PBS Engineering + Environmental

November 25, 2016

Chuck Doan
Yakima School District #7
104 N 4th Avenue
Yakima, WA 98902

Via email: doan.chuck@yakimaschools.org

Regarding: Fungal Sample Results
Blue Wall – Room 509 and Room 617
Eisenhower High School
Yakima, Washington
PBS Project: 64361.001

Dear Mr. Doan:

On November 21, 2016, PBS Engineering and Environmental Inc. (PBS), with assistance from Yakima School District (District) personnel, performed destructive investigations into suspect moisture impacted building materials around the upper windows, referred to as Curtain Wall Light Shelf according to project drawing sheet A8.3 detail 7, in Room 509 and Room 617 at Eisenhower High School in Yakima, Washington. PBS collected various suspect fungal samples during this destructive investigation work.

DESTRUCTIVE INVESTIGATION

District personnel used hand tools and manual methods to remove sections of the sill assembly of the upper windows in Room 509 and Room 617. The sill assembly consists of steel beam with a layer of fire-rated plywood, plywood blocking, and MDF. The MDF appears to have been edged along the finished aluminum window frame with a plastic finishing strip with a skimcoat layer and paint.

During the destructive investigation, PBS observed water impacted skimcoat and paint on the MDF. Removal of the MDF layer revealed that the MDF had been impacted by moisture (visible staining and loss of integrity). The plywood blocking and the plywood on the steel beam both appeared to have been impacted by moisture (visible staining). PBS utilized a Delmhorst BD-2100 pin-style moisture meter to determine moisture concentrations in the MDF, plywood blocking, and plywood on the steel beam. All three layers were determined to have elevated moisture concentrations.

Visible staining from moisture and visible suspect fungal growth was observed on all layers of the sills which were inspected in Room 509 and Room 617. Moisture impacts to the materials in Room 509 did not appear to be as significant as in Room 617. Tape-lift samples were collected from the plywood blocking and plywood on the metal beam in Room 617.

Following the destructive investigation and subsequent clean-up of the work areas, air sampling was performed for fungal particulate matter in Room 509 and Room 617. Additional samples were collected outside these two rooms and outside the building for comparison purposes. The sampling was performed to document possible fungal concentrations following the destructive investigation work

FUNGAL SAMPLING

Tape-Lift Samples

Tape-lift fungal samples were collected using Bio Tape-brand Surface Samples (slides). The tacky portion of these slides is pressed directly onto the sample area, typically an area with suspect visible fungal growth, resulting in possible fungal material adhering directly to the slide. Table 1 below summarizes the results of the tape-lift fungal sampling.

Table 1: Fungal Particulate Tape-Lift Sample Results

Sample Number	Sample Location	Spore Type	Relative Abundance
TL-01	Room 617, north window, north corner of sill	Hyphal fragments Aspergillus/Penicillium-like	High Moderate
TL-02	Room 617, north window, center of sill	Ascospores Hyphal fragments	High Moderate

Laboratory analysis of the tape-lift samples indicates fungi are present on plywood under the sill of the upper windows. Fungal particulate matter identified as high to moderate may be considered elevated beyond background levels.

Fungal Air Samples

Samples were collected at approximately 8:00p.m. during normal HVAC operations. Samples were collected using Allergenco-D sampling cassettes (spore traps) with a high-volume vacuum pump. Each sample was collected at a flow rate of 15 Liters per minute for ten (10) minutes (150 liters total per sample) from approximately four (4) feet above floor level. Samples were submitted under chain of custody to Lab/Cor, Inc. of Seattle, Washington for non-viable fungal particulate identification and quantification by optical microscopic methods. Table 2 below summarizes the laboratory results.

Table 2: Fungal Particulate Air Sample Results

Sample Number	Sample Location	Total Count
ST-06	Outdoor; comparison	3,325
ST-07	Hallway adjacent to Room 514T	100
ST-08	Room 509	55
ST-09*	2nd floor; commons area adjacent to Room 617	110
ST-10*	Room 617	5,110 (*5,040 of which is Pen./Asp. Also identified in TL-02*)

*PBS confirmed with the laboratory that the sample location descriptions for ST-09 and ST10 were switched. PBS requested the lab revise their laboratory report to reflect the correct sample locations.

