Make sure you have read the attached document. A vote will be taken to determine if this document can be added to the Safety Manual.

Our focus will be on sharing information learned from the recent Mt. Graham Wildfire and valuable training awareness of particulate hazards from forest fire smoke, Hantavirus, allergenic moth scales and the like. This information is useful for all projects and personnel even if you do not work on a telescope site.

LOCATION: Steward Observatory N305
TIME: 9:00 AM – 11:00 AM

AGENDA:
9:00 – 9:20 AM – Welcome and Safety Update – Jeffery Kingsley, Associate Director, Steward Observatory

9:20 -9:35 AM - Air Quality Update for Steward Observatory, Bldg. 65 – Steve Holland, Chief Risk Manager, Risk Management Services & TBD Building 65 Task Force Member

9:35 - 10:00 AM – Respiratory Protection-Refresher Update for Telescope sites – Julia Rosen, Health Safety Officer, Risk Management Services

10:00 – 10:45 AM – Lessons Learned – The 2017 Mt. Graham Wildfire- Eric Buckley, Director, MGIO and David Carroll, Engineer Safety Manager, LBTO

10:45- 11:00 AM – Vote to add Wildland Fire Safety Section to the SOSC Manual– Dale Webb, Safety Manager, Steward Observatory. Update on National Safety Conference – Cory Knop, MMTO

NAME	WORK GROUP
Armando Aguard	MGTO
Shane OSEN	MGIO
ERIC BUCKLEY	MGIO
Dan Caywood	OSC
Alyson Ford	ARO
Paul Gabor	Vatican Obs
DALE A Webb	SO
Jeff Urban	RFCML
KURT KENAGY	RFCML
Mario Rascon	ETM
PAUL MASEMAN	SOML
Karen Kenagy	SOML
Bill Wood	S.O.
Jim Grantham	Mtn Ops
Cory Knop	MMT
BRIAN COMISSO	MMT
Teresa Galota	VATT
Teresa Lappin	ITL
MARK BUSLEWICZ	SOBO
STEVE HOLLAND	RMS
Julia Roge	RMS
Gabriel Coronado	SOBO

SOSC Meeting Tuesday, November 28, 2017

NAME	WORK GROUP
THOMAS WATSON	BUSINESS OFFICE
David Carroll	CBTO
Jeffrey S. Kingsley	UASO
CHAD BENDER	SO
MATT RADEMACHER	STEWARD SOLAR LAB
Thomas Folkers	ARO
Lorraine Santiago	Risk management.
Luis Carlos Davis	OIA

Safety and You!

Steward Observatory

THE UNIVERSITY OF ARIZONA
TUCSON ARIZONA

Welcome to the 30th Steward Observatory Safety Committee Meeting

Room N305 November 28, 2017

9:00 AM

Agenda

THE UNIVERSITY OF ARIZONA
TUCSON ARIZONA

LOCATION: Steward Observatory N305
TIME: 9:00 AM – 11:00 AM

AGENDA:

9:00-9:20 **Welcome and Safety Update** – *Jeffery Kingsley, Associate Director, Steward Observatory*

9:20-9:35 **Air Quality Update for Steward Observatory, Bldg. 65** – *Steve Holland, Chief Risk Manager, Risk Management Services & TBD Building 65 Task Force Member*

9:35-10:00 **Respiratory Protection-Refresher Update for Telescope sites** – *Julia Rosen, Health Safety Officer, Risk Management Services*

10:00-10:45 **Lessons Learned – The 2017 Mt. Graham Wildfire**- *Eric Buckley, Director, MGIO and David Carroll, Engineer Safety Manager, LBTO*

10:45-10:50 **Vote to add Wildland Fire Safety Section to the SOSC Manual** – *Dale Webb, Safety Manager, Steward Observatory*

10:50–11:00 **Update on National Safety Conference** – *Cory Knop, MMTO Engineer*

Welcome & Update

I. Defining Safety Training, Train, Documentation and Compliance

II. SO Annual Evaluations are including:

① Safety questionnaire
② Define safety training
③ Documents current compliance
④ Documents plans for full compliance
⑤ Requesting employee identify safety concerns

III. Plan to monitor and report compliance by SO and defined groups in SOSC Semi-Annual Meetings

- **SO overall compliance is 69%**
- **Groups with highest compliance:** CSG 99%, RFCML Integration 99% & RFCML Casting 97%

IV. Faculty, students and post docs safety process is being developed

Welcome & Update

Two major focus areas for 2018

I. Defensive Driving Training

Listed below is the directive by Risk Management Services. Since they use the word **MUST,** it is not a choice to opt out if one drives for University Business. All UA employees, students, and volunteers driving on University business must take this class. The training is good for 4 years and then you must re-certify. The class is in four sections and can be reached through UAccess.arizona.edu.

https://risk.arizona.edu/training/defensive-driving

II. Safety Data Sheets Management (SDS) focus on ensuring that they are up to date and near chemical cabinets. Excellent example is MMT see Cory Knop.

Safety and You!

Steward Observatory Safety Committee
November 28, 2017

Update on Indoor Air Quality Issues

Recent Actions

- Four quarterly environmental sampling events scheduled
- Testing performed by RMS, includes surface wipes and air samples, analysis by Quantitative Polymerase Chain Reaction (qPCR)
- Testing coupled with visual inspection to look for moisture problems
- Schedule intended to evaluate IAQ impacts from seasonal variations
    - Q1 – June 28, 2017
    - Q2 – October 12, 2017
    - Q3 – January 2018 – date TBD
    - Q4 – April 2018 – date TBD

Q1 results

- Q1 – four species identified
  - Aureobasidium pollulans (Group 1)
  - Cladosporum sphareospermum (Group 1)
  - Aspergillus niger (Group 1)
  - Cladosporum cladosporiodes I (Group 2)
- ERMI scores for surface wipes were 3.1, 2.6, 3.4, 0.8 for areas tested. Scores of 0-5 are Level 3 or moderate likelihood of mold issue
- Air sample results were generally low values and unremarkable
- Visual inspection identified some water damaged ceiling tiles, which were scheduled for replacement

Next Step – Qualtrix Building Occupant Survey

- Anonymous survey to measure building occupant IAQ perceptions
- Being developed by PhD graduate student in Epidemiology – COPH
- Draft developed, currently being finalized
- Survey expected to be administered in early 2018

RISK MANAGEMENT SERVICES
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THE UNIVERSITY OF ARIZONA

MEMORANDUM

DATE: July 24, 2017

TO: Steward Observatory Task Force

FROM: Risk Management Services

SUBJECT: Steward Observatory Sampling Event- (1st Quarter)

This report describes the first of 4 sampling events that will take place during the next year in Building 65, Steward Observatory. The purpose of this assessment was to monitor the indoor air quality of the building during different seasons of the year. This is due to a previous indoor air quality history including mold existence and water intrusion, as well as occupant concerns.

During the first sampling event we used the following protocol:

Air samples will be collected and analyzed using Quantitative Polymerase Chain Reaction (qPCR) methods to identify individual mold species which might be present.
Surface swab samples will be collected concurrently with air samples, and analyzed using qPCR analysis techniques. Surface sample results will only be utilized to compare changing conditions between sampling events, and evaluate any trends over time. Seasonal variations are expected, particularly during periods of monsoon-related moisture and heavy rainfall.
These samples are going to be compared with previous sampling events to be able to monitor and analyze building changes overtime.
On the day of sampling, RMS will contact Steward Observatory Building manager and will do a visual inspection of the building to determine any moisture issue or building concerns.

SAMPLING DESCRIPTION AND LOCATIONS

The quarterly sampling events will include the collection of interior air samples and surface swab samples, both analyzed by quantitative real-time polymerase reaction.

Quantitative real-time polymerase chain reaction (qPCR) analysis can be used to identify mold species collected from swab or air samples. In the qPCR process, DNA is extracted from a sample, combined with a primer and probe mixture, heated and cooled in multiple amplification cycles creating fluorescent signals, which are then counted. Mold species can be identified within a few days rather than weeks when using the culture-based methods. The Environmental Relative Moldiness Index (ERMI) was developed by the US EPA to identify 36 mold species present in typical mold-affected homes. The ERMI custom qPCR panel will be requested from the analytical laboratory to quantify mold species in samples from Building 65.

For qPCR air sampling, samples will be collected using a high volume air pump calibrated with a primary source calibration unit to draw up to approximately 15 liters of air per minute. The pump(s) will be placed securely on the floor and an approximately 5-foot length of plastic tubing will be attached to the pump and suspended to a 4.5-foot height via a tripod. A 37mm qPCR sample collection cassette will be placed at the end of the tubing. Following qPCR sample collection recommendations, the pump will be run for approximately 240 minutes to collect approximately 3600 liters of air per sample. The relative humidity percent and temperature will be documented for each sample collection location. The sample number and total volumes will be documented onto a chain-of-custody form and transported along with the samples to a NVLAP certified lab for the ERMI custom qPCR panel.

qPCR samples are going to be taken from two (2) interior locations. One of the interior location samples will be taken from the main hallway in the 3rd floor. This area was chosen because it is centrally located area, representative of the building. The other sample is going to be taken in Room N-134 due to previous indoor air quality problems. In addition, one exterior/reference sample will be collected between the new and old building. This sample will be collected at the same time as the interior samples. The sample collection locations will remain consistent throughout the duration of sampling.

Surface swab samples – Concurrent with the day quarterly air sampling is conducted, RMS will collect surface samples in the building, using a 6x6 inch template and moistened filter media, which will be containerized and labelled with a unique sample number for qPCR analysis as well. The sample numbers will be documented onto a chain-of-custody form and transported along with the air samples to a NVLAP certified lab for analysis using the ERMI custom qPCR panel. Surface samples will only be collected from smooth vertical wall surfaces, at least five feet above the walking surface in the designated locations. Surface swab sample locations will include the following: Room N134 (basement laboratory), room 162 (basement office), room 490 (fourth floor office), in the 3rd floor main hallway as a centrally located area representative of the building and an exterior sample between the two buildings. The relative humidity percent, temperature and sampling time will also be documented for each sample collection location.

Written results of all testing will be compiled by RMS for distribution to the Steward Observatory Building Air Quality Task Force and Steward Observatory Management within five working days of receipt by RMS.

SURFACE SWAB RESULTS

The first sampling event took place on June 28th, 2017. Risk Management used Forensic Analytical Laboratories to analyze the samples.

As the results were received, Risk management decided to compare the swab results of two previous sampling events with ours. The previous sampling events were not performed by us, but by third parties respectively. Therefore, the sampling protocols were not the same and we did not sample in the same exact spots. Although, we tried to do the best comparison possible to see if we could notice any general changes in the indoor air quality of the

building. We should be able to give a more concrete result when we perform the rest of our sampling events in the future following the same sampling protocol.

We received our surface swab samples and found that only three species of mold were present in the 5 areas we chose to sample. (Refer to results in Appendices) Therefore, we tabulated and compared the spore equivalents of the only four (4) mold species found on this sampling areas with the spore equivalents of the previous sampling events areas. You can see the result comparisons in Table 1:

Table 1: Steward Observatory Swab Sampling ERMI Score Comparison between Environmental Analytics, Western Technologies and Risk Management

Stewart Observatory Swab Sampling Ermi Score Comparisson										
Date	Analysis	Company	Location	Mold Species Group 1	Sp/Eq	Mold Species Group 2	Sp/Eq	Mold Species Group 1	Sp/Eq	ERMI SCORE
3/29/2016	ERMI	Environmental Analytics	Main Lobby/3rd Floor	Aureobasidium Pullulans	2100	Cladiosporum Sphareospermum/ Cladosporoides I	74	Aspergillus Niger	240	11.15
8/9/2016		Western technologies			No sample		No Sample		No sample	Other Format
6/28/2017		Risk Management (6"x6" swabs)			400		140		144	2.6
3/29/2016	ERMI	Environmental Analytics	Room N-134	Aureobasidium Pullulans	220	Cladiosporum Sphareospermum/ Cladosporoides I	320	Aspergillus Niger	64	11.71
8/9/2016		Western Technologies			1070		3100		ND	Other Format
6/28/2017		Risk Management			306		217		ND	3.1
3/29/2016	ERMI	Environmental Analytics	Room 164/162	Aureobasidium Pullulans	570	Cladiosporum Sphareospermum/ Cladosporoides I	42	Aspergillus Niger	22	8.62
8/9/2016		Western technologies			1520		<10		82	Other format
6/28/2017		Risk Management			31		74.4		ND	3.4
3/29/2016	ERMI	Environmental Analytics	Room 490	Aureobasidium Pullulans	2500	Cladiosporum Sphareospermum/ Cladosporoides I	910	Aspergillus Niger	510	16.13
8/9/2016		Western technologies			n/a		188		284	Other Format
6/28/2017		Risk Management			186		31		n/a	0.8
3/29/2016	ERMI	Environmental Analytics	Outdoors	Aureobasidium Pullulans	1700	Cladiosporum Sphareospermum/ Cladosporoides I	430	Aspergillus Niger	48	-0.14
8/29/2016		Western technologies			No Sample		No sample		No sample	No sample
6/28/2017		Risk Management			7		ND		ND	0.8

Legend:

ERMI Score	Level or Risk	Likelihood of Mold Problem
-10 to -4	Level 1	Lowest
-4 to 0	Level 2	Lower
0 to 5	Level 3	Moderate
5 to 20	Level 4	High

Group I Species: 26 species of mold commonly associated with water damage
Group II Species: 10 species common to indoor environments

As mentioned in the sampling protocol, the ERMI score is determined by analyzing dust samples by qPCR for 36 species of mold divided into 2 groups. Group 1 is composed of 26 species of molds commonly associated with water damage. Group 2 is composed of 10 species common to indoor environments. The ERMI score is generated by comparing the logarithmic concentration (Log Conc) difference in Group 1 and Group 2 molds.

As for Risk Management results, the 4 mold species found in the swab sample areas were Aureobasidium Pollulans (Group 1), Cladosporum Sphareospermum (Group 1), Cladosporum Cladosporoides I (Group 2) and Aspergillus Niger (Group 1).

In Room N-134, we found Aureobasidium Pollulans (Group 1), Cladosporum

Sphareospermum (Group 1), and Cladosporum Cladosporoides I (Group 2). The ERMI Score was 3.1, considered by the lab as a Moderate Level 3 (Likelihood of Mold Problem). We can see that this ERMI score is much lower than the HERTSMI-2 score (11.31) calculated in 03/29/16 by Environmental Analytics.

In the 3rd Floor Main Hallway, we found Aureobasidium Pollulans (Group 1), Cladosporum Cladosporoides I (Group 2) and Aspergillus Niger (Group 1). The ERMI Score was 2.6, considered by the lab as a Moderate Level 3 as well. As for the comparison, we used the Main Lobby (1st Floor) samples taken by Environmental Analytics since we did not sample in the same exact locations. They had an 11.18 HERTSMI-2 Score.

In Room 162, we found Aureobasidium Pollulans (Group 1) and Cladosporum Sphareospermum (Group 1). The ERMI Score was 3.4, considered by the lab as a Moderate Level 3 as well. As for the comparison, we used Room 164 samples taken by Environmental Analytics. Even though we did not sample in the same exact location, these 2 rooms are right next to each other. They had an 8.62 HERTSMI-2 Score.

In Room 490, we found Aureobasidium Pollulans (Group 1) and Cladosporum Cladosporoides I (Group 2). The ERMI Score was 0.8, considered by the lab as a Moderate Level 3 (Likelihood of Mold Problem). We can see that this ERMI score is much lower than the HERTSMI-2 score (16.13) calculated by Environmental Analytics.

As for the outdoor swab samples, we found Aureobasidium Pollulans (Group 1). The ERMI Score was 0.8, considered by the lab as a Moderate Level 3 (Likelihood of Mold Problem). We can see that this ERMI score is slightly higher than the HERTSMI-2 score (-0.14) calculated by Environmental Analytics. Even though the HERTSMI-2 score is slightly lower, it is still considered as Moderate Level 3.

Even though we cannot conclude anything concrete from this analysis and comparison, we can say that the ERMI scores from the swab samples taken by Risk Management in 06/28/17 are significantly lower than the HERTSMI-2 ones taken by Environmental Analytics on 03/29/16. Even though the analysis used by both events has different names, they do have the same genetic test. In addition, the HERTSMI-2 looks for the presence of only five particularly dangerous species of mold: Aspergillus penicilloides, Aspergillus versicolor, Chaetomium globosum, Stachybotrys chartarum, and Wallemia sebi. We did not find any of these in our swab surface sampling results.

As for our results, we saw a greater ERMI Score in mold species in the rooms tested inside the building than in the outside area. Aureobasidium pullulans was the only mold species found outside, even though it is a mold species commonly associated with water damage. It is not uncommon that we found that same species in all of the mold swab samples we took inside the building.

Cladosporium Cladosporioides I was found in some rooms, but we know that this species is common to the indoor environments.

For Cladosporium Sphaerospermum and Aspergilus Niger, they are species commonly found in the air. The ERMI Score lab results tells us that there may have been water damage in the past or present.

We will need to continue working on the building, inspecting it, and keep our sampling protocol as stated to be able to give a concrete conclusion from these results.

AIR SAMPLE RESULTS

qPCR air sampling was also performed as part of the Risk Management sampling protocol. We took qPCR air samples in two areas inside the building (Room N-134 and in the 3rd Floor Hallway) and one area outside the building. (Refer to results at Appendices).

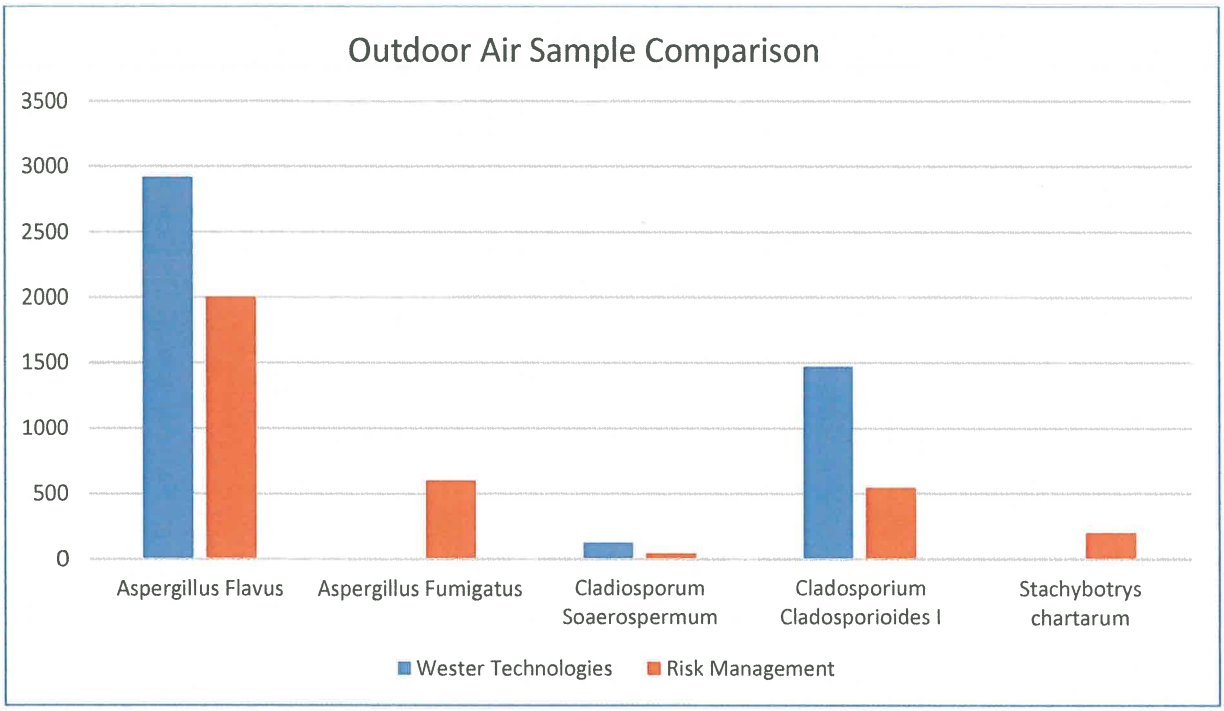
The air sample results from the lab do not have an ERMI Score. Forensics Analytical does not perform an ERMI Score equation for qPCR air samples. Their lab has only designed ERMI scores for swab samples. Their report shows the same quantified 36 species, but without the final ERMI score.

