L		
Media Type:	Fungal-AllergencoD			Fungal-AllergencoD		
Analyst - Analysis Date:	DW - 5/22/2023			DW - 5/22/2023		
MRL:	67			67		
Scope - Magnification:	Olympus BHS - 600			Olympus BHS - 600		
Notes:						
Fungal Identification	Raw Count*	Total Count**	Total/m³	Raw Count*	Total Count**	Total/m³
Acremonium - like	27	135	1800			
Ascospores, non-specified	102	510	6800	56	280	3733
Aspergillus/ Penicillium-like						
Basidiospores - like	87	435	5800	61	305	4067
Cercospora - like	1	5	67			
Cladosporium	11	55	733	22	110	1467
Ganoderma	3	15	200			
Hyphal Fragments	1	5	67	2	10	133
Myxo./Periconia/Smuts/Rusts	1	5	67			
Summary Total:	233	1165	15534	141	705	9400

Reviewed by:

[Signature]
X

Derk Wipprecht
Laboratory Supervisor