With the exception of sample ST-10 which identified a high concentration of *Aspergillus*/*Penicillium*-like spores, total fungal particulate concentrations were lower indoors compared to outdoor fungal particulate concentrations. While, the predominant types of fungal particulates identified in the samples collected from indoors are also identified in the outdoor sample, some fungal particulates identified in the indoor samples are not identified in the outdoor sample.

In general, all the types of fungal particulate matter identified and their relative concentrations in the samples, both indoors and outdoors, are typical of the fungal particulate matter observed in samples collected from school sites throughout the region.

Refer to the attached laboratory data sheets for additional sample data.

CONCLUSIONS

Moisture impacted materials were observed on the sills of the upper windows in Room 509 and Room 617. Due to the construction of the window assemblies and adjacent interior finishes, PBS was not able to determine how the moisture penetrated the building envelope at this time.

High to moderate concentrations of fungal growth has been confirmed on the fire-rated plywood on the steel beam and associated plywood blocking of the sill in Room 617. The type of fungal material identified, particularly in sample TL-01 (*Aspergillus*/*Penicillium*-like), is often associated with moisture impacted building materials.

Airborne fungal particulate concentrations identified in the sample collected Room 617 indicate an elevated concentrations of *Aspergillus*/*Penicillium*-like spores. Airborne fungal particulate concentrations identified in the other indoor samples are significantly lower than outdoor concentrations. It should be noted that no elevated fungal concentrations were identified in samples collected from these same areas and analyzed prior to this destructive investigation (see PBS report dated 11/19/2016).

RECOMMENDATIONS

PBS recommends cleaning Room 617 using appropriate protocols such as wet wiping and HEPA vacuums as outlined in the EPA document *Mold Remediation in Schools and Commercial Buildings* (EPA 402-K-01-001). Once the room has been cleaned, air samples may be collected and analyzed to determine airborne fungal particulate concentrations prior to reoccupancy of the classroom.

PBS recommends further destructive investigation to assess moisture impacted building materials and interior finishes and determine the extent of possible fungal growth at window assemblies associated with the Blue Wall at Eisenhower High School. This may include dismantling exterior finishes and window assemblies to gain access to concealed materials.

LIMITATIONS

The findings and conclusions in this report are limited to the areas inspected as well as the professional judgment concerning the significance of the data gathered during the investigation. Only accessible areas and materials were examined during this investigation

Please feel free to contact me at 509.942.1600 or john.price@pbsenv.com with any questions or comments.

Sincerely,
PBS Engineering and Environmental Inc.

John Price
Sr. Project Manager - IH

Attachments: Laboratory Data Sheets
JP

Lab/Cor, Inc.
7619 6th Ave NW
Seattle, WA 98117

Final Report

Phone: (206) 781-0155
http://www.labcor.net

A Professional Service Corporation in the Northwest

Nonviable Surface

Job Number: **161015**
Client: **PBS Engineering + Environmental**
Project Name: IKE - Blue Wall
Project No.: 64361.001
Reference No.:

Report Number: 161015R01
Date Received: 11/23/2016

Lab/Cor ID:	**S1**	**S2**
Sample No.:	TL-01	TL-02
Description:	Window #1 - Location 1 at North End of Sill	Window #1 - Location 2 at Center of Sill
Sample Measure:	1 in²	1 in²
Media Type:	Fungal-BioTape	Fungal-BioTape
Analyst:	AT	AT
Analysis Date:	11/23/2016	11/23/2016
Notes:		

Fungal Identification	**Relative Abundance**	**Relative Abundance**
Ascospores	Trace	High
Aspergillus/ Penicillium-like	Moderate	Trace
Aureobasidium		Trace
Hyphal Fragments	High	Moderate

Reviewed by:

x

Ashley Tonge
Technician/Analyst

Trace = <10 counts in examined area
Low = <30% coverage of examined area
Moderate = 30% - 70% coverage of examined area
High = >70% coverage of examined area