We cannot compare air sample results inside the building with past sampling events, because air samples were not taken in the same or similar places and/or using the same sampling technique.

The highest mold species concentration found in rooms N-134 and the 3rd Floor Hallway were Aspergillus flavus, Aspergillus fumigatus, and Cladiosporum sphaerospermum. All of these species except Cladiosporum sphaerospermum were all found outside at lower spore counts than inside.

The only results we can compare are the outdoor air sample results from Western Technologies and ours, even though it does not add much value to our goal. Although, the highest count of mold species from the Risk Management sampling found outside were Aspergillus flavus, Aspergillus fumigatus, Cladiosporum sphaerospermum and Stachybotrys chartarum. To re-assure, we did not find Stachybotrys inside the building. Please see Chart 1 below to see the difference of Risk Management Results and Western Technologies:

Chart 1: Outside Air Sample Comparison Western technologies vs. Risk Management



We did not find an extreme change in the species spore count outside during the two sampling events. Changes may have occurred because of a difference in temperature and humidity, since samples were taken in different seasons. Please see Table 2 for Temperature and Humidity Results.

Table 2: Temperature and Humidity Sample Areas 06/28/17- Risk Management

Date	Location	Temperature & Relative Humidity before Sampling	Temperature & Relative Humidity after Sampling
06/28/17	Outdoors	84°F/ 37.5%	99.9°F/ 15.5%
06/28/17	Room N-134	74.6°F/ 43%	77.4°F/ 30.8%
06/28/17	3rd Floor Main Hallway	75.3°F/ 39.9%	75°F/ 33.8%
06/28/17	Room -162	75.4°F/ 39.1%	Not Taken (Only Swab)
06/28/17	Room 490	77.7°F/ 40%	Not Taken (Only Swab)

VISUAL BUILDING INSPECTION

As part of the sampling protocol, a building inspection along with FM from Steward Observatory was performed the same day. The purpose was to look for any sign of water intrusion or water damages in the building.

During the inspection Risk management found signs of previous water intrusions on 23 areas around the building where water stained ceiling tiles were spotted. Risk Management is not aware if the water leaks are old and have been previously fixed. Since the ceiling tiles have not been changed there is no way to find out than to change them out. Therefore, all of the stained ceiling tiles were reported to FM immediately to take action. The reported water stained ceiling tiles were in the following rooms: N208C, 353-A, 356-B, 356-A, 362, 366, 374-C, 374-A, 374, 374-D, 486, 450, N-503, N-507, N-526, N-535, 562, 571, 579, 580-F, 580-G, 580-H, and 581.

A water leak was found in the sink bottom shelf of Room N-134. This has been a problem in the past and has had to be replaced. This finding was notified to FM as well.

Our continuing plan consists in inspecting the building after they have replaced the ceiling tiles to make sure the leaks have been fixed. If not a corrective action will be assigned.

CONCLUSION

Risk Management first sampling event results show lower ERMI scores than past sampling events in similar areas. A concrete conclusion is not given since the sampling protocol Risk Management used is different from the past sampling protocols. We can say that according to the building inspection, there has been water intrusion events in the past that needs to be addressed. Our main goal is to fix the root cause of our problem, which is keeping the building from having water infiltrations, fixing them immediately and continue to monitor it. Risk Management will continue to sample after a few months to be able to give a concrete conclusion while keeping up the work in the building.

Appendices

Forensic Analytical Laboratories

Preliminary Report

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Client ID:	CH1000
Report Number:	F121057
FALI Job ID:	CH1000-5469
Date Received:	06/29/17
Date Analyzed:	07/05/17
Date Printed:	07/05/17
First Reported:	NA

Lab Number	**40170313**
Sample ID	**Room N-134**
Location	

Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample Date	6/28/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	306	310	52.7	2.48
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	217	220	37.3	2.33
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**581**	**580**		
Sum of Logs				**4.81**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	58	58	10	1.76
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**581**	**580**		
Sum of Logs				**1.76**
LOD				**1**

ERMI™ Score

GROUP 1	**4.81**
GROUP 2	**1.76**
ERMI™ SCORE †	**3.1**
LEVEL	**Level 3**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Forensic Analytical Laboratories

Preliminary Report

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Client ID:	CH1000
Report Number:	F121057
FALI Job ID:	CH1000-5469
Date Received:	06/29/17
Date Analyzed:	07/05/17
Date Printed:	07/05/17
First Reported:	NA

Lab Number	**40170314**
Sample ID	**3rd Floor Main Hallway**
Location	

Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample Date	6/28/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	144	140	21	2.15
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	401	400	58.4	2.6
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**686**	**690**		
Sum of Logs				**4.75**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	141	140	20.6	2.14
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**686**	**690**		
Sum of Logs				**2.14**
LOD				**1**

ERMI™ Score

GROUP 1	**4.75**
GROUP 2	**2.14**
ERMI™ SCORE †	**2.6**
LEVEL	**Level 3**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F121057
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/05/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	40170315
Sample ID	Room-162
Location	

Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample Date	6/28/2017
Weight/Area	Not Indicated
Media	

Group 1				
Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	31	31	25.6	1.49
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	90	90	74.4	1.95
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**121**	**120**		
Sum of Logs				**3.44**
LOD				**1**

Group 2				
Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	ND	ND	-	-
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**121**	**120**		
Sum of Logs				**2.14**
LOD				**1**

ERMI™ Score	
GROUP 1	3.44
GROUP 2	2.14
ERMI™ SCORE †	3.4
LEVEL	Level 3

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Forensic Analytical Laboratories

Preliminary Report

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F121057
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/05/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40170316**
Sample ID	**Room 490**
Location	

Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample Date	6/28/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	186	190	85.7	2.26
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**217**	**220**		
Sum of Logs				**2.26**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	31	31	14.3	1.49
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**217**	**220**		
Sum of Logs				**1.49**
LOD				**1**

ERMI[sm] Score

GROUP 1	**2.26**
GROUP 2	**1.49**
ERMI[sm] SCORE †	**0.8**
LEVEL	**Level 3**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Client ID: CH1000
Report Number: F121057
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/05/17
First Reported: NA

Total Samples Submitted: 4
Total Samples Analyzed: 4

Explanations:

ND	None Detected
-	Not Applicable

Notes:
This test is performed pursuant to licensing arrangements with Roche Molecular Systems, Inc. and Applied Biosystems.
Spore Equivalents (Sp Eq) represent all cells pertaining to the identified species which contain DNA, including hyphal fragments.

The Environmental Relative Moldiness Index (ERMI^{SM}) is a screening tool developed by the USEPA to assist in predicting the relative "mold burden" on a given home. The ERMI^{SM} was developed by screening dust samples from 1096 homes across the United States as part of the 2006 HUD American Healthy Home Survey, and ranking these homes in a RMI (Relative Moldiness Index). The ERMI^{SM} score is determined by analyzing dust samples by quantitative PCR for 36 species of mold divided into two groups. Group I is composed of 26 species of molds commonly associated with water damage. Group II is composed of 10 species common to indoor environments. By comparing the difference in Group I and Group II molds, an ERMI^{SM} score is generated which can then be compared to the nationwide RMI.

ERMI^{SM} Score	Level or Risk	Likelihood of Mold Problem in Home
-10 to -4	Level 1	Lowest
-4 to 0	Level 2	Lower
0 to 5	Level 3	Moderate
5 to 20	Level 4	High

Guidelines For Interpretation:
No accepted quantitative regulatory standards currently exist by which to assess the health risks related to mold exposure. Molds have been associated with a variety of health effects and sensitivity varies from person to person.

Several organizations, including: the American Conference of Governmental Industrial Hygienists (ACGIH); the American Industrial Hygiene Association (AIHA); the Indoor Air Quality Association (IAQA); the United States Environmental Protection Agency (USEPA); the Centers for Disease Control (CDC), as well as the California Department of Health Services (CADHS), have all published guidelines for assessment and interpretation of mold resulting from water intrusion in buildings.

FALI reports solely the organisms observed on the sample(s). The limit of detection is based on observing one spore/colony per area analyzed. This is not an inclusive list of the fungal types identified in the microbiology laboratory.

The data presented in this report has not been subject to final review and is therefore subject to change.
The recipient assumes full responsibility for the use and interpretation of this preliminary data.

Nick Hopkins, Microbiology Laboratory Supervisor, Hayward Laboratory

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Forensic Analytical Laboratories

Preliminary Report

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Client ID:	CH1000
Report Number:	F121247
FALI Job ID:	CH1000-5469
Date Received:	07/12/17
Date Analyzed:	07/17/17
Date Printed:	07/17/17
First Reported:	NA

Lab Number	**40170615**
Sample ID	**67-070717-05**
Location	Outside Bldg. 65 swab

Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Date	7/7/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	7	7	100	0.84
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**7**	**7**		
Sum of Logs				**0.840**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	ND	ND	-	-
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**7**	**7**		
Sum of Logs				
LOD				**1**

ERMI[SM] Score

GROUP 1	**0.840**
GROUP 2	
ERMI[SM] SCORE †	**0.8**
LEVEL	**Level 3**

† ERMI[SM] Score = Group 1 - Group 2

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F121247
FALI Job ID: CH1000-5469
Date Received: 07/12/17
Date Analyzed: 07/17/17
Date Printed: 07/17/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Total Samples Submitted: 1
Total Samples Analyzed: 1

Explanations:

ND	None Detected
-	Not Applicable

Notes:
This test is performed pursuant to licensing arrangements with Roche Molecular Systems, Inc. and Applied Biosystems.
Spore Equivalents (Sp Eq) represent all cells pertaining to the identified species which contain DNA, including hyphal fragments.

The Environmental Relative Moldiness Index (ERMI^{SM}) is a screening tool developed by the USEPA to assist in predicting the relative "mold burden" on a given home. The ERMI^{SM} was developed by screening dust samples from 1096 homes across the United States as part of the 2006 HUD American Healthy Home Survey, and ranking these homes in a RMI (Relative Moldiness Index). The ERMI^{SM} score is determined by analyzing dust samples by quantitative PCR for 36 species of mold divided into two groups. Group I is composed of 26 species of molds commonly associated with water damage. Group II is composed of 10 species common to indoor environments. By comparing the difference in Group I and Group II molds, an ERMI^{SM} score is generated which can then be compared to the nationwide RMI.

ERMI^{SM} Score	Level or Risk	Likelihood of Mold Problem in Home
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The data presented in this report has not been subject to final review and is therefore subject to change.
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Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F121056
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/13/17
First Reported: 07/13/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40170309				40170310				40170311			
Sample ID	90-062817-01				90-062817-02				90-062817-03			
Location	Room N-134				3rd floor hallway				Outside between 2 buildings			
Sample Date	06/28/17				06/28/17				06/28/17			
Volume	4044.6 L				3608.9 L				3863.3 L			
Organism	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3
Acremonium strictum	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Alternaria alternata	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Aspergillus flavus	202	47	0.25	50	ND	-	0.28	ND	2000	47.6	0.26	520
Aspergillus fumigatus	<10	0.9	0.25	<2.5	12	1.2	0.28	3	598	14.3	0.26	150
Aspergillus niger	17	3.9	0.25	4	19	1.9	0.28	5	185	4.4	0.26	48
Aspergillus ochraceus	ND	-	0.25	ND	<10	0.1	0.28	<2.8	56	1.3	0.26	14
Aspergillus penicilloides	17	3.9	0.25	4	57	5.8	0.28	16	64	1.5	0.26	17
Aspergillus restrictus	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Aspergillus sclerotiorum	ND	-	0.25	ND	ND	-	0.28	ND	33	0.8	0.26	9
Aspergillus sydowii	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Aspergillus unguis	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Aspergillus ustus	3	0.7	0.25	1	<10	0.4	0.28	<2.8	27	0.6	0.26	7
Aspergillus versicolor	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Aureobasidium pullulans	ND	-	0.25	ND	ND	-	0.28	ND	58	1.4	0.26	15
Chaetomium globosum	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Cladosporium cladosporioides I	20	4.6	0.25	5	29	2.9	0.28	8	543	13	0.26	140
Cladosporium cladosporioides II	<10	0.5	0.25	<2.5	12	1.2	0.28	3	91	2.2	0.26	24
Cladosporium herbarum	ND	-	0.25	ND	<10	0.1	0.28	<2.8	<10	0.048	0.26	<2.6
Cladosporium sphaerospermum	162	37.6	0.25	40	834	84.3	0.28	230	41	1	0.26	11
Epicoccum nigrum	ND	-	0.25	ND	ND	-	0.28	ND	96	2.3	0.26	25
Eurotium amstelodami	<10	0.7	0.25	<2.5	<10	0.7	0.28	<2.8	91	2.2	0.26	24
Mucor racemosus	ND	-	0.25	ND	ND	-	0.28	ND	<10	0.1	0.26	<2.6
Paecilomyces variotii	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Penicillium brevicompactum	ND	-	0.25	ND	ND	-	0.28	ND	89	2.1	0.26	23

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Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F121056
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/13/17
First Reported: 07/13/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40170309				40170310				40170311			
Sample ID	90-062817-01				90-062817-02				90-062817-03			
Location	Room N-134				3rd floor hallway				Outside between 2 buildings			
Sample Date	06/28/17				06/28/17				06/28/17			
Volume	4044.6 L				3608.9 L				3863.3 L			
Organism	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3
Penicillium chrysogenum	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Penicillium corylophilum	ND	-	0.25	ND	<10	0.3	0.28	<2.8	ND	-	0.26	ND
Penicillium crustosum	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Penicillium purpurogenum	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Penicillium spinulosum	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Penicillium variabile	ND	-	0.25	ND	ND	-	0.28	ND	ND	-	0.26	ND
Rhizopus stolonifer	ND	-	0.25	ND	<10	0.1	0.28	<2.8	<10	0.024	0.26	<2.6
Scopulariopsis brevicaulis	ND	-	0.25	ND	ND	-	0.28	ND	<10	0.1	0.26	<2.6
Scopulariopsis chartarum	<10	0.2	0.25	<2.5	<10	0.2	0.28	<2.8	<10	0.048	0.26	<2.6
Stachybotrys chartarum	ND	-	0.25	ND	ND	-	0.28	ND	199	4.7	0.26	52
Trichoderma viride	ND	-	0.25	ND	<10	0.6	0.28	<2.8	ND	-	0.26	ND
Wallemia sebi	ND	-	0.25	ND	<10	0.2	0.28	<2.8	11	0.3	0.26	3
Total	431			110	990			270	4,193			1,100
Comments												

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Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F121056
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/13/17
First Reported: 07/13/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40170312											
Sample ID	90-062817-04											
Location	Blank											
Sample Date	06/28/17											
Volume	Not Indicated											
Organism	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**
Acremonium strictum	ND	-	1	ND								
Alternaria alternata	ND	-	1	ND								
Aspergillus flavus	ND	-	1	ND								
Aspergillus fumigatus	ND	-	1	ND								
Aspergillus niger	ND	-	1	ND								
Aspergillus ochraceus	ND	-	1	ND								
Aspergillus penicilloides	ND	-	1	ND								
Aspergillus restrictus	ND	-	1	ND								
Aspergillus sclerotiorum	ND	-	1	ND								
Aspergillus sydowii	ND	-	1	ND								
Aspergillus unguis	ND	-	1	ND								
Aspergillus ustus	ND	-	1	ND								
Aspergillus versicolor	ND	-	1	ND								
Aureobasidium pullulans	ND	-	1	ND								
Chaetomium globosum	ND	-	1	ND								
Cladosporium cladosporioides I	ND	-	1	ND								
Cladosporium cladosporioides II	ND	-	1	ND								
Cladosporium herbarum	ND	-	1	ND								
Cladosporium sphaerospermum	ND	-	1	ND								
Epicoccum nigrum	ND	-	1	ND								
Eurotium amstelodami	ND	-	1	ND								
Mucor racemosus	ND	-	1	ND								
Paecilomyces variotii	ND	-	1	ND								
Penicillium brevicompactum	ND	-	1	ND								

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Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F121056
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/13/17
First Reported: 07/13/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40170312											
Sample ID	90-062817-04											
Location	Blank											
Sample Date	06/28/17											
Volume	Not Indicated											
Organism	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**
Penicillium chrysogenum	ND	-	1	ND								
Penicillium corylophilum	ND	-	1	ND								
Penicillium crustosum	ND	-	1	ND								
Penicillium purpurogenum	ND	-	1	ND								
Penicillium spinulosum	ND	-	1	ND								
Penicillium variabile	ND	-	1	ND								
Rhizopus stolonifer	ND	-	1	ND								
Scopulariopsis brevicaulis	ND	-	1	ND								
Scopulariopsis chartarum	ND	-	1	ND								
Stachybotrys chartarum	ND	-	1	ND								
Trichoderma viride	ND	-	1	ND								
Wallemia sebi	ND	-	1	ND								
Total	ND			ND								
Comments												

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F121056
FALI Job ID: CH1000-5469
Date Received: 06/29/17
Date Analyzed: 07/05/17
Date Printed: 07/13/17
First Reported: 07/13/17

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Total Samples Submitted: 4
Total Samples Analyzed: 4

Explanations:

%	Percent of Total
LOD	Limit of Detection (Units are the same as result units)
Sp Eq/m^3	Spore equivalents per cubic meter of air sampled
ND	None Detected
Sp Eq	Total number of spore equivalents detected in the sample; 'Spore Equivalents' represent all cells pertaining
-	Not Applicable
	to the identified species which contain DNA, including hyphal fragments.

Notes:
This test is performed pursuant to licensing arrangements with Roche Molecular Systems, Inc. and Applied Biosystems.

Guidelines For Interpretation:
No accepted quantitative regulatory standards currently exist by which to assess the health risks related to mold exposure. Molds have been associated with a variety of health effects and sensitivity varies from person to person.

Several organizations, including: the American Conference of Governmental Industrial Hygienists (ACGIH); the American Industrial Hygiene Association (AIHA); the Indoor Air Quality Association (IAQA); the United States Environmental Protection Agency (USEPA); the Centers for Disease Control (CDC), as well as the California Department of Health Services (CADHS), have all published guidelines for assessment and interpretation of mold resulting from water intrusion in buildings.

FALI reports solely the organisms observed on the sample(s). The limit of detection is based on observing one spore/colony per area analyzed. This is not an inclusive list of the fungal types identified in the microbiology laboratory.

Nick Hopkins, Microbiology Laboratory Supervisor, Hayward Laboratory

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THE UNIVERSITY OF ARIZONA

E M O R A N D U M

DATE: November 6, 2017

TO: Buell Januzzi, Director, Steward Observatory
Steward Observatory Indoor Air Quality Task Force

FROM: Risk Management Services

SUBJECT: Steward Observatory Sampling Event- (2nd Quarter)

This report summarizes findings from the second of four environmental sampling events scheduled for Building 65, Steward Observatory. The purpose of the year-long assessment is to monitor the indoor air quality of the building during different seasons of the year. This is due to the previous indoor air quality history including water intrusion, mold growth in some areas, and health concerns raised by building occupants.

The second environmental sampling event was conducted on October 12, 2017. The protocol used for sample collection is outlined below.

Air samples will be collected and analyzed using Quantitative Polymerase Chain Reaction (qPCR) methods to identify individual mold species which might be present.
Surface swab samples will be collected concurrently with air samples, and analyzed using qPCR analysis techniques. Surface sample results will only be utilized to compare changing conditions between sampling events, and evaluate any trends over time. Seasonal variations are expected, particularly during periods of monsoon-related moisture and heavy rainfall.
These samples are going to be compared with previous sampling events to be able to monitor and analyze building changes overtime.
On the day of sampling, RMS will contact Steward Observatory Building manager and will do a visual inspection of the building to determine any moisture issue or building concerns.

SAMPLING DESCRIPTION AND LOCATIONS

The quarterly sampling events will include the collection of interior air samples and surface swab samples, both analyzed by quantitative real-time polymerase reaction.

Quantitative real-time polymerase chain reaction (qPCR) analysis can be used to identify mold species collected from swab or air samples. In the qPCR process, DNA is extracted from a sample, combined with a primer and probe mixture, heated and cooled in multiple amplification cycles creating fluorescent signals, which are then counted. Mold species can be identified within a few days rather than weeks when using the culture-based methods. The Environmental Relative

Moldiness Index (ERMI) was developed by the US EPA to identify 36 mold species present in typical mold-affected homes. The ERMI custom qPCR panel will be requested from the analytical laboratory to quantify mold species in samples from Building 65.