161015

Fungal / Particulate Sample Chain of Custody Record

Lab/Cor, Inc
7619 6th Ave NW
Seattle, WA 98117

Office (206) 781-0155
Fax (206) 789-8424

mail@labcor.net
www.labcor.net

Client: PBS ENGINEERING AND ENVIRONMENTAL INC
Address: 400 BRADLEY BLVD., STE. 300
City, State, Zip: RICHLAND, WA 99352
Contact: JOHN PRICE
Phone: 208-869-1150 Fax: —
Email: john.price@pbsenv.com
Other Info: —

Analysis Type:
Nonviable Options:
X Fungal ID
___ Fungal & Particulate ID
___ Particulate ID
___ Quantitative Analysis *(Total Count)*
X Qualitative Analysis *(Relative Abundance)*
Viable Options:
___ Complete Analysis
___ Genera Only ___ Stachy Only

Turnaround Time:
X 6 hr **RUSH***
___ 24 hours*
___ 48 hours
___ 3 days *(NV Std)*
___ 5 days
___ Viable *(7-10 days)*

Project Name: IKE - BLUE WALL **Project Number:** 64361.001 **P.O. Number:** —

		Sample Information												Sampling Information						
		Sample Type									Media Type			Sample Date	Sample Time		Sample Flow Rate			Total Volume / Area
		Air		Swab		Bulk		Dust		Tape										
Sample #	Sample Description	NV	V	NV	V	NV	V	NV	V	NV	MEA	Stachy	Other		On	Off	Start	End	Avg	
TL-01	WINDOW #1 - LOCATION 1 @ NORTH END OF SILL									✓			✓	11/21/16						1-in²
TL-02	WINDOW #1 - LOCATION 2 @ CENTER OF SILL									✓			✓	11/21/16						1-in²

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Seattle, WA 98117

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http://www.labcor.net

Final Report

A Professional Service Corporation in the Northwest

Nonviable Air

Job Number: **161017**
Client: **PBS Engineering + Environmental**
Project Name: IKE - Blue Wall
Project No.: 64361.001
Reference No.:

Report Number: 161017R02
Date Received: 11/23/2016

Lab/Cor ID:	**S1**	**S2**
Sample No.:	ST-06	ST-07
Description:	Exterior - Court Yard West End	Interior - Main Hall Across from Room 514T
Sample Measure:	150 L	150 L
Media Type:	Fungal-AllergencoD	Fungal-AllergencoD
Analyst - Analysis Date:	AT - 11/23/2016	AT - 11/23/2016
MRL:	33	33
Scope - Magnification:	Olympus BHT-BH2 - 600	Olympus BHT-BH2 - 600
Notes:		

Fungal Identification	**Raw Count***	**Total Count****	**Total/m³**	**Raw Count***	**Total Count****	**Total/m³**
Alternaria						
Ascospores	58	290	1933	1	5	33
Aspergillus/ Penicillium-like	38	190	1267			
Basidiospores	545	2725	18167	18	90	600
Bipolaris sp.						
Cladosporium	23	115	767	1	5	33
Epicoccum						
Hyphal Fragments						
Myxo./ Periconia/ Smuts	1	5	33			
Ulocladium						
Summary Total:	**665**	**3325**	**22167**	**20**	**100**	**666**

* - Raw Counts per 20% of Sample
** - Total Count per Sample

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Nonviable Air

Job Number: 161017
Client: PBS Engineering + Environmental
Project Name: IKE - Blue Wall
Project No.: 64361.001
Reference No.:

Report Number: 161017R02
Date Received: 11/23/2016

Lab/Cor ID:	**S3**	**S4**
Sample No.:	ST-08	ST-09
Description:	Interior - Room 509 South Wall	Interior - 2nd Floor Commons
Sample Measure:	150 L	150 L
Media Type:	Fungal-AllergencoD	Fungal-AllergencoD
Analyst - Analysis Date:	AT - 11/23/2016	AT - 11/23/2016
MRL:	33	33
Scope - Magnification:	Olympus BHT-BH2 - 600	Olympus BHT-BH2 - 600
Notes:		