For qPCR air sampling, samples will be collected using a high volume air pump calibrated with a primary source calibration unit to draw up to approximately 15 liters of air per minute. The pump(s) will be placed securely on the floor and an approximately 5-foot length of plastic tubing will be attached to the pump and suspended to a 4.5-foot height via a tripod. A 37mm qPCR sample collection cassette will be placed at the end of the tubing. Following qPCR sample collection recommendations, the pump will be run for approximately 240 minutes to collect approximately 3600 liters of air per sample. The relative humidity percent and temperature will be documented for each sample collection location. The sample number and total volumes will be documented onto a chain-of-custody form and transported along with the samples to a NVLAP certified lab for the ERMI custom qPCR panel.

qPCR samples are going to be taken from two (2) interior locations. One of the interior location samples will be taken from the main hallway in the 3rd floor. This area was chosen because it is centrally located area, representative of the building. The other sample is going to be taken in Room N-134 due to previous indoor air quality problems. In addition, one exterior/reference sample will be collected between the new and old building. This sample will be collected at the same time as the interior samples. The sample collection locations will remain consistent throughout the duration of sampling.

Surface swab samples – Concurrent with the day quarterly air sampling is conducted, RMS will collect surface samples in the building, using a 6x6 inch template and moistened filter media, which will be containerized and labelled with a unique sample number for qPCR analysis as well. The sample numbers will be documented onto a chain-of-custody form and transported along with the air samples to a NVLAP certified lab for analysis using the ERMI custom qPCR panel. Surface samples will only be collected from smooth vertical wall surfaces, at least five feet above the walking surface in the designated locations. Surface swab sample locations will include the following: Room N134 (basement laboratory), room 162 (basement office), room 490 (fourth floor office), in the 3rd floor main hallway as a centrally located area representative of the building and an exterior sample between the two buildings. Due to building complaints after the 1st quarter sampling process, additional swab sample where taken. These additional samples were taken in Rooms 358, 359 and Room 6-A in the Annex. The relative humidity percent, temperature and sampling time will also be documented for each sample collection location.

Written results of all testing will be compiled by RMS for distribution to the Steward Observatory Building Air Quality Task Force and Steward Observatory Management within five working days of receipt by RMS.

SURFACE SWAB RESULTS

The second sampling event took place on October 12, 2017. Risk Management used Forensic Analytical Laboratories to analyze the samples.

Now that two rounds of sampling have been conducted, following an identical sampling procedure, we can deliver comparative results between the first two events. The results are presented to illustrate changes in mold organisms between the first sampling round held on June 28, 2017 and the second sampling round held on October 12, 2017. The sampling dates were specifically chosen to compile and compare data from different seasons.

As mentioned in the sampling protocol, the ERMI score is determined by analyzing dust samples by qPCR for 36 species of mold divided into 2 groups. Group 1 is composed of 26 species of molds commonly associated with water damage. Group 2 is composed of 10 species common to indoor environments. The ERMI score is generated by comparing the logarithmic concentration (Log Conc) difference in Group 1 and Group 2 molds. Please see Appendices for details of the mold organism's groups used in the ERMI score.

ERMI scores are assigned to different risk levels which can be used to predict the likelihood of existing mold growth in the building as shown in Table 1:

Table 1: ERMI Score Legend:

ERMI Score	Level or Risk	Likelihood of Mold Problem
-10 to -4	Level 1	Lowest
-4 to 0	Level 2	Lower
0 to 5	Level 3	Moderate
5 to 20	Level 4	High

Table 2 shows a general comparison of organisms between the two Risk Management sampling events conducted to date

Table 2: Steward Observatory Swab Sampling ERMI Score Comparison between Risk Management Sampling Events

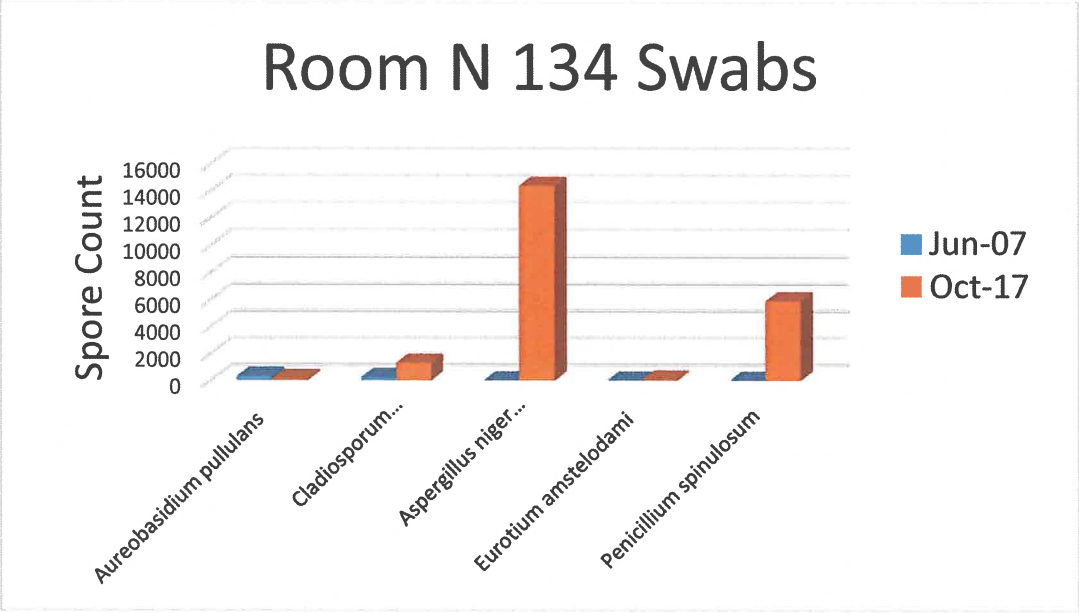
Steward Observatory Swab Sampling ERMI Score Comparison							
Date	**Location**	**Aureobasidium pullulans**	**Cladiosporum sphareospermum/Cladosporoides I/II**	**Aspergillus niger /flavus/ochraceus**	**Eurotium amstelodami**	**Penicillium spinulosum**	**ERMI SCORE**
6/28/2017	3rd Floor	400	140	144	0	0	2.6
10/12/2017		200	516	0	0	0	1.5
6/28/2017	Room N-134	306	217	0	0	0	3.1
10/12/2017		130	1300	14400	82	5900	10.6
6/28/2017	Room 162	31	74.4	0	0	0	3.4
10/12/2017		144,053	16	36	0	0	4.8
6/28/2017	Room 490	186	31	0	0	0	0.8
10/12/2017		77	35	0	58	0	1.2
6/28/2017	Outdoors	7	0	0	0	0	0.8
10/12/2017		198,200	2100	24	0	0	-3.9
6/28/2017	Room 358	Not tested	Not Tested	Not Tested	Not tested	Not Tested	Not Tested
10/12/2017		433	0	0	0	5900	12.3
6/28/2017	Room 359	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested
10/12/2017		281	311400	62300	0	2605	-1
6/28/2017	Room 6a Annex	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested
10/12/2017		27	28	1561000	0	2605	6.2

During this second swab sampling event, 9 mold organisms from both Group 1 and Group 2 were found at the different sampled locations. The following Group I species were identified: Aureobasidium pollulans (Group 1), Cladosporum sphareospermum (Group 1), Aspergillus niger (Group 1), Aspergillus flavus (Group1), Eurotium amstelodami (Group 1), Aspergillus ochraceus (Group 1), and Penicillium spinulosum (Group 1). The following Group 2 organisms were identified: Cladosporum cladosporoides I (Group 2), Cladosporum cladosporoides II (Group 2).

Following, is a discussion per location of the mold organisms found. We also compared and described what was found during this second event with the first event.

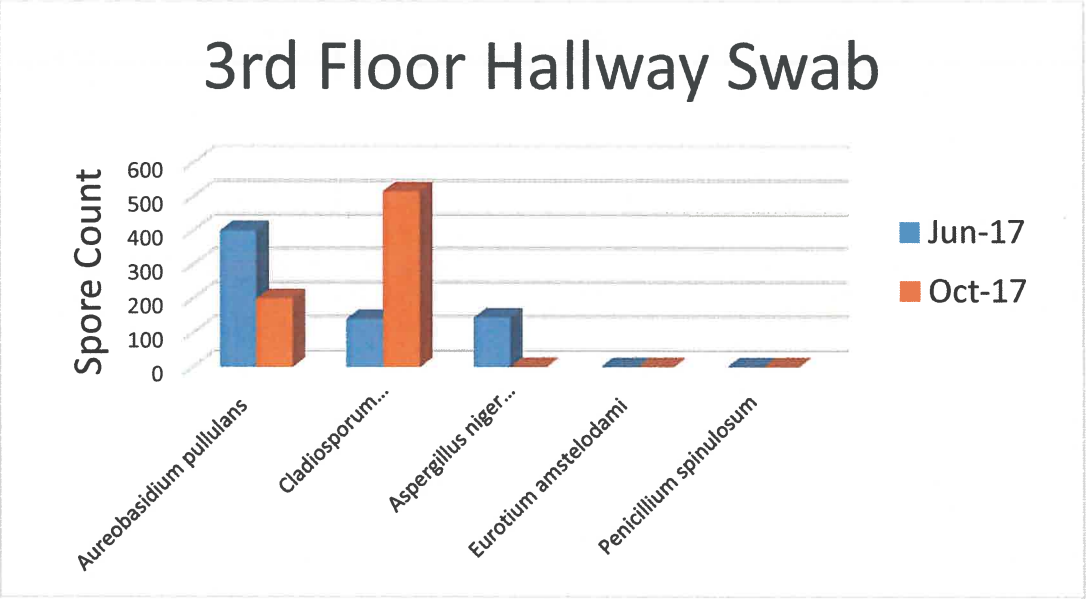
In Room N-134, we found Aureobasidium Pollulans, Cladosporum Sphareospermum, Aspergillus ochraceus and Penicillium spinulosum from Group 1. We also found Cladosporum Cladosporoides I and Cladosporum Cladosporoides II from Group 2. The ERMI Score is 10.6, considered by the lab as a High Level 4 (Likelihood of Mold Problem). We can see that this ERMI score is much higher than the ERMI score (3.1) from our first sampling round. We can also see that additional mold organisms are present in Room N-134 that were not present in the first round. Also, the majority of the mold organisms present are part of Group 1 organisms, molds commonly associated with water damage. See Figure 1 for visual representation of this swab sampling results:

Figure 1: Room N-134 Swabs



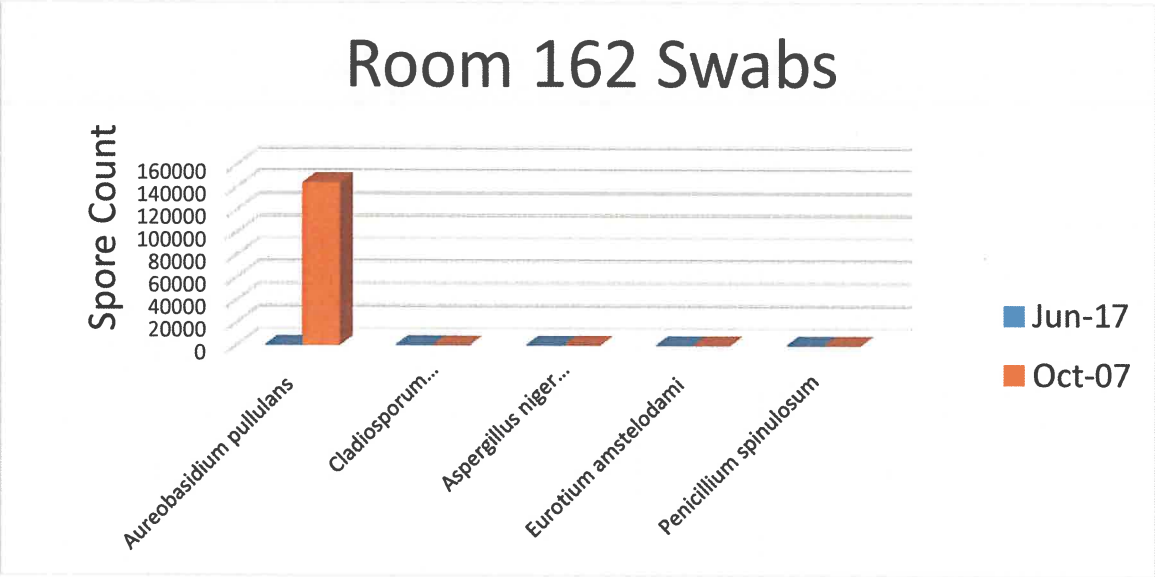
In the 3rd Floor Main Hallway, we found Aureobasidium pollulans and Cladosporum sphareospermum from Group 1 and Cladosporum cladosporoides I and II from Group 2. The ERMI Score is 1.5, considered by the lab as a Moderate Level 3. We can see that the ERMI score is lower than the ERMI score in the first sampling event (2.6). The highest mold values found in the 3rd floor hallway are part of the Group 1 organisms, molds commonly associated with water damage. See Figure 2 for visual representation of this swab sampling results:

Figure 2: 3rd Floor Swabs



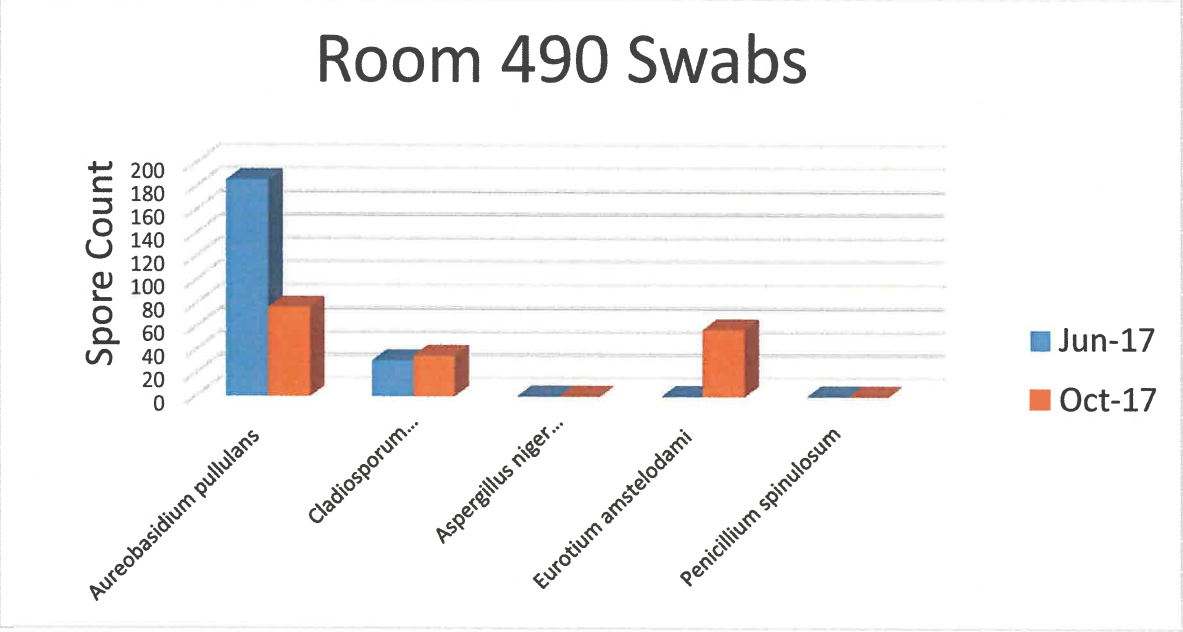
In Room 162, we found Aureobasidium pollulans and Aspergillus niger from Group I. We also found Cladosporium cladosporoides I from Group II. The ERMI Score is 4.8, considered by the lab as a Moderate Level 3 as well but close to High Level 4. The ERMI score was higher than the ERMI score in the first sampling event (3.4) in this same area. A high score of 144,000 sp Eq of Aureobasidium pullulans was found, but it is still lower than the outside value of 198,000 sp Eq. See Figure 3 for visual representation of this swab sampling results:

Figure 3: Room 162 Swabs



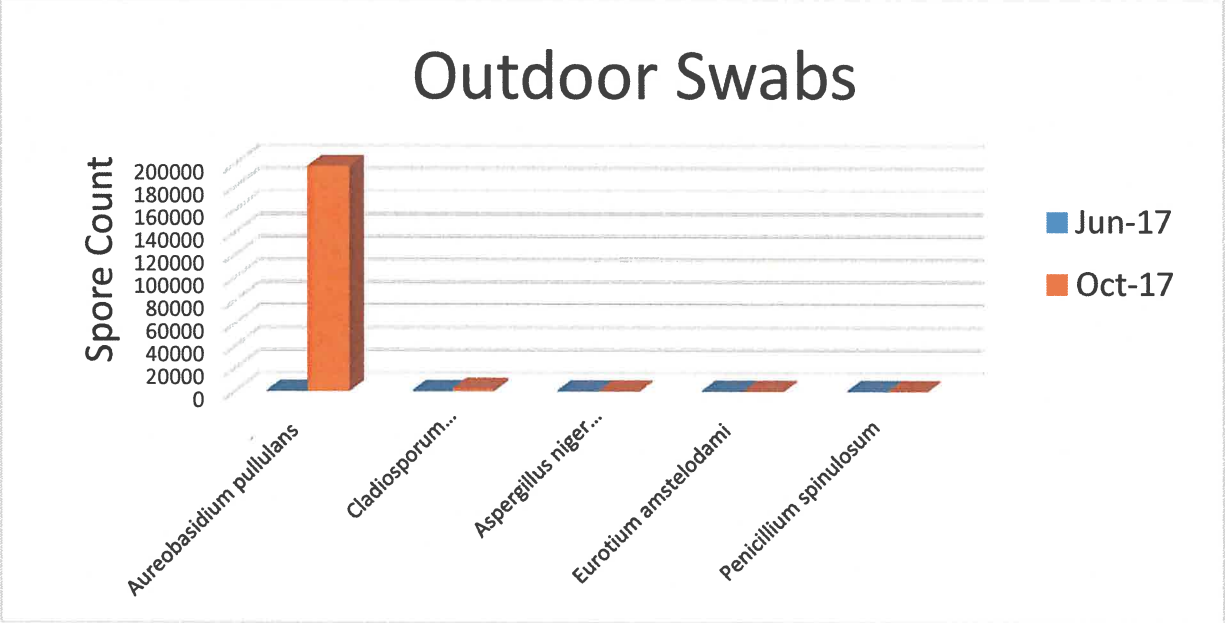
In Room 490, we found Aureobasidium Pollulans and Eurotium amstelodami from Group 1. We also found Cladosporum Cladosporoides I and II from Group 2. The ERMI Score is 1.2, considered by the lab as a Moderate Level 3 (Likelihood of Mold Problem). The ERMI score was higher compared to the ERMI score (0.8) from the first sampling event. See Figure 4 for visual representation of this swab sampling results:

Figure 4: Room 490 Swabs



As for the outdoor swab samples, we found Aureobasidium Pollulans, Aspergilus niger, and Aspergillus fumigatus from Group I. We also found Cladosporum Cladosporoides I and II, Alternaria alternate and Epicoccum nigrum from Group II. The ERMI Score is -3.9, considered by the lab as a Lower Level 2 (Likelihood of Mold Problem). We can see that this ERMI score is lower than the ERMI score from the 1st sampling event (0.8). See Figure 5 for visual representation of this swab sampling results:

Figure 5: Outdoor Swabs



The following additional rooms were sampled in response to newer building occupant's complaints. They cannot be compared to the first sampling event since they were not included at the time. These locations will be included in the next two scheduled sampling events so seasonal variations can be compared.

In Room 358, we found Aureobasidium pullulans and Penicillium spinulosum from Group I. The ERMI score is 12.3 considered by the lab as a High Level 4 (Likelihood of Mold Problem). The 2 mold organisms found are both commonly associated with water damage.

In Room 359, we found Aureobasidium Pullulans and Penicillium spinulosum from Group I. We also found Aspergillus ustus and Clasoporium clasoporioides from Group II. The ERMI score is -1.0, considered by the lab as a Lower Level 2. Even though Penicillium spinulosum was present in this room, the ERMI score is lower since there was a higher spore count of Cladosporium and Aspergillus (Group II) (molds commonly found inside a building). The high spore counts of Group II molds, affect the ERMI score.

In Room 6A, we found Aspergillus flavus and Aureobasidium pollulans from Group 1. We also found Cladosporium cladosporoides I from Group 2. The ERMI score is 6.2, considered by the lab as a High Level 4. There was a high spore count of Aspergillus flavus in this room which was not found in the swab sample taken outside the building. This organism is also commonly associated with water damage.

The following discussion is focused on the higher spore counts found in specific rooms which are particularly from Group I, mold commonly associated with water damage in a building.

Aureobasidium pullulans was found in every room and area sampled. Even though it is a Group I mold, commonly associated with water damage in buildings, there was a higher spore count in the swab sample taken outside the building. The detection of this species indoors is most likely the result of being carried into the building by occupants, and/or distribution through the HVAC system.

We found Cladiosporium sphaerospermum in some rooms (3rd Floor Hallway, N-134 and 359. Even though we did not encounter a high spore count of this organism, it was not present outside the building. Being a Group I mold species, it indicates that there may be residual water damage in some parts of the building that is being detected in these samples.

We found a high spore count of Aspergillus ochraceus in Room N-134. It was not found in the sample taken outside the building. Being a Group I mold species, it indicates that there may be residual water damage in some parts of the building that is being detected in this room.

We found high spore counts of Penicillium spinolosum in rooms N-134, 358, and 359. Specifically, in room 358, the spore count was 5,650,000 sp Eq. This organism was not found in the sample taken outside the building. This spore count caused Room 358 ERMI score to be 12.3 indicating a Level 4, High Possibility of Mold Problem. Room 358 is the room where an employee recently experienced respiratory difficulties, and was relocated to the Annex.

We found Aspergillus flavus in Room 6-A of the Annex. This room was included in the sampling event because it is the temporary relocation room for the employee from 358. The spore count was 1,560,000. Considered a Group I mold, it indicates that there still may be residual water damage related problems in this room. Aspergillus flavus is a mold typically found in air conditioning ducts and building materials that have been damaged by a flood or water intrusion.

In general, there is a tendency of higher ERMI scores for this second swab sampling round than for the first swab sampling round by Risk Management. We notice an increase in spore

counts at the majority of the sampled areas. We also noticed new organism spore counts that were not present during the first sampling round. For some detected species, these increased counts corresponded with higher counts outside, which is likely attributable to increased monsoon season moisture. Higher spore counts that did not have a corresponding outdoor finding may be an indicator of residual water damage in the building that needs further remedial attention.

AIR SAMPLE RESULTS

qPCR air sampling was also performed as part of the Risk Management sampling protocol. We took qPCR air samples in two areas inside the building (Room N-134 and in the 3rd Floor Hallway) and one area outside the building. (Refer to results at Appendices).

The air sample results from the lab are not presented in the ERMI Score format. Forensics Analytical Laboratories does not perform an ERMI Score equation for qPCR air samples. Their lab has only designed ERMI scores for swab samples. Their report shows the same quantified 36 species, but without the final ERMI score. Air sample results are more representative of concentrations that may be inhaled by building occupants, but there is not always a direct correlation between findings from surface swab samples and air samples. Multiple factors may impact whether spores found in surface swabs become airborne, and available for inhalation by building occupants.

We found several mold organisms in the air samples from Rooms N-134 and the 3rd Floor Hallway. Aspergillus flavus/ fumigatus/niger and Eurotium amstelodami (Group 1) were present in low counts in these areas compared to the outside spore count. Aurebasidium Pollulans, Cladosporium cladosporioides I/II (Group II) were present in lower counts as well, compared to the outside air samples.

Cladosporium sphaerospermum (Group I) was found in the air of the 3rd Floor Hallway, but was not encountered outside the building.

We noticed a slightly increase in spore counts in Room N-134 and the 3rd Floor Hallway compared to the first sampling round. Spore counts were higher outside for this second sampling event as well. It is important to notice that the air samples inside the building had a lower spore count compared to the spore count outside the building.

Please see Figure 6, 7 and 8 below to see the difference of Risk Management Results between the 1st and 2nd Sampling Round:

Figure 6: Room N-134 Air Samples

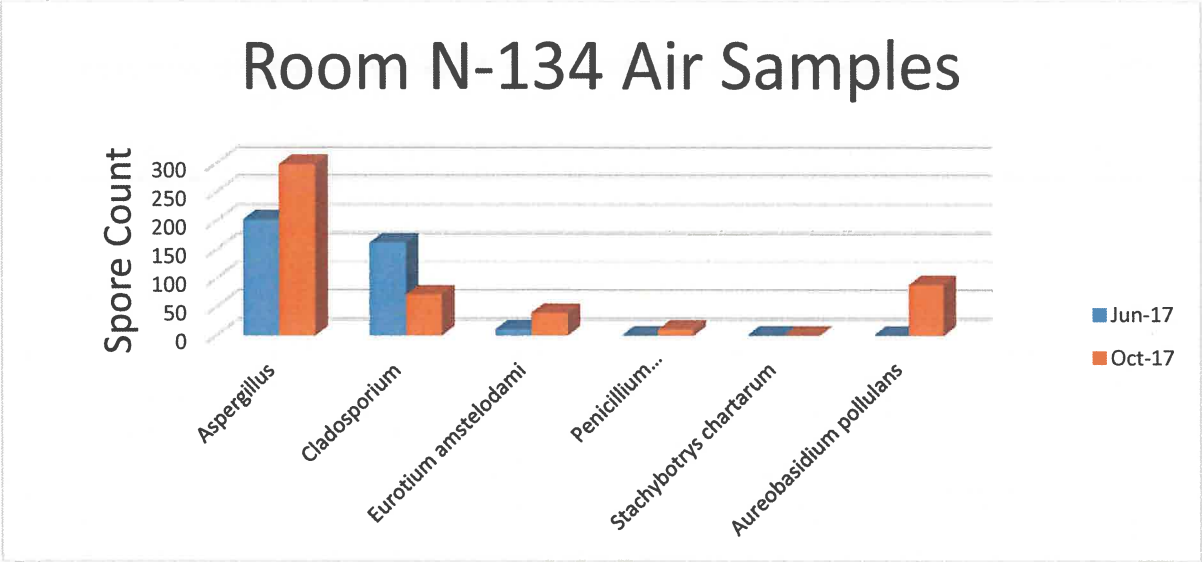


Figure 7: 3rd Floor Hallway Air Samples

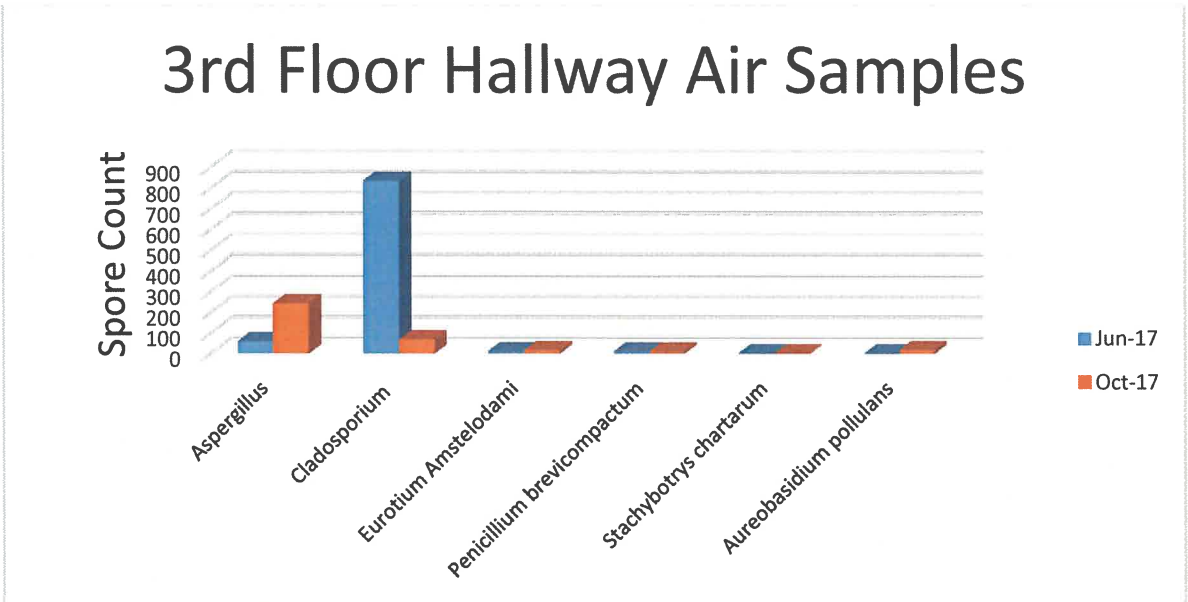
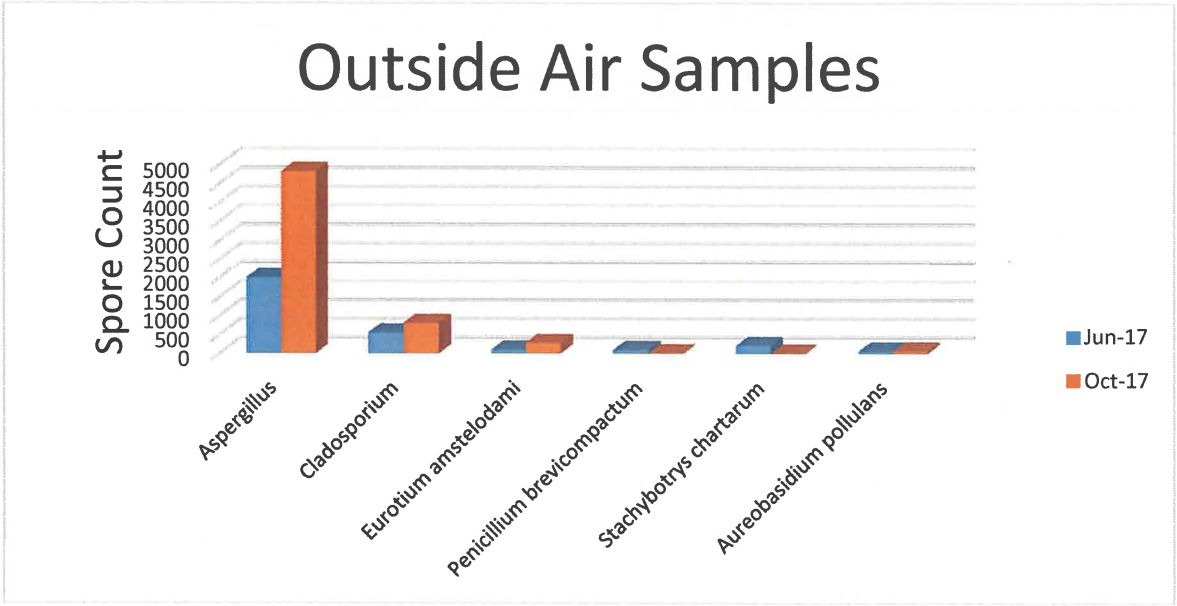


Figure 8: Outside Air Samples



We did not find an extreme change in the organism spore count inside the building during the two air sampling events. Slight changes may have occurred because of a difference in temperature and humidity, since samples were taken in different seasons. Please see Table 3 for Temperature and Humidity Results from the 1st Sampling Round on 06/28/17. See Table 4 for Temperature and Humidity Results from the 2nd Sampling Round on 10/12/17.

Table 3: Temperature and Humidity Sample Areas 06/28/17- Risk Management

Date	Location	Temperature & Relative Humidity before Sampling	Temperature & Relative Humidity after Sampling
06/28/17	Outdoors	84°F/ 37.5%	99.9°F/ 15.5%
06/28/17	Room N-134	74.6°F/ 43%	77.4°F/ 30.8%
06/28/17	3rd Floor Main Hallway	75.3°F/ 39.9%	75°F/ 33.8%
06/28/17	Room -162	75.4°F/ 39.1%	Not Taken (Only Swab)
06/28/17	Room 490	77.7°F/ 40%	Not Taken (Only Swab)

Table 4: Temperature and Humidity Sample Areas 10/12/17- Risk Management

Date	Location	Temperature & Relative Humidity before Sampling	Temperature & Relative Humidity after Sampling
10/12/17	Outdoors	74.2°F/ 36.7%	Not Taken
10/12/17	Room N-134	75.4°F/ 32.7%	Not Taken
10/12/17	3rd Floor Main Hallway	74.5°F/ 37.6%	Not Taken
10/12/17	Room -162	75.6°F/ 33.2%	Not Taken (Only Swab)
10/12/17	Room 490	74.2°F/ 34.2%	Not Taken (Only Swab)
10/12/17	Room 358	74.5°F/ 37.6%	Not Taken Only Swab
10/12/17	Room 359	74.5°F/ 37.6%	Not Taken (Only Swab)
10/12/17	Room 6-A	74.5°F/ 37.6%	Not Taken (Only Swab)

VISUAL BUILDING INSPECTION

As part of the sampling protocol, a building inspection was conducted with the Steward Observatory Building Manager the same day. The purpose was to look for any new sign of water intrusion or residual water damage in the building. We also went to every room we saw damage during the 1st Sampling Round to confirm if appropriate repairs had been implemented.

During the inspection, Risk management found that the rooms where we reported water damaged ceiling tiles during the 1st Round had been replaced: N208C, 356-B, 356-A, 374-C, 374-A, 374, 374-D, 486, 450, N-503, N-507, N-526, N-535, 562, and 571. No further water damage was noted in these rooms. Some rooms still have water damaged ceiling tiles since the 1st Round" 353-A, 362, 366, 579, 580-F, 580G, 580H and 581. No new leaks have been reported in these rooms. All of the stained ceiling tiles were reported to FM for replacement.

The following rooms did not have any visual water damage issues during the 1st Round, but did this time: Rooms 360, 353-F, and outside N-501 have water stained ceiling tiles that need to be replaced. A work request has been submitted to FM for this to be done.

Room 353-F needs to have the air vents cleaned. A work order has been submitted for this task.

Room N-208C has an open window. This condition allows potential water intrusion into the room as well as temperature and humidity variations which may facilitate mold growth, and affect the building Indoor Air Quality (IAQ).

SUMMARY AND CONCLUSION

The second Building 65 sampling event results indicate higher spore counts and ERMI scores than the first sampling event. ERMI scores were only provided for the swab results, ERMI is not

applicable to air sampling results.

The air sample results from the second quarter indicate that there is a lower spore count inside the building compared to the outside of the building. These results are very similar to the results from the first quarter.

The lab results from this sampling event indicate that mold spores are not present in high quantities in the air. Mold spores are present in a higher quantity on the vertical surfaces of some parts of the building.

It is important to note that the 1st and 2nd sampling event were held at different seasons of the year. The first sampling event (06/28/17) was before the local monsoon season started. The second sampling event (10/12/17) was after the monsoon season had finished. It is an expected result to find that a progressive increase in mold spore counts after Tucson monsoon season ends, which corresponds to the findings from this second event.

Risk Management will continue to sample quarterly to evaluate fluctuations in spore counts during different seasons. We will continue sampling in the additional rooms which were not part of the original sampling plan, so that we can have comparative values next quarterly sampling.

RMS recommends that our office be consulted regarding relocation decisions for staff experiencing any adverse reaction in the building. In the case involving relocation to the Annex, it appears this has not resulted in improved symptoms for the affected employee. RMS can assist with assessment of different areas in the building that may provide a more successful relocation outcome.

Appendices

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40174038**
Sample ID	**65-101217-05**
Location	3rd Floor Hallway

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	200	200	25.4	2.3
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	516	520	65.4	2.71
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**788**	**790**		
Sum of Logs				**5.01**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	37	37	4.7	1.56
Cladosporium cladosporioides II	32	32	4.1	1.5
Cladosporium herbarum	<10	<10	0.4	0.47
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**788**	**790**		
Sum of Logs				**3.53**
LOD				**1**

ERMI[SM] Score

GROUP 1	**5.01**
GROUP 2	**3.53**
ERMI[SM] SCORE †	**1.5**
LEVEL	**Level 3**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40174039**
Sample ID	**65-101217-06**
Location	Room 490

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	77	77	41.2	1.88
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	65	65	34.8	1.81
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**187**	**190**		
Sum of Logs				**3.69**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	35	35	18.7	1.54
Cladosporium cladosporioides II	10	10	5.3	1
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**187**	**190**		
Sum of Logs				**2.54**
LOD				**1**

ERMI[SM] Score

GROUP 1	**3.69**
GROUP 2	**2.54**
ERMI[SM] SCORE †	**1.2**
LEVEL	**Level 3**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Forensic Analytical Laboratories

Preliminary Report

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Client ID:	CH1000
Report Number:	F123310
FALI Job ID:	CH1000-5469
Date Received:	10/13/17
Date Analyzed:	10/26/17
Date Printed:	10/26/17
First Reported:	NA

Lab Number	**40174040**
Sample ID	**65-101217-07**
Location	Room 162

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	36	36	-	1.55
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	144000	140,000	100	5.15
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**144,000**	**140,000**		
Sum of Logs				**6.7**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	16	16	-	1.2
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	<10	<10	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	<10	<10	-	0.69
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**144,000**	**140,000**		
Sum of Logs				**1.89**
LOD				**1**

ERMI™ Score

GROUP 1	**6.7**
GROUP 2	**1.89**
ERMI™ SCORE †	**4.8**
LEVEL	**Level 3**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40174041**
Sample ID	**65-101217-08**
Location	Room N-134

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	14400	14,000	65.1	4.15
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	130	130	0.6	2.11
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	1300	1,300	5.9	3.11
Eurotium amstelodami	75	75	0.3	1.87
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	5310	5,300	24	3.72
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**22,100**	**22,000**		
Sum of Logs				**15.0**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	29	29	0.1	1.46
Cladosporium cladosporioides II	882	880	4	2.94
Cladosporium herbarum	<10	<10	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**22,100**	**22,000**		
Sum of Logs				**4.4**
LOD				**1**

ERMI™ Score

GROUP 1	**15.0**
GROUP 2	**4.4**
ERMI™ SCORE †	**10.6**
LEVEL	**Level 4**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40174042**
Sample ID	**65-101217-09**
Location	Outside

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	9	9	-	0.95
Aspergillus niger	24	24	-	1.38
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	198000	200,000	44.2	5.29
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**448,000**	**450,000**		
Sum of Logs				**7.62**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	247300	250,000	55.3	5.39
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	2100	2,100	0.5	3.32
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	<10	<10	-	0.47
Epicoccum nigrum	211	210	-	2.32
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**448,000**	**450,000**		
Sum of Logs				**11.5**
LOD				**1**

ERMI™ Score

GROUP 1	**7.62**
GROUP 2	**11.5**
ERMI™ SCORE †	**-3.9**
LEVEL	**Level 2**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40174043**
Sample ID	**65-101217-10**
Location	Room 358

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	433	430	-	2.63
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	814	810	-	2.91
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	5650000	5,700,000	100	6.75
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**5,650,000**	**5,700,000**		
Sum of Logs				**12.3**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	ND	ND	-	-
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**5,650,000**	**5,700,000**		
Sum of Logs				**11.5**
LOD				**1**

ERMI℠ Score

GROUP 1	**12.3**
GROUP 2	**11.5**
ERMI℠ SCORE †	**12.3**
LEVEL	**Level 4**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Lab Number	**40174044**
Sample ID	**65-101217-11**
Location	Room 359

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	ND	ND	-	-
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	33	33	-	1.51
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	281	280	0.1	2.44
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	92	92	-	1.96
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	2610	2,600	0.7	3.41
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**376,000**	**380,000**		
Sum of Logs				**9.32**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	62300	62,000	16.6	4.79
Cladosporium cladosporioides I	311000	310,000	82.6	5.49
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**376,000**	**380,000**		
Sum of Logs				**10.3**
LOD				**1**

ERMI[SM] Score

GROUP 1	**9.32**
GROUP 2	**10.3**
ERMI[SM] SCORE †	**-1.0**
LEVEL	**Level 2**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Forensic Analytical Laboratories

Preliminary Report

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Client ID:	CH1000
Report Number:	F123310
FALI Job ID:	CH1000-5469
Date Received:	10/13/17
Date Analyzed:	10/26/17
Date Printed:	10/26/17
First Reported:	NA

Lab Number	**40174045**
Sample ID	**65-101217-12**
Location	Room 6A-Annex

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Date	10/12/2017
Weight/Area	Not Indicated
Media	

Group 1

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Aspergillus flavus	1560000	1,600,000	100	6.19
Aspergillus fumigatus	ND	ND	-	-
Aspergillus niger	ND	ND	-	-
Aspergillus ochraceus	ND	ND	-	-
Aspergillus penicilloides	ND	ND	-	-
Aspergillus restrictus	ND	ND	-	-
Aspergillus sclerotiorum	ND	ND	-	-
Aspergillus sydowii	ND	ND	-	-
Aspergillus unguis	ND	ND	-	-
Aspergillus versicolor	ND	ND	-	-
Aureobasidium pullulans	28	28	-	1.44
Chaetomium globosum	ND	ND	-	-
Cladosporium sphaerospermum	ND	ND	-	-
Eurotium amstelodami	ND	ND	-	-
Paecilomyces variotii	ND	ND	-	-
Penicillium brevicompactum	ND	ND	-	-
Penicillium corylophilum	ND	ND	-	-
Penicillium crustosum	ND	ND	-	-
Penicillium purpurogenum	ND	ND	-	-
Penicillium spinulosum	ND	ND	-	-
Penicillium variabile	ND	ND	-	-
Scopulariopsis brevicaulis	ND	ND	-	-
Scopulariopsis chartarum	ND	ND	-	-
Stachybotrys chartarum	ND	ND	-	-
Trichoderma viride	ND	ND	-	-
Wallemia sebi	ND	ND	-	-
Total for Both Groups	**1,560,000**	1,600,000		
Sum of Logs				**7.63**
LOD				**1**

Group 2

Organism	Sp Eq	Sp Eq/mg dust	%	Log Conc
Acremonium strictum	ND	ND	-	-
Alternaria alternata	ND	ND	-	-
Aspergillus ustus	ND	ND	-	-
Cladosporium cladosporioides I	28	28	-	1.44
Cladosporium cladosporioides II	ND	ND	-	-
Cladosporium herbarum	ND	ND	-	-
Epicoccum nigrum	ND	ND	-	-
Mucor racemosus	ND	ND	-	-
Penicillium chrysogenum	ND	ND	-	-
Rhizopus stolonifer	ND	ND	-	-
Total for Both Groups	**1,560,000**	1,600,000		
Sum of Logs				**1.44**
LOD				**1**

ERMI™ Score

GROUP 1	**7.63**
GROUP 2	**1.44**
ERMI™ SCORE †	**6.2**
LEVEL	**Level 4**

Fusarium soli	ND	ND	-	-
P.decumbens				
P.expansum	ND	ND	-	-
Ulocladium chartarum	ND	ND	-	-

Comments	

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Client ID: CH1000
Report Number: F123310
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/26/17
Date Printed: 10/26/17
First Reported: NA

Sample Type: Swab
Analysis: PCR Environmental Relative Moldiness Index Panel
Job ID / Site:

Total Samples Submitted: 8
Total Samples Analyzed: 8

Explanations:

ND	None Detected
-	Not Applicable

Notes:
This test is performed pursuant to licensing arrangements with Roche Molecular Systems, Inc. and Applied Biosystems.
Spore Equivalents (Sp Eq) represent all cells pertaining to the identified species which contain DNA, including hyphal fragments.

The Environmental Relative Moldiness Index (ERMI[SM]) is a screening tool developed by the USEPA to assist in predicting the relative "mold burden" on a given home. The ERMI[SM] was developed by screening dust samples from 1096 homes across the United States as part of the 2006 HUD American Healthy Home Survey, and ranking these homes in a RMI (Relative Moldiness Index). The ERMI[SM] score is determined by analyzing dust samples by quantitative PCR for 36 species of mold divided into two groups. Group I is composed of 26 species of molds commonly associated with water damage. Group II is composed of 10 species common to indoor environments. By comparing the difference in Group I and Group II molds, an ERMI[SM] score is generated which can then be compared to the nationwide RMI.

ERMI[SM] Score	Level or Risk	Likelihood of Mold Problem in Home
-10 to -4	Level 1	Lowest
-4 to 0	Level 2	Lower
0 to 5	Level 3	Moderate
5 to 20	Level 4	High

Guidelines For Interpretation:
No accepted quantitative regulatory standards currently exist by which to assess the health risks related to mold exposure. Molds have been associated with a variety of health effects and sensitivity varies from person to person.

Several organizations, including: the American Conference of Governmental Industrial Hygienists (ACGIH); the American Industrial Hygiene Association (AIHA); the Indoor Air Quality Association (IAQA); the United States Environmental Protection Agency (USEPA); the Centers for Disease Control (CDC), as well as the California Department of Health Services (CADHS), have all published guidelines for assessment and interpretation of mold resulting from water intrusion in buildings.

FALI reports solely the organisms observed on the sample(s). The limit of detection is based on observing one spore/colony per area analyzed. This is not an inclusive list of the fungal types identified in the microbiology laboratory.

The data presented in this report has not been subject to final review and is therefore subject to change.
The recipient assumes full responsibility for the use and interpretation of this preliminary data.

Huw Davies, Microbiology Laboratory Supervisor, Hayward Laboratory

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F123065
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/18/17
Date Printed: 10/20/17
First Reported: 10/20/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40173686				40173687				40173688			
Sample ID	65-101217-01				65-101217-02				65-101217-03			
Location	Room N-134				3rd FL Hallway				Outside			
Sample Date	10/12/17				10/12/17				10/12/17			
Volume	3660.0 L				3321.0 L				3705.0 L			
Organism	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3
Acremonium strictum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Alternaria alternata	ND	-	0.27	ND	ND	-	0.3	ND	37	0.6	0.27	10
Aspergillus flavus	298	54.6	0.27	81	242	55.1	0.3	73	4810	72	0.27	1,300
Aspergillus fumigatus	17	3.1	0.27	5	<10	1.8	0.3	<3	86	1.3	0.27	23
Aspergillus niger	22	4	0.27	6	38	8.7	0.3	11	392	5.9	0.27	110
Aspergillus ochraceus	ND	-	0.27	ND	<10	-	0.3	<3	<10	0.045	0.27	<2.7
Aspergillus penicilloides	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Aspergillus restrictus	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Aspergillus sclerotiorum	ND	-	0.27	ND	ND	-	0.3	ND	<10	0.1	0.27	<2.7
Aspergillus sydowii	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Aspergillus unguis	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Aspergillus ustus	ND	-	0.27	ND	ND	-	0.3	ND	27	0.4	0.27	7
Aspergillus versicolor	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Aureobasidium pullulans	88	16.1	0.27	24	17	3.9	0.3	5	61	0.9	0.27	16
Chaetomium globosum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Cladosporium cladosporioides I	71	13	0.27	19	67	15.3	0.3	20	801	12	0.27	220
Cladosporium cladosporioides II	<10	1.6	0.27	<2.7	<10	1.1	0.3	<3	28	0.4	0.27	8
Cladosporium herbarum	ND	-	0.27	ND	ND	-	0.3	ND	<10	0.03	0.27	<2.7
Cladosporium sphaerospermum	ND	-	0.27	ND	41	9.3	0.3	12	ND	-	0.27	ND
Epicoccum nigrum	ND	-	0.27	ND	ND	-	0.3	ND	128	1.9	0.27	35
Eurotium amstelodami	39	7.1	0.27	11	15	3.4	0.3	5	275	4.1	0.27	74
Mucor racemosus	ND	-	0.27	ND	ND	-	0.3	ND	<10	0.1	0.27	<2.7
Paecilomyces variotii	ND	-	0.27	ND	ND	-	0.3	ND	<10	0.03	0.27	<2.7
Penicillium brevicompactum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND

Continue on next page

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F123065
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/18/17
Date Printed: 10/20/17
First Reported: 10/20/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40173686				40173687				40173688			
Sample ID	65-101217-01				65-101217-02				65-101217-03			
Location	Room N-134				3rd FL Hallway				Outside			
Sample Date	10/12/17				10/12/17				10/12/17			
Volume	3660.0 L				3321.0 L				3705.0 L			
Organism	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3	Sp Eq	%	LOD	Sp Eq/m^3
Penicillium chrysogenum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Penicillium corylophilum	<10	0.5	0.27	<2.7	<10	0.5	0.3	<3	<10	0.045	0.27	<2.7
Penicillium crustosum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Penicillium purpurogenum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Penicillium spinulosum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Penicillium variabile	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Rhizopus stolonifer	<10	-	0.27	<2.7	<10	0.2	0.3	<3	ND	-	0.27	ND
Scopulariopsis brevicaulis	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Scopulariopsis chartarum	ND	-	0.27	ND	ND	-	0.3	ND	<10	0.045	0.27	<2.7
Stachybotrys chartarum	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Trichoderma viride	ND	-	0.27	ND	ND	-	0.3	ND	ND	-	0.27	ND
Wallemia sebi	ND	-	0.27	ND	<10	0.7	0.3	<3	<10	0.1	0.27	<2.7
Total	547			150	439			130	6,672			1,800
Comments												

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Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
Report Number: F123065
FALI Job ID: CH1000-5469
Date Received: 10/13/17
Date Analyzed: 10/18/17
Date Printed: 10/20/17
First Reported: 10/20/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40173689											
Sample ID	65-101217-04											
Location	Blank											
Sample Date	10/12/17											
Volume	0.0 L											
Organism	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**
Acremonium strictum	ND	-	1	ND								
Alternaria alternata	ND	-	1	ND								
Aspergillus flavus	ND	-	1	ND								
Aspergillus fumigatus	ND	-	1	ND								
Aspergillus niger	ND	-	1	ND								
Aspergillus ochraceus	ND	-	1	ND								
Aspergillus penicilloides	ND	-	1	ND								
Aspergillus restrictus	ND	-	1	ND								
Aspergillus sclerotiorum	ND	-	1	ND								
Aspergillus sydowii	ND	-	1	ND								
Aspergillus unguis	ND	-	1	ND								
Aspergillus ustus	ND	-	1	ND								
Aspergillus versicolor	ND	-	1	ND								
Aureobasidium pullulans	ND	-	1	ND								
Chaetomium globosum	ND	-	1	ND								
Cladosporium cladosporioides I	ND	-	1	ND								
Cladosporium cladosporioides II	ND	-	1	ND								
Cladosporium herbarum	ND	-	1	ND								
Cladosporium sphaerospermum	ND	-	1	ND								
Epicoccum nigrum	ND	-	1	ND								
Eurotium amstelodami	ND	-	1	ND								
Mucor racemosus	ND	-	1	ND								
Paecilomyces variotii	ND	-	1	ND								
Penicillium brevicompactum	ND	-	1	ND								

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Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

Tuscon, AZ 85701

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Client ID: CH1000
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Date Printed: 10/20/17
First Reported: 10/20/17

Total Samples Submitted: 4
Total Samples Analyzed: 4

Lab Number	40173689											
Sample ID	65-101217-04											
Location	Blank											
Sample Date	10/12/17											
Volume	0.0 L											
Organism	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**	**Sp Eq**	**%**	**LOD**	**Sp Eq/S**
Penicillium chrysogenum	ND	-	1	ND								
Penicillium corylophilum	ND	-	1	ND								
Penicillium crustosum	ND	-	1	ND								
Penicillium purpurogenum	ND	-	1	ND								
Penicillium spinulosum	ND	-	1	ND								
Penicillium variabile	ND	-	1	ND								
Rhizopus stolonifer	ND	-	1	ND								
Scopulariopsis brevicaulis	ND	-	1	ND								
Scopulariopsis chartarum	ND	-	1	ND								
Stachybotrys chartarum	ND	-	1	ND								
Trichoderma viride	ND	-	1	ND								
Wallemia sebi	ND	-	1	ND								
Total	ND			ND								
Comments												

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Forensic Analytical Laboratories

Fungal Analysis by PCR

University of Arizona, Risk Management S
Lorrane Santiago
220 W 6th St. Bldg. 300 B 2nd Fl.

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Client ID: CH1000
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Date Received: 10/13/17
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Date Printed: 10/20/17
First Reported: 10/20/17

Sample Type: Polycarbonate Filter
Analysis: PCR ERMI Panel Modified
Job ID / Site:

Total Samples Submitted: 4
Total Samples Analyzed: 4

Explanations:

%	Percent of Total
LOD	Limit of Detection (Units are the same as result units)
Sp Eq/m^3	Spore equivalents per cubic meter of air sampled
ND	None Detected
Sp Eq	Total number of spore equivalents detected in the sample; 'Spore Equivalents' represent all cells pertaining
-	Not Applicable
	to the identified species which contain DNA, including hyphal fragments.

Notes:
This test is performed pursuant to licensing arrangements with Roche Molecular Systems, Inc. and Applied Biosystems.

Guidelines For Interpretation:
No accepted quantitative regulatory standards currently exist by which to assess the health risks related to mold exposure. Molds have been associated with a variety of health effects and sensitivity varies from person to person.

Several organizations, including: the American Conference of Governmental Industrial Hygienists (ACGIH); the American Industrial Hygiene Association (AIHA); the Indoor Air Quality Association (IAQA); the United States Environmental Protection Agency (USEPA); the Centers for Disease Control (CDC), as well as the California Department of Health Services (CADHS), have all published guidelines for assessment and interpretation of mold resulting from water intrusion in buildings.

FALI reports solely the organisms observed on the sample(s). The limit of detection is based on observing one spore/colony per area analyzed. This is not an inclusive list of the fungal types identified in the microbiology laboratory.

Huw Davies, Microbiology Laboratory Supervisor, Hayward Laboratory

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Respiratory Protection Refresher

November 28, 2017

for Steward Observatory

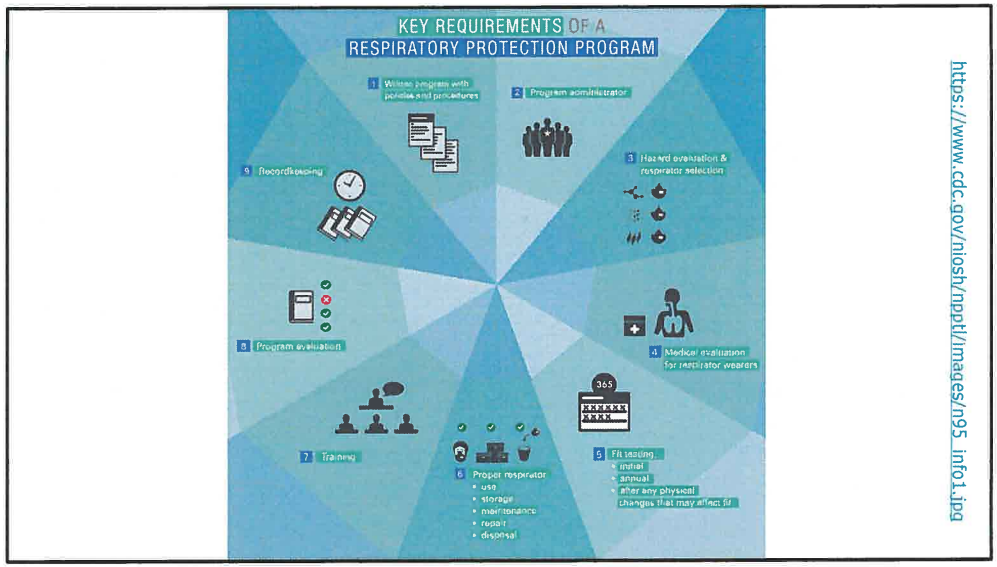
Today's Thought

- "The purpose of art is washing the dust of daily life off our souls."

- Pablo Picasso

- The purpose of wearing your respirator is to protect you from the dust of daily life and work.

2



https://www.cdc.gov/niosh/npptl/images/n95_info1.jpg

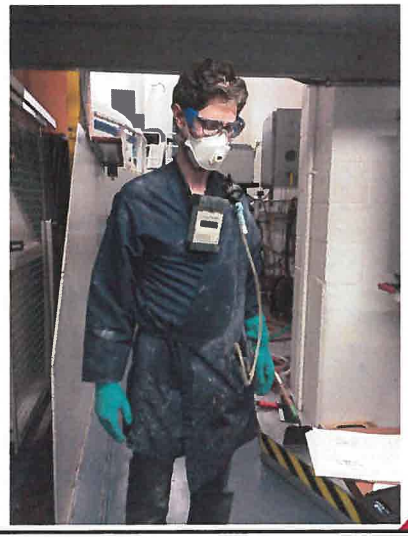
Respirator

Assigned Protection Factors

Wear for exposure levels up to PF x OEL and below IDLH

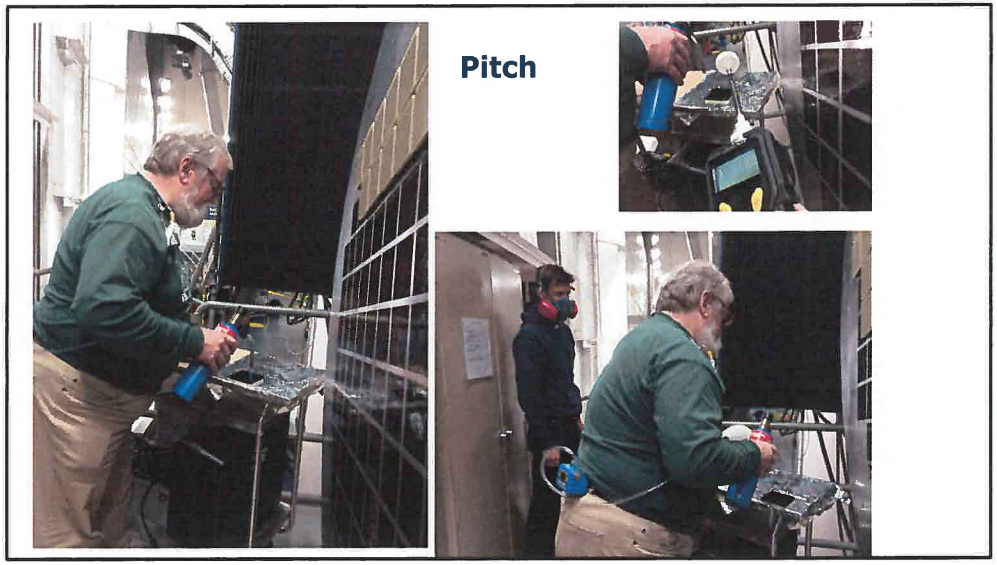
Mask	Protection Factor
Disposable N95	10
½ mask	10
Full-face	50
Hooded PAPR	25 or 1000
Full-face PAPR	100
Full-face Supplied Air	1000
SCBA	10,000

IDLH = Immediately Dangerous to Life and Health



N95 for Swarf Protection

5


Pitch

Welding

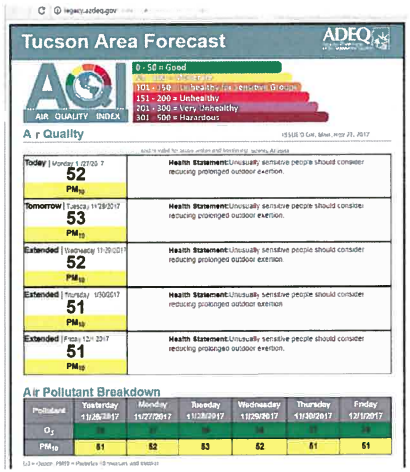
Downdraft Table
Powered Air Purifying Respirator with
Welder's Hood & Speedglass

7

PAPRs
acid vapor
& mist
protection

Aren't you glad you wore your respirator?

9



Tucson Area Forecast

ADEQ

AQI AIR QUALITY INDEX

0 - 50 = Good
101 - 150 = Unhealthy for Sensitive Groups
151 - 200 = Unhealthy
201 - 300 = Very Unhealthy
301 - 500 = Hazardous

Air Quality

Today | Monday 11/27/20 7 **52** PM_{10}	**Health Statement:** Unusually sensitive people should consider reducing prolonged outdoor exertion.
Tomorrow | Tuesday, 11/28/2017 **53** PM_{10}	**Health Statement:** Unusually sensitive people should consider reducing prolonged outdoor exertion.
Extended | Wednesday 11/29/2017 **52** PM_{10}	**Health Statement:** Unusually sensitive people should consider reducing prolonged outdoor exertion.
Extended | Thursday 11/30/2017 **51** PM_{10}	**Health Statement:** Unusually sensitive people should consider reducing prolonged outdoor exertion.
Extended | Friday 12/1/2017 **51** PM_{10}	**Health Statement:** Unusually sensitive people should consider reducing prolonged outdoor exertion.

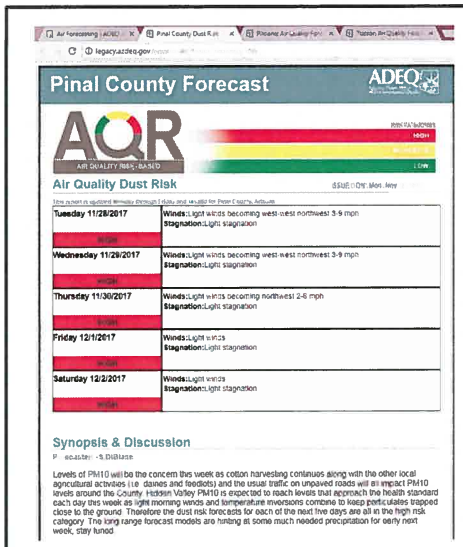
Air Pollutant Breakdown

Pollutant	Yesterday 11/26/2017	Monday 11/27/2017	Tuesday 11/28/2017	Wednesday 11/29/2017	Thursday 11/30/2017	Friday 12/1/2017
O_3	39	37	36	36	37	38
PM_{10}	51	52	53	52	51	51

10

EPA: Air Now https://www.airnow.gov/index.cfm?action=airnow.main

Arizona – IAQ Alert Sign-Up
https://public.govdelivery.com/accounts/AZDEQ/subscriber/new



Pinal County Forecast

ADEQ

AQR
AIR QUALITY RISK-BASED

HIGH
MODERATE
LOW

Air Quality Dust Risk

Tuesday 11/28/2017 HIGH	**Winds:** Light winds becoming west-west northwest 3-9 mph **Stagnation:** Light stagnation
Wednesday 11/29/2017 HIGH	**Winds:** Light winds becoming west-west northwest 3-9 mph **Stagnation:** Light stagnation
Thursday 11/30/2017 HIGH	**Winds:** Light winds becoming northwest 2-6 mph **Stagnation:** Light stagnation
Friday 12/1/2017 HIGH	**Winds:** Light winds **Stagnation:** Light stagnation
Saturday 12/2/2017 HIGH	**Winds:** Light winds **Stagnation:** Light stagnation

Synopsis & Discussion

Levels of PM10 will be the concern this week as cotton harvesting continues along with the other local agricultural activities (i.e. dairies and feedlots) and the usual traffic on unpaved roads will all impact PM10 levels around the County. Hidden Valley PM10 is expected to reach levels that approach the health standard each day this week as light morning winds and temperature inversions combine to keep particulates trapped close to the ground. Therefore the dust risk forecasts for each of the next five days are all in the high risk category. The long range forecast models are hinting at some much needed precipitation for early next week, stay tuned.

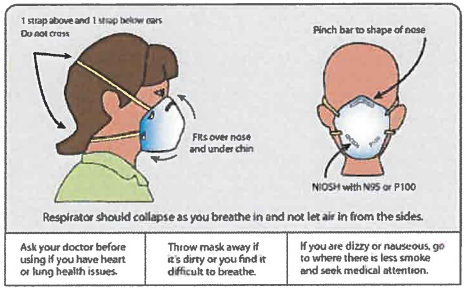
11

Check Outdoor Conditions

EPA The right respirator * and proper fit can reduce your exposure to wildfire smoke.

Cloth (wet or dry), paper masks, and tissues will **NOT** filter out wildfire smoke.
Look for respirators (masks) marked NIOSH with N95 or P100. They can be found online, or in hardware, home repair, or drugstores.

* Respirators are not designed to fit children. Facial hair prevents proper fit and reduces effectiveness.



Respirator should collapse as you breathe in and not let air in from the sides.

Ask your doctor before using if you have heart or lung health issues.	Throw mask away if it's dirty or you find it difficult to breathe.	If you are dizzy or nauseous, go to where there is less smoke and seek medical attention.

Use a respirator only after first trying other, more effective methods to avoid smoke. That includes staying indoors and reducing activity. When possible, people at risk should move away from the smoky area.

AIRNOW.GOV

12

Protecting People & the Environment: Maintenance

Hazard	Wet Methods	HEPA vacuum	Respirator Cartridge Color & Name	See doctor if symptoms I = infectious A = Allergenic T =Toxic	EPA hazardous Waste	Disinfect
Wood dust						
Lead paint						
Silica						
Mold						
Mice Bird Bat droppings						
Solvent-based Paint Spraying & thinner						

Protecting People & the Environment
Maintenance Tasks

Hazard	Wet Methods	HEPA vacuum	Respirator Cartridge Color & Name	See doctor if symptoms I = Infectious A = Allergenic T= Toxic	EPA hazardous Waste	Disinfect
Wood dust		X	Pink P-100 Particulates	A		
Lead paint	X	X	Pink P-100 Particulates	X	X	
Silica	X	X	Pink P-100 Particulates	T		
Mold	X	X	Pink P-100 Particulates	A, I		X
Mice/ Bird/ Bat/droppings	X	X	Pink P-100 Particulates	A, I		X
Solvent-based Paint Spraying & thinner		(intrinsically safe local exhaust for fire prevention	Combo Multivapor P100 LimeGreen OV/AM/AG Pink P-100	T	X	

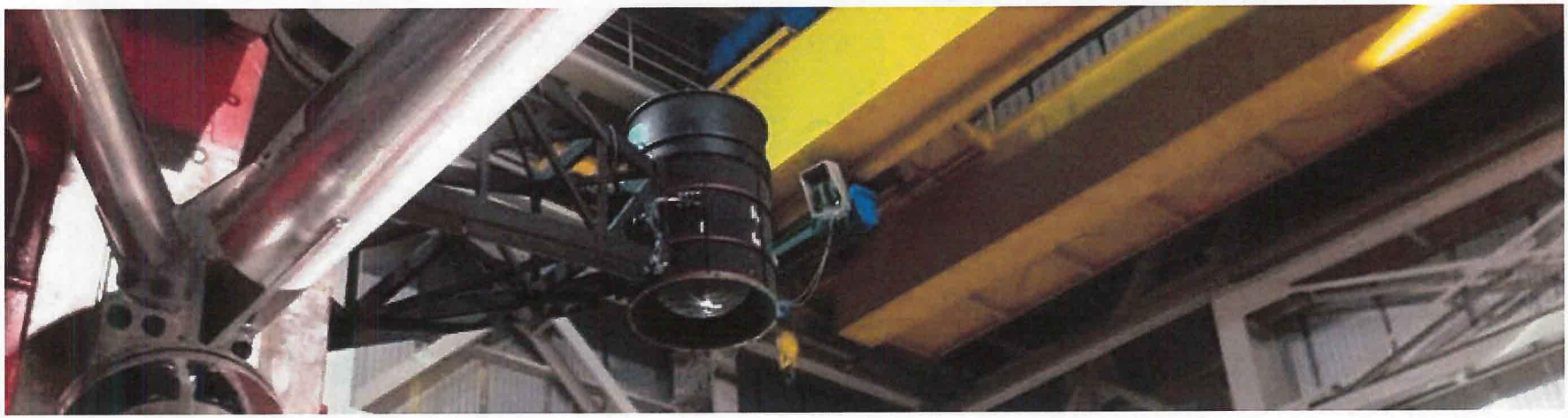
Wildfire Safety
Red Cross

About
Before
During
After

Prepare in Advance

+ Be sure you're Red Cross Ready. That means:

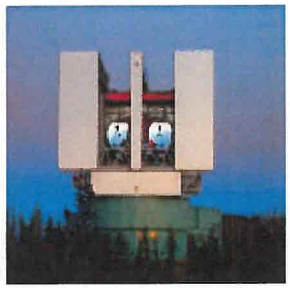
http://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/wildfire#Before



Lessons Learned from the Frye Fire

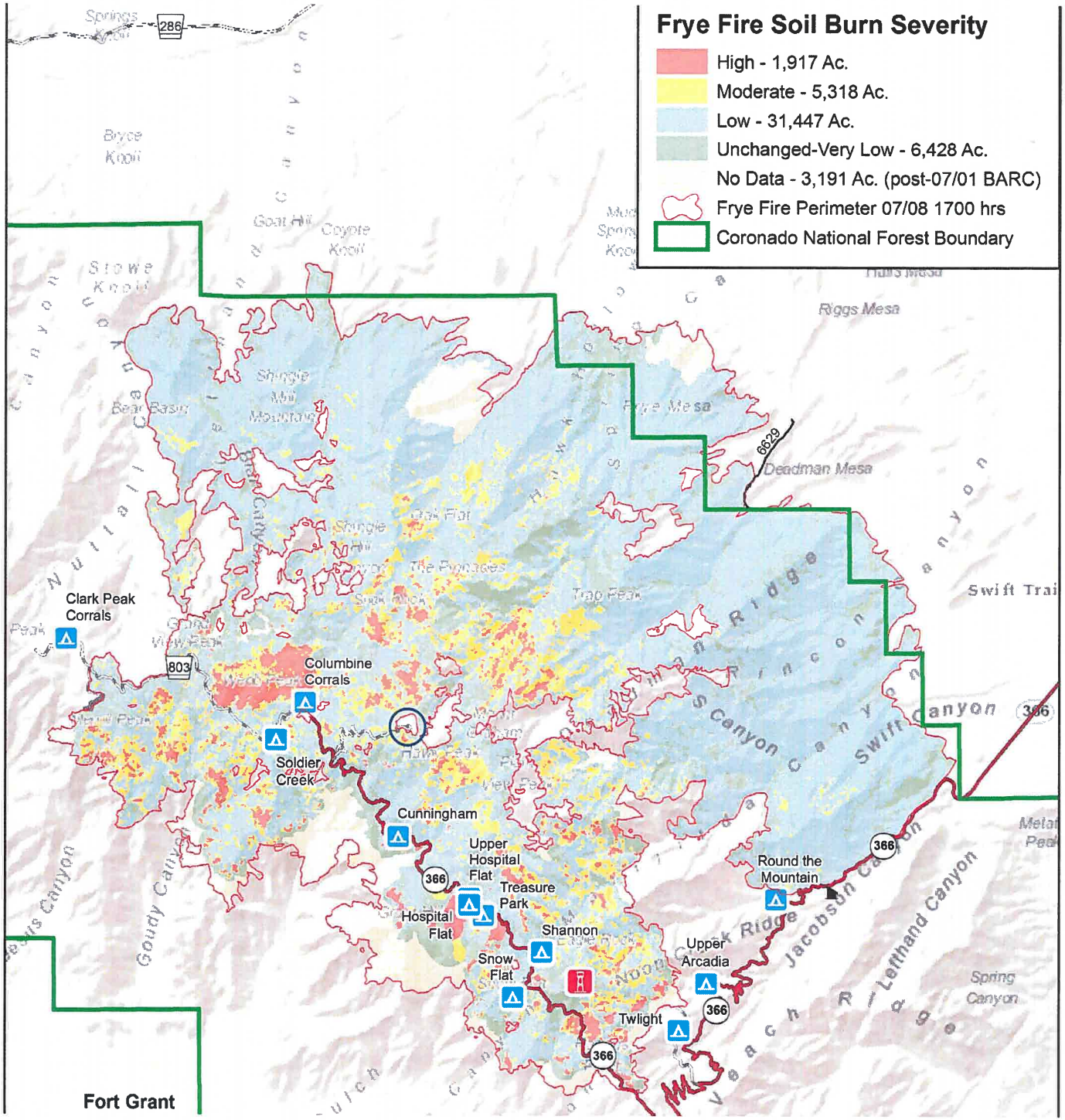
Large Binocular Telescope Observatory
David Carroll, Safety Manager/Engineer

Quick Facts

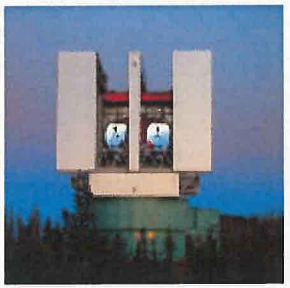


- Cause: Lightning
- 48,000+ acres
- Fire Danger: June 6 – July 16, 2017 (41 days)
- Flooding Danger: July 16, 2017-Present
- 7 incident command (IC) transitions
- 3 district rangers
- Multiple (10+) different fire fighting crews
- Fire crews lodged at the LBTO throughout the event.
- Significant burn threats to the Vatican Telescope and the MGIO Utility Building
- 2 MGIO and 1 LBTO staff on site throughout (minimum)

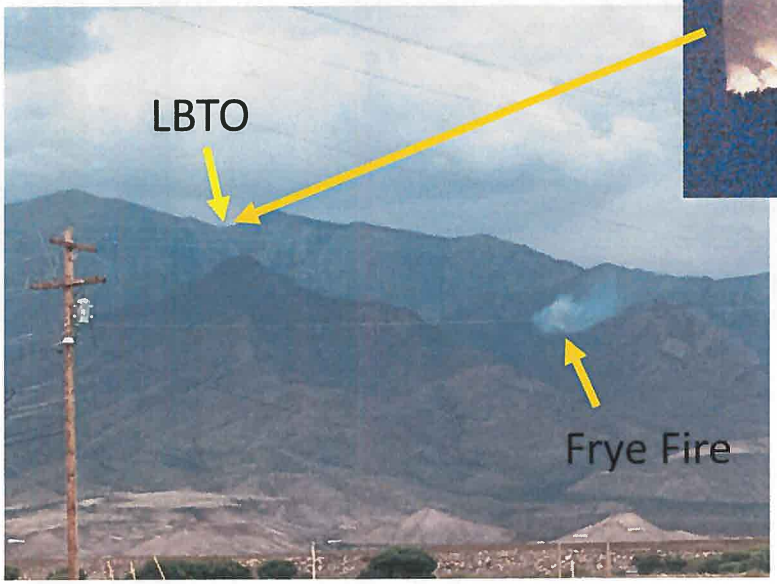
○ MGIO


Frye Fire Soil Burn Severity
High - 1,917 Ac.
Moderate - 5,318 Ac.
Low - 31,447 Ac.
Unchanged-Very Low - 6,428 Ac.
No Data - 3,191 Ac. (post-07/01 BARC)
Frye Fire Perimeter 07/08 1700 hrs
Coronado National Forest Boundary
Clark Peak Corrals
Columbine Corrals
Soldier Creek
Cunningham
Upper Hospital Flat
Hospital Flat
Treasure Park
Shannon
Snow Flat
Twilight
Upper Arcadia
Round the Mountain
Riggs Mesa
Deadman Mesa
Swift Trail
Fort Grant
803
366
6629

Fire Grows & Spreads Quickly!



- 11 days from 5-acre fire to observatory doorstep.

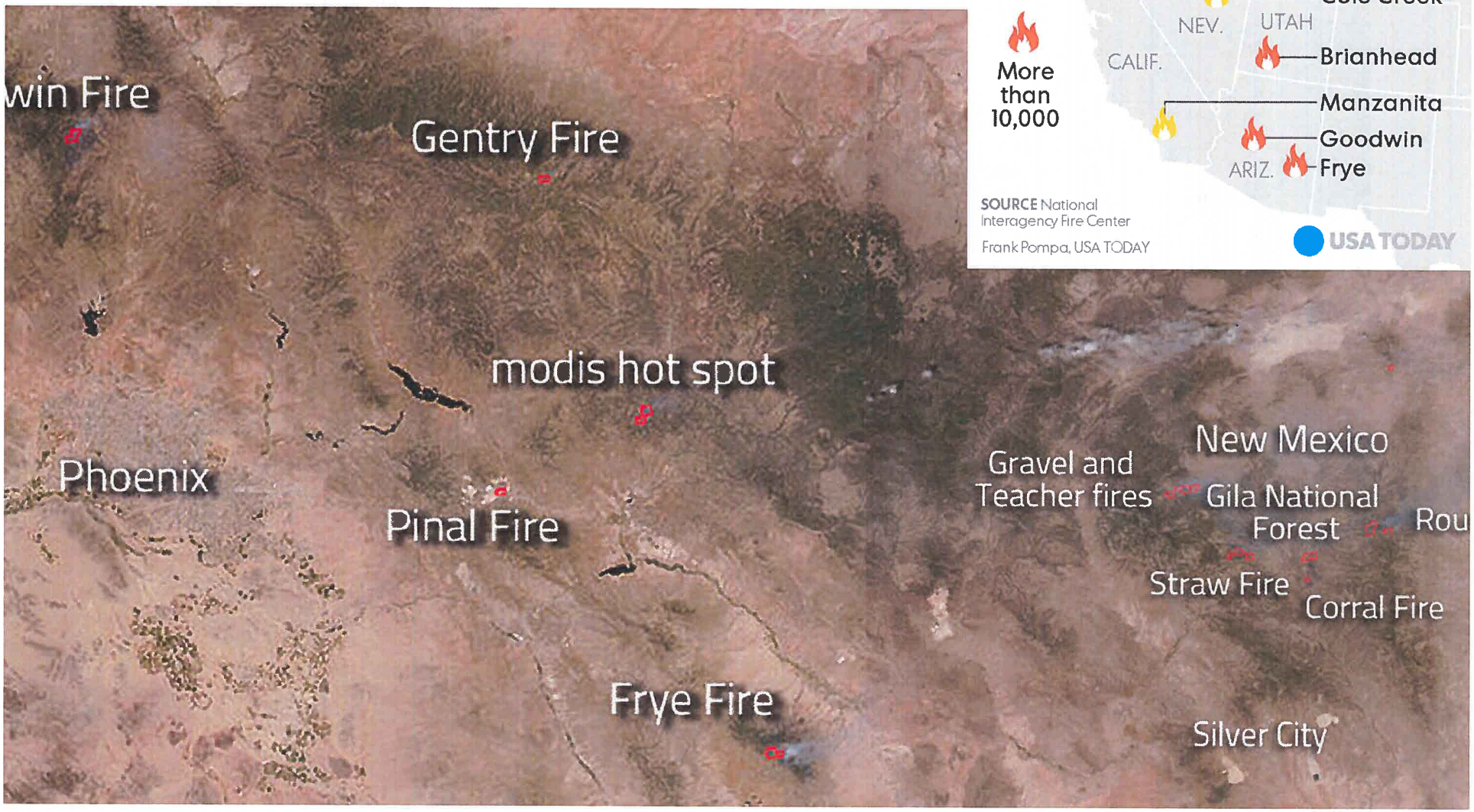


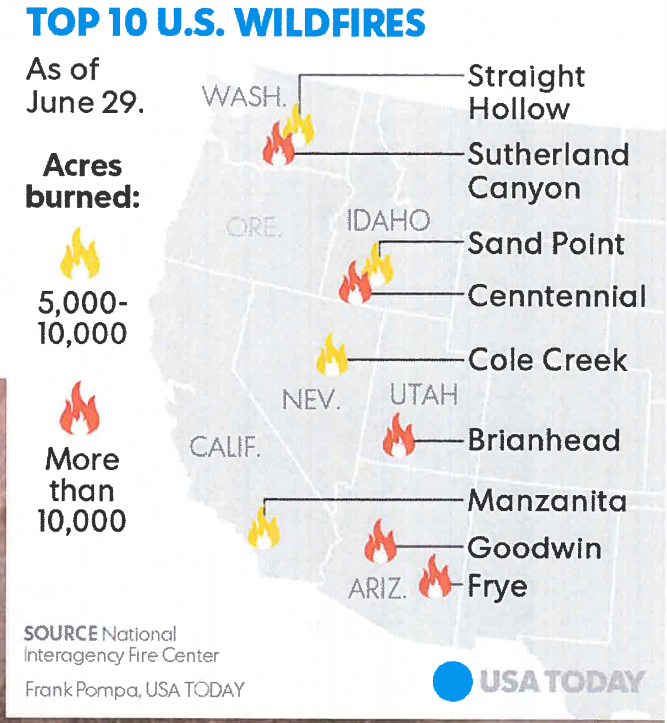
June 7, 2017

June 15, 2017
Over the ridge

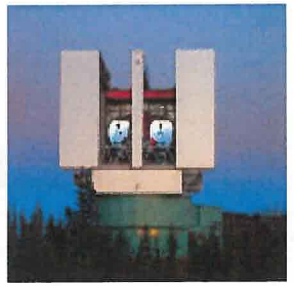
June 18, 2017

Limited Resources, Multiple Fires



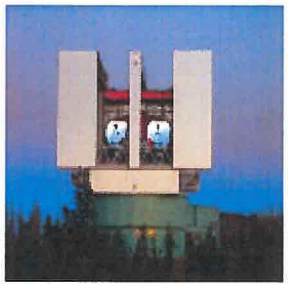


Fire Fighting Philosophy



- US Forest Service (USFS)
  - Risk minimization strategy - Personnel before property & active vs. passive response.
  - Prioritization of finite resources – Helicopters, aircraft, and crew.
  - Philosophy – Let it burn unless people or property are at risk.
- The Million Dollar Question:
  - Could early resources have prevented this fire?
  - Answer: Quite Possibly.
- Paradox:
  - While USFS will actively fight fires that threaten people or property, people or property are likely not at risk until the fire becomes a major threat.
- Lesson: Assume every fire could threaten your site!

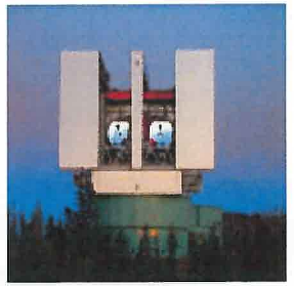
Prioritization of Risk



1. Personnel
2. Property/Assets
3. Environment (squirrel habitat, archaeological sites)
4. Business operations

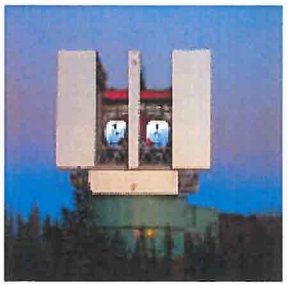
- External vs. internal risk assessment
- Acceptable risk (to whom?)
- Acceptable balance of risk in decision-making

Staffing



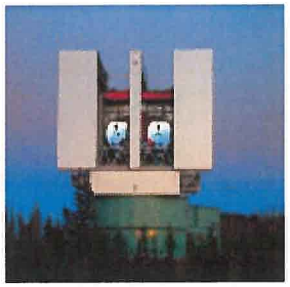
- Evacuate all non-essential staff.
- Each fire and site is different; There is no blueprint!
- Regular meetings of external (USFS IC), then Internal (site) groups should determine the staffing plan.
- Weigh risk to staff with risk to property and operations. Risk management is not always dealt in absolutes.
- First, is it advised/allowed, and then, is it safe?
- Is there a designated shelter-in-place location, approved by the jurisdiction? Do we have supplies and equipment necessary?
- Is there a need to stay?
- Never force anyone to stay, unless ordered by the IC.

Staffing



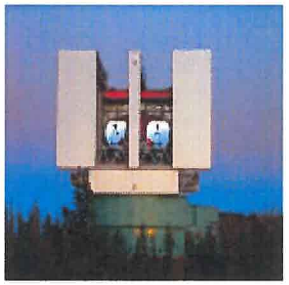
- Even if it can be safe, why stay?
  - Execute the forest fire mitigation plan.
  - HVAC, smoke management (turtle strategy) to minimize impact on people, the building and equipment.
  - Equipment wrapping, covering, power-down.
  - Operate controls with “eyes-on” and “hands-on.”
  - Assist and oversee site and fire crews.
  - Prepare building to minimize impact of heat (move flammables and sensitive equipment to safe locations, etc.)
  - Prepare the site to re-open, if possible.

Summit Egress



- Routes
  - Work with the jurisdiction having authority ahead of time to understand which egress routes from your site can and will be utilized in an emergency.
- Shelter-In-Place
  - Designate this location along with the jurisdiction having authority. This generally will require a walkthrough.
  - If there is no safe shelter-in-place location at your site, full evacuation is prudent, particularly if only 1 site egress route is available.

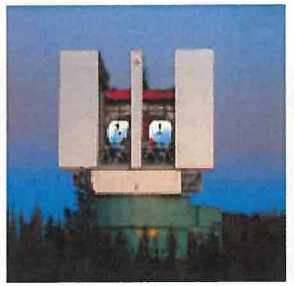
Travel



- All travel dictated by the IC and approved by the director.
- Expect a fire crew or law enforcement escort.
- Checkpoints and approved personnel only.
- Keep tightly managed lists and communicate them to the IC regularly.
- Voluntary basis for staff. If you don't feel safe, don't go!

- Always follow instructions of IC.
  - Violations could be deadly or result in fines up to $5,000 per individual or 10,000 for a corporation.
  - Could lose access to the site.

Air Quality



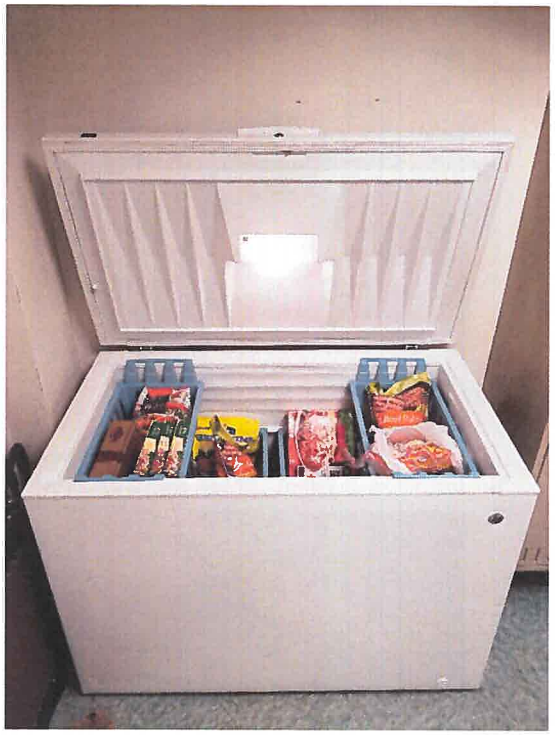
- Forest Fire Smoke: Particulate, CO2, CO, hydrocarbons, organic chemicals, nitrogen oxides, trace minerals, water
- Factors (think dose): Concentration, duration of exposure, material burning, individual physiology, sensitivity, and medical conditions.
- Short term: Particulate; respiratory irritation. Can complicate chronic medical conditions (asthma, lung, heart disease).

- Controls
  - Evacuation (eliminate the hazard)
  - HVAC system management
  - Local (room) Filtration Units (HEPA, charcoal, low/no ozone generation)
  - N-95 filtering face piece respirators

    - OSHA voluntary use: 1910.134 App D
- Ensure equipment/supplies are stocked on a PM.
- Reference: https://www3.epa.gov/airnow/wildfire_may2016.pdf

Food, Water, Fuel

- Meals, Ready-to-Eat (MREs), frozen foods, dry foods.
- LBTO plans for 7 days of food, water, fuel for minimally designated staff.
- Keep these items stocked, and incorporate into a PM schedule (such as fire extinguishers) to ensure they remain stocked throughout the year.
- Keep water and fuel tanks full at first signs of fire.



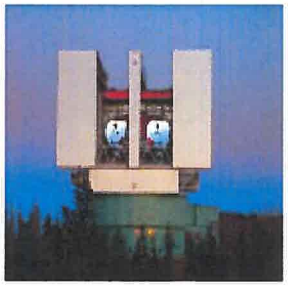
Protecting Equipment

- Hazards: Smoke, ash, fire retardant spray, water, moths, heat.
- Assets: Telescope, instruments, buildings, vehicles, outdoor equipment.
- What to guard and when? Perform a risk assessment.
- Have a plan. Identify what to cover/guard/wrap, how and when. Incorporate it into the Emergency Response Plan.

- Sensitive Optics
- Electronics
- Electricity, water, fire infrastructure

Plastic wrap, cedar for moths near optics, etc.

Untrained Visitors

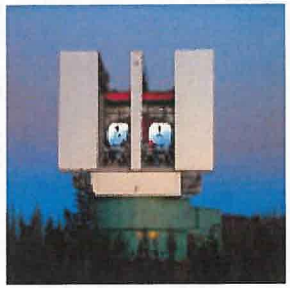


- Jurisdiction dictates your IC, fire fighting, and law enforcement crews.
- Crews likely will not be familiar with site/conditions.
- Communicate site safety items to each IC.
- Consider preparing a document/communication for Fire Crews.
- Importance of signage and labeling (as a last resort)

Manage through Transitions:

- 7 Incident Command (ICs) changes
- 3 USFS District Ranger changes
- Fire Crews on 14 day shifts, with overlap over ~8 weeks.

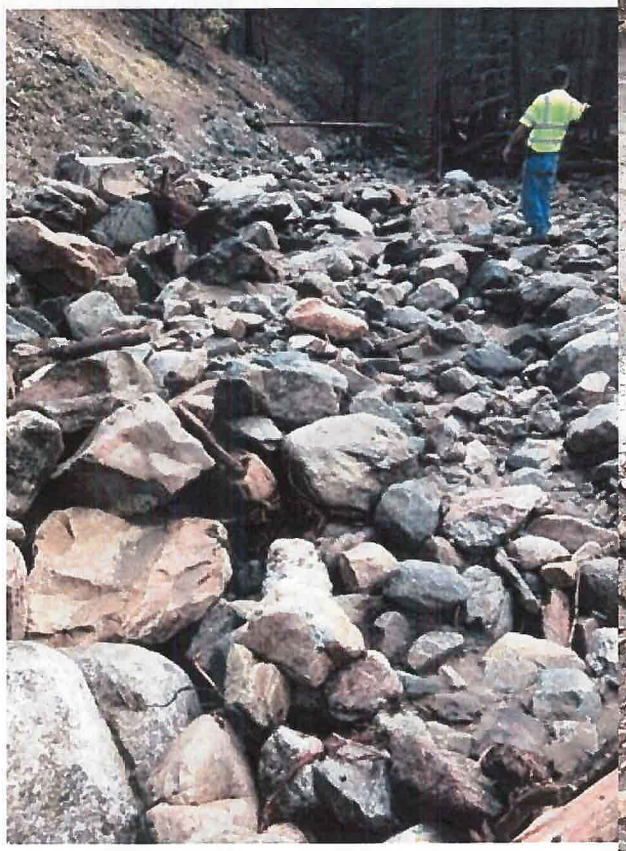
Communication



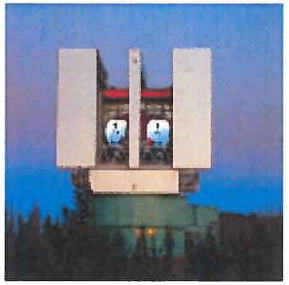
- Be clear on who your liaison is with the jurisdiction having authority. Keep 1 POC.
- Over-communicate. It will never seem like you did after the fact.
- Use online tools (like zoom, etc.) to keep internal stakeholders informed and involved.
- Site cameras can give perspective to those off-site.
- Designate a media relations POC.
- Designate beforehand who will re-direct communications within your organization, and to whom.

Post-Fire Flooding

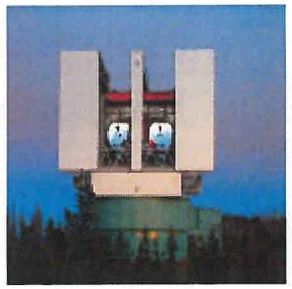
Post-Fire Flooding



Post-Fire Flooding

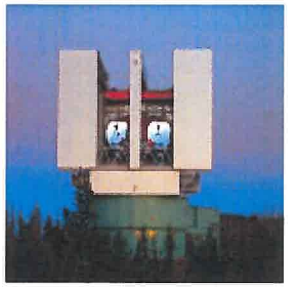


Post-Fire Flooding



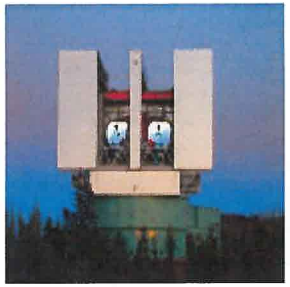
- Multiple wash outs on State Route 366, both paved and unpaved sections. Runoff intensity is magnified when vegetation is burned.
- Intensity depends on amount of rain, burn profile, and the surface area of the drainage basin.
- Like the fire, expect a day-to-day nature.
- Follow instructions of jurisdiction (ADOT, tribal, etc.). Let them go first!
- Monitor weather, but be aware that storms appear out of "thin air," commonly in the afternoon on Mt. Graham. Avoid travel within 90 minutes of heavy rains.
- Advise staff to be prepared to stay multiple days (food, medication, family arrangements, etc.).
- Travel in caravans, 4WD trucks with high clearance only.
- Avoid being trapped between two washouts.
- Do not drive through deep water. Wait it out. There is only so much water above you.

Contingency Planning



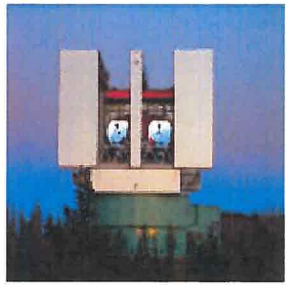
- Do you have a plan? Is it *written*? Is it clear? There could be multiple documents that apply.
- Meet with the group having jurisdiction, plus all stakeholders to review your plan.
- Practice the plan. Run drills and solicit input from within and without the organization.
- Consider:
  - Evacuation protocol, egress routes, shelter-in-place, supplies
  - Emergency shutdown protocols for HVAC, power distribution, instruments, data servers, etc.
  - Minimal power consumption modes
  - Training & drills
  - Multiple communication options, and keeping numbers current.
  - Tasks requiring inspection or upkeep should be incorporated into the PM plan/system.

Training



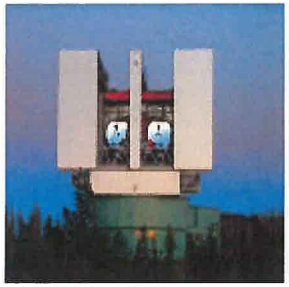
- General – Evacuation, preventing fires, reporting fires (who to call)
- ERT – Train on-site staff on the written plan. This includes throwing breakers, prepping equipment, location of supplies.
- Drills – perform drills with internal and external teams.
- Wildland Firefighting ("red card")
- Wildland First Responder
- Training for management

Other Points



- MGIO/LBTO was aligned with USFS IC on risks and decision-making with regards to risks and access permissions/restrictions. No surprises…
- Goal of burning previous footprints (burn areas) is just that, a goal. Frye fire jumped quickly to unburned areas despite reassurance that it would be contained in the previous burn footprint.
- Despite the goal of burning excess forest fuel as a strategy (USFS), much fuel remains on Mt. Graham.
- The threat of fire is very real. This could happen again next season (or at any time).
- Start preparing today.

Discussion/Questions?



- Thank you!

LESSONS LEARNED FROM THE FRYE FIRE 2017

November 28, 2017
Eric Buckley
Director, MGIO

OR….DID WE DO ANYTHING RIGHT AT ALL?

In The Beginning.....

The Frye Fire was natural caused; lightning strike on June 7th

Any fire on Mt. Graham creates a great deal of emotion with locals

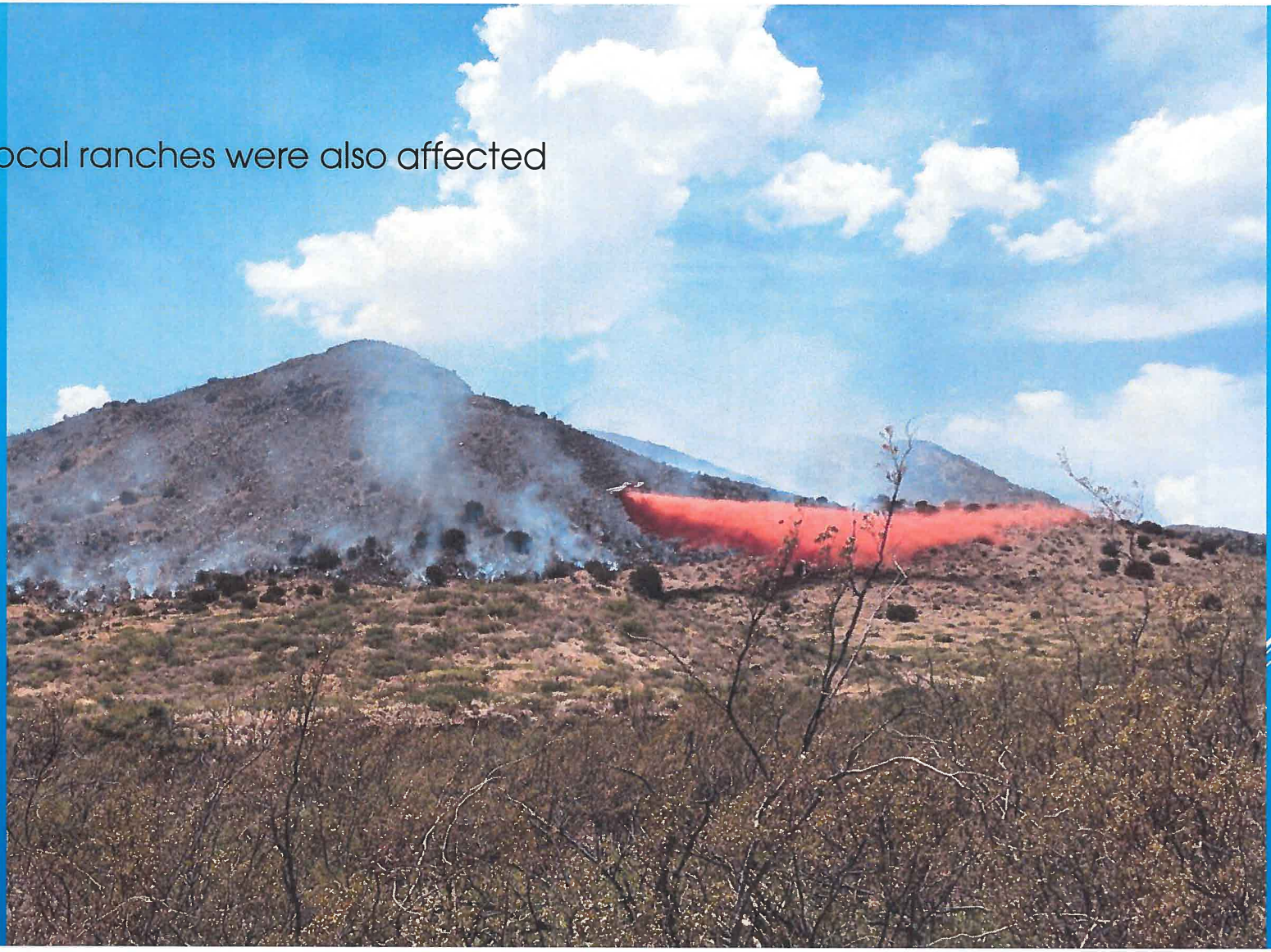
Residents take a sense of ownership with the mountain

A large fire event *can* lead to some tense confrontations with fire officials

- 1996 Clark Peak Fire 6,300 acres
- 2004 Nuttall Complex Fire 30,000 acres
- 2017 Frye Fire 48,400 acres

Fire threatened our facilities, homes (88 cabins), communication towers, wildlife (Mt. Graham Red Squirrel, Gila Trout, Mexican Spotted Owl, Goshawk, Talus Snail)

Many local ranches were also affected



The LBT

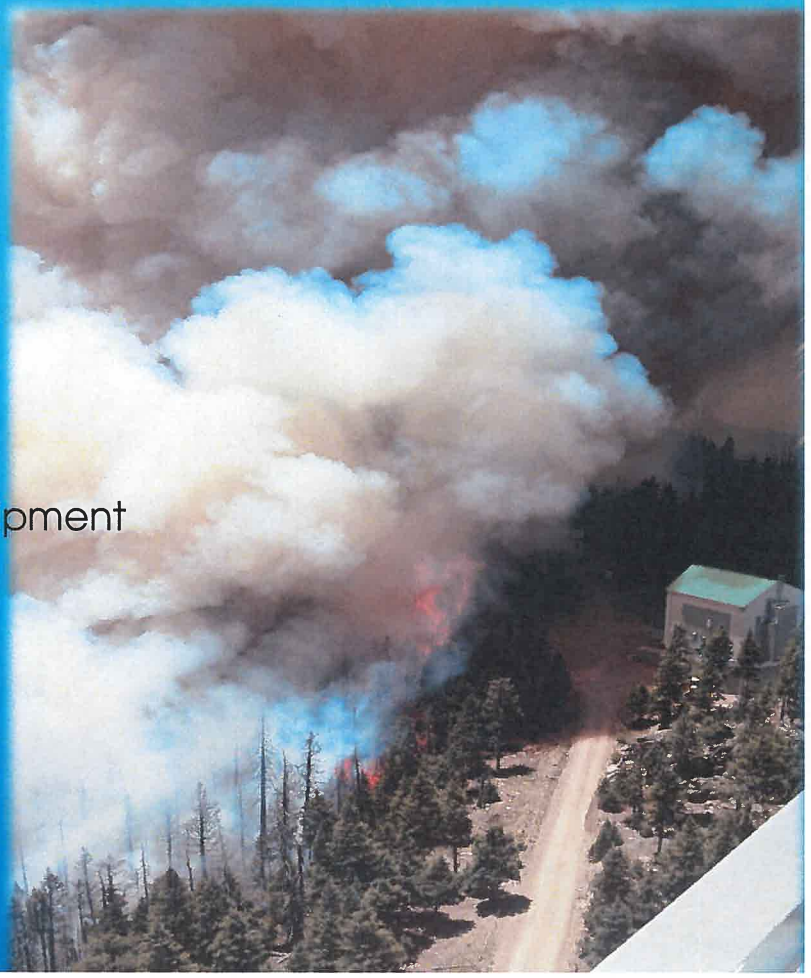
And somewhere behind all the smoke is the VATT and the SMT

As the fire develops, you have to ask the tough questions

- Do we stay or do we go?

- If you go:
  What are the procedures for a safe and secure site closure?
  Each building has its own unique conditions and behaviors
  Do you know how to shut down all of the different systems?
  Safe storage of chemicals and other volatile items

- If you stay:
  The biggest question of all - What are the risks?
  Be sure your building has adequate PPE and fire fighting equipment
  Where is it and do your people know how to use it?



Too Close For Comfort!

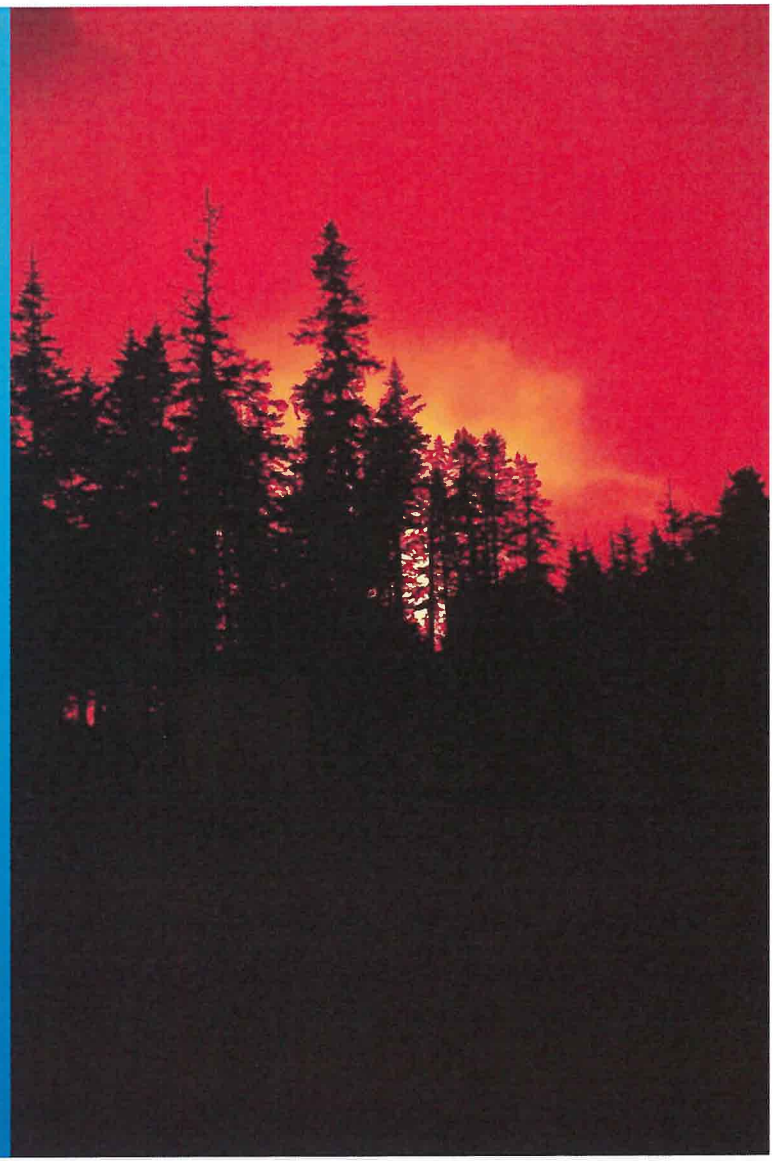
PROBLEMS WE FACED

- Keeping the site and telescopes operating amidst a conflagration raises tough questions

- How many employees should remain on site?
  What are the risks to these people?

  Who qualifies as "essential"?
  Are they wildland fire fighter trained? Is it required?
  How will they be evacuated in short notice?
  Can they be swapped out with other 'qualified' employees?

- Constantly changing fire officials; staying current with their particular regulations and procedures



ONLY "VERY HIGH"?

LOGISTICAL CHALLENGES:

- Travel and access to the summit very restricted
  - 8 days of no travel
  - LE escorts and caravans required much of the time
- Limited to essential personnel only – define 'essential'?
  - These restrictions and procedures changed by the hour
  - Swapping out our personnel with replacements
- Commercial power turned off for 19 days
- Re-supply/transportation challenges:
  - Water for sprinkler system, drinking water, food, medications
  - Power supply; fuel deliveries

WELL, AT LEAST WE GOT SOME GREAT PICTURES…

LBT Parking Lot

SOME PROBLEMS WE FACED WITH USFS:

- Frequent Incident Command changes
  7 different IC's in ~40 days
  3 Local District Rangers

- With each IC change brings a whole new set of players
- Reintroduce ourselves, get to know everyone and let them get to know us
- Each IC had their own unique management styles
- Fire fighters rotate out every 14 days

- Learning to adjust to fire fighting philosophies was a challenge

At the end of the day:

- All fire officials were professional and responsive to our requests. Must stay within their own safety rule boundaries


Tucson, we have a problem....

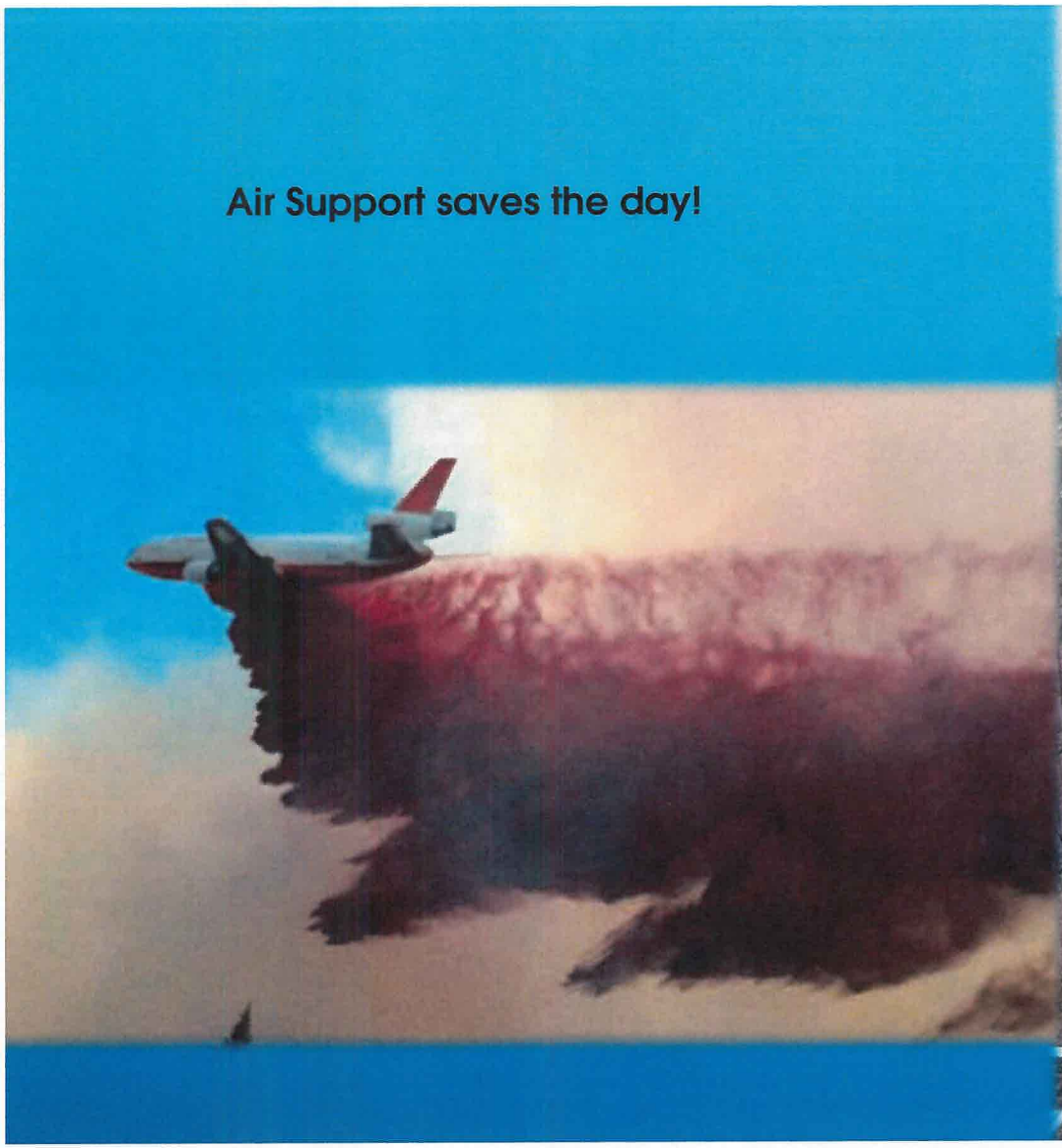
What We Did Right

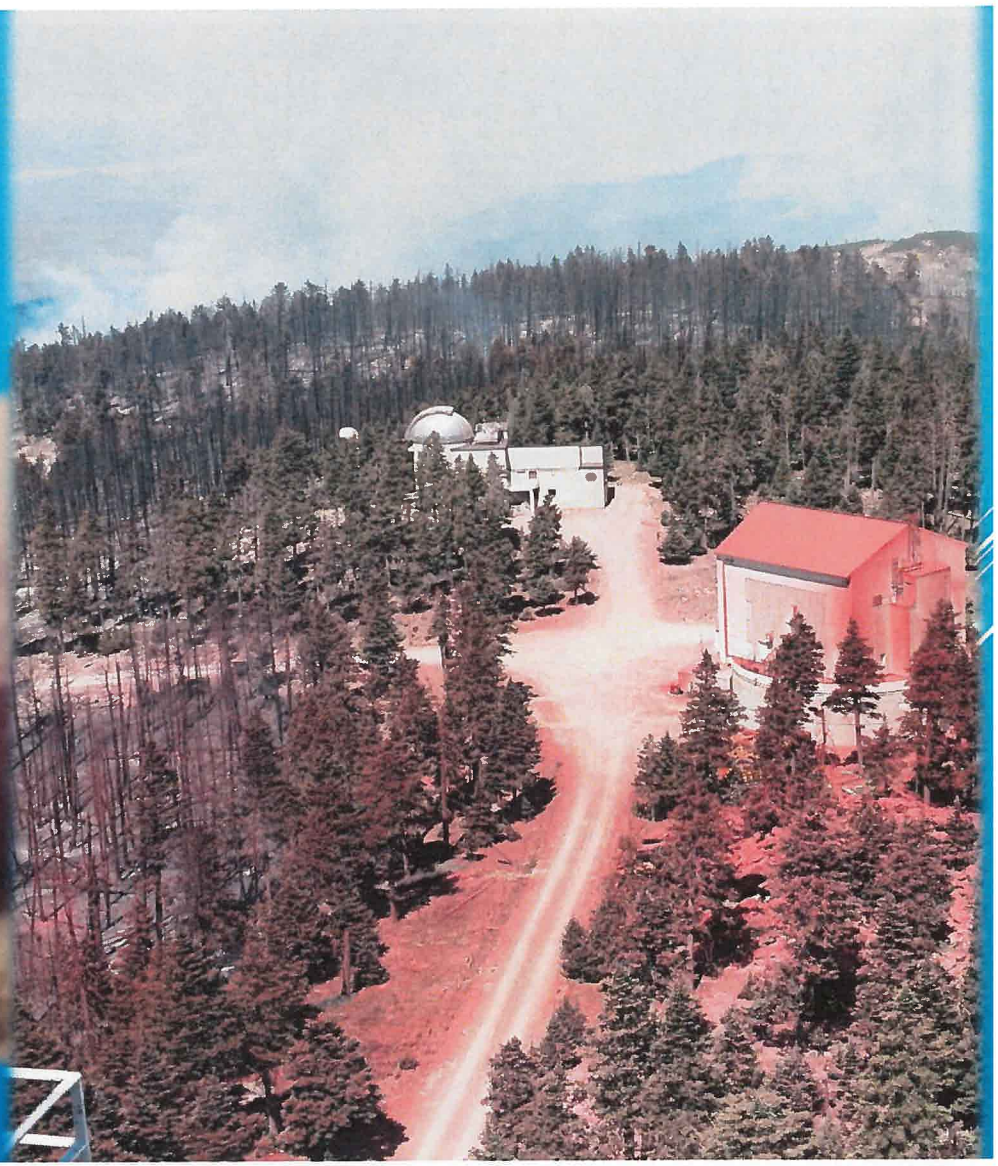
- Established relationships with fire officials and law enforcement right away and stayed in constant communication
- Attended daily coordination meetings – very important!
- Organized and set schedules for MGIO employees' round the clock shifts
  - MGIO crews were ready and willing to work the long hours
  - Sgt. Boltinghouse of UAPD was key to our success
- We released daily updates – very important!
- Established an alternate escape route off the summit (at the end of fire) with permissions from local FS district ranger
- Held evaluation meeting afterwards to critique our performance

View from the staff housing of Fort Grant Prison Complex, July 5th

View from the LBT roof

Air Support saves the day!





What To Plan For Next Time

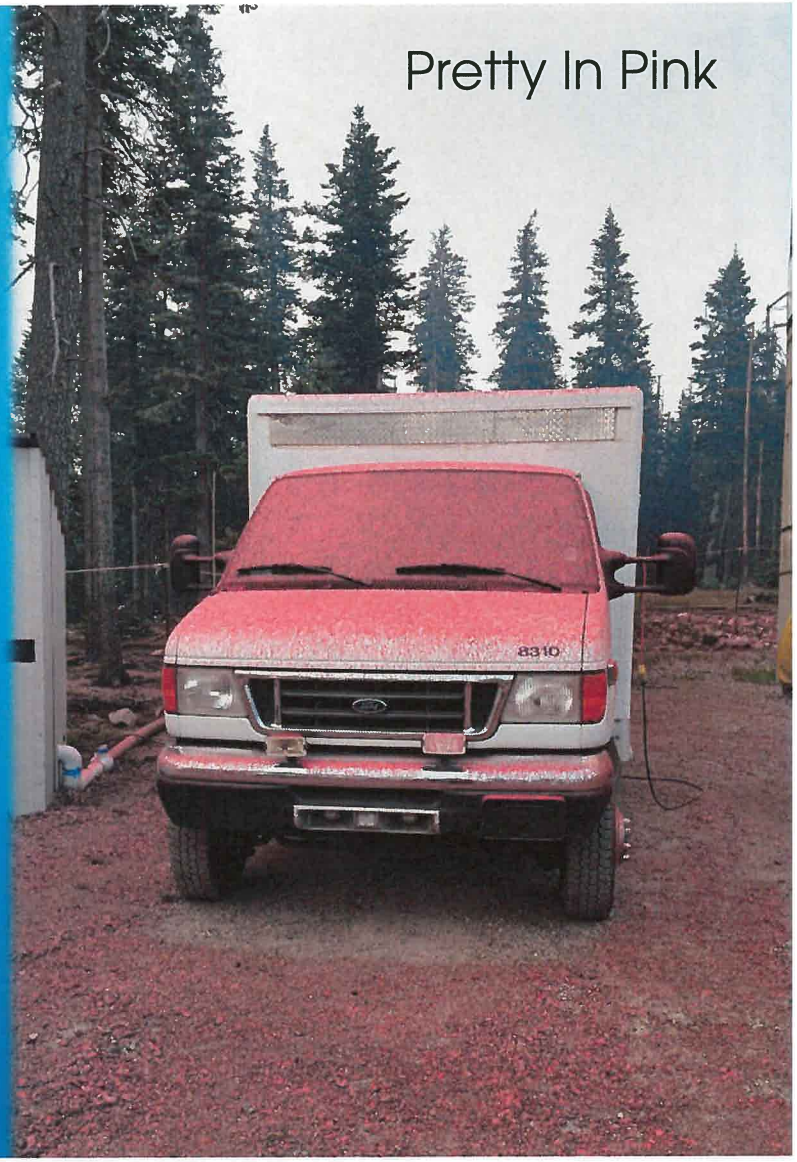
- Keep extra provisions in all of the buildings; food, water, first aid supplies, medications

- Have a Forest Fire Emergency Contingency Plan
  - What to do and where to go when things go bad
  - Have and know your 'shelter-in-place'
  - Have and know your evacuation plan

- What if commercial power is turned off? What is your back up supply; are you prepared?

- Be ready for long hours; it will not be an 8 to 5 day!
  - Early morning fire meetings and late night calls
  - Weekends and holidays

- Afterwards: don't expect much help from USFS
  - BAER (burned area emergency rehabilitation) money ran out very quickly



The northeastern slopes of the Pinaleno's

June 22nd

After The Fire….

Heavy flooding caused extensive damage not only to mountain roads, but to local communities

Ash runoff into lakes, ponds and streams

The aftermath of the fire will be felt for many years to come

Removing Gila Trout from mountain streams

Post Fire Flooding

Plugged culverts caused runoff to flow over roadways causing major damage to all roads

One way access road repairs caused periodic traffic delays

With ground cover burned away, even light rains cause big problems very quickly!

Flooding across the access road July 30th


New problem: Flooding!
July 30th

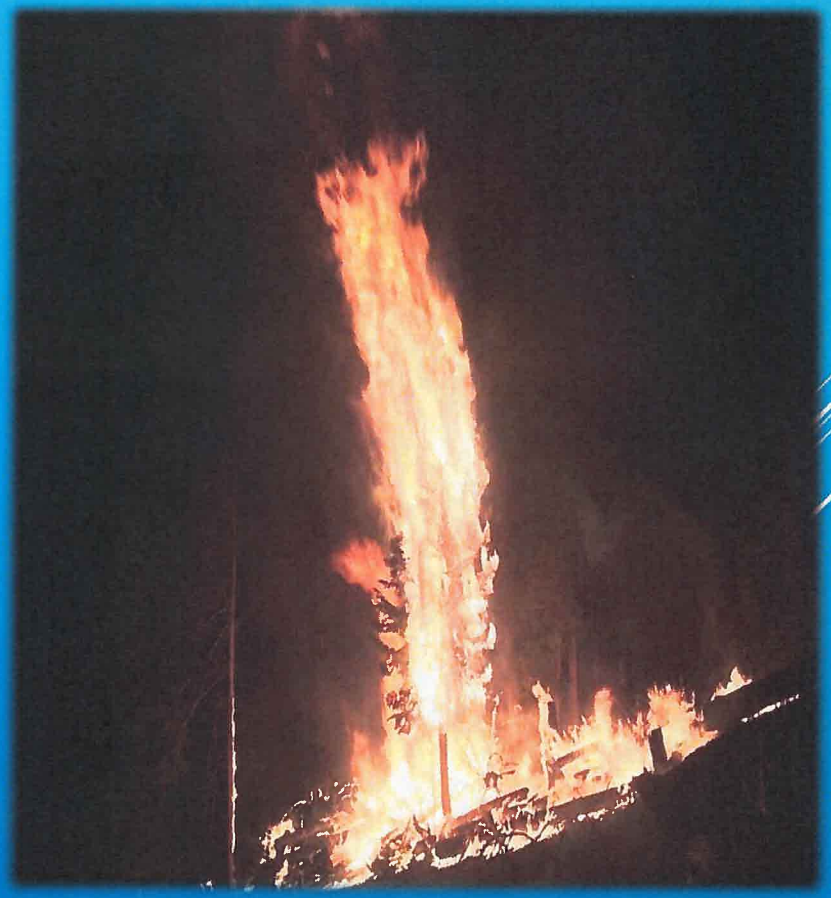
FRYE FIRE FACTS:

Total fire size 48,443 acres