Fungal Identification	**Raw Count***	**Total Count****	**Total/m³**	**Raw Count***	**Total Count****	**Total/m³**
Alternaria						
Ascospores				1	5	33
Aspergillus/ Penicillium-like	6	30	200	7	35	233
Basidiospores	3	15	100	10	50	333
Bipolaris sp.				1	5	33
Cladosporium				2	10	67
Epicoccum				1	5	33
Hyphal Fragments	2	10	67			
Myxo./ Periconia/ Smuts						
Ulocladium						
Summary Total:	**11**	**55**	**367**	**22**	**110**	**732**

* - Raw Counts per 20% of Sample
** - Total Count per Sample

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Nonviable Air

Job Number: 161017
Client: PBS Engineering + Environmental
Project Name: IKE - Blue Wall
Project No.: 64361.001
Reference No.:

Report Number: 161017R02
Date Received: 11/23/2016

Lab/Cor ID:	**S5**	
Sample No.:	ST-10	
Description:	Interior - Room 617 South Wall	
Sample Measure:	150 L	
Media Type:	Fungal-AllergencoD	
Analyst - Analysis Date:	AT - 11/23/2016	
MRL:	33	
Scope - Magnification:	Olympus BHT-BH2 - 600	
Notes:		

Fungal Identification	Raw Count*	Total Count**	Total/m³	Raw Count*	Total Count**	Total/m³
Alternaria	1	5	33			
Ascospores						
Aspergillus/ Penicillium-like	1008	5040	33600			
Basidiospores	4	20	133			
Bipolaris sp.						
Cladosporium	4	20	133			
Epicoccum						
Hyphal Fragments	2	10	67			
Myxo./ Periconia/ Smuts	2	10	67			
Ulocladium	1	5	33			
Summary Total:	**1022**	**5110**	**34066**			

Reviewed by:

x

Ashley Tonge
Technician/Analyst

* - Raw Counts per 20% of Sample
** - Total Count per Sample

161017

Fungal / Particulate Sample Chain of Custody Record

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Client: PDS ENGINEERING AND ENVIRONMENTAL
Address: 400 BRADLEY BLVD., STE. 300
City, State, Zip: RICHLAND, WA 99352
Contact: JOHN PRICE
Phone: 208-869-4150 Fax: —
Email: john.price@pdsenv.com
Other Info:

Analysis Type:
Nonviable Options:
X Fungal ID
___ Fungal & Particulate ID
___ Particulate ID
✓ Quantitative Analysis *(Total Count)*
___ Qualitative Analysis *(Relative Abundance)*
Viable Options:
___ Complete Analysis
___ Genera Only ___ Stachy Only

Turnaround Time:
X 6 hr RUSH*
___ 24 hours*
___ 48 hours
___ 3 days *(NV Std)*
___ 5 days
___ Viable *(7-10 days)*

Project Name: IKE- BLUE WALL **Project Number:** 64361.001 **P.O. Number:** —

		Sample Information												Sampling Information						
		Sample Type									Media Type			Sample Date	Sample Time		Sample Flow Rate			Total Volume / Area
		Air		Swab		Bulk		Dust		Tape										
Sample #	Sample Description	NV	V	NV	V	NV	V	NV	V	NV	MEA	Stachy	Other		On	Off	Start	End	Avg	
ST-06	EXTERIOR; COURT YARD WEST END	✓											✓	11/21/16	2040	2050	15	15	15	150L
ST-07	INTERIOR; MAIN HALL ACROSS FROM RM 514T	✓											✓	11/21/16	2000	2010	15	15	15	150L
ST-08	INTERIOR; ROOM 509 SOUTH WALL	✓											✓	11/21/16	2010	2020	15	15	15	150L
ST-10	INTERIOR; ROOM 617 SOUTH WALL	✓											✓	11/21/16	2012	2022	15	15	15	150L
ST-09	INTERIOR; 2nd FLOOR COMMONS	✓											✓	11/21/16	2025	2035	15	15	15	150L

Corrected by John Price at 1405 on 11/25/16

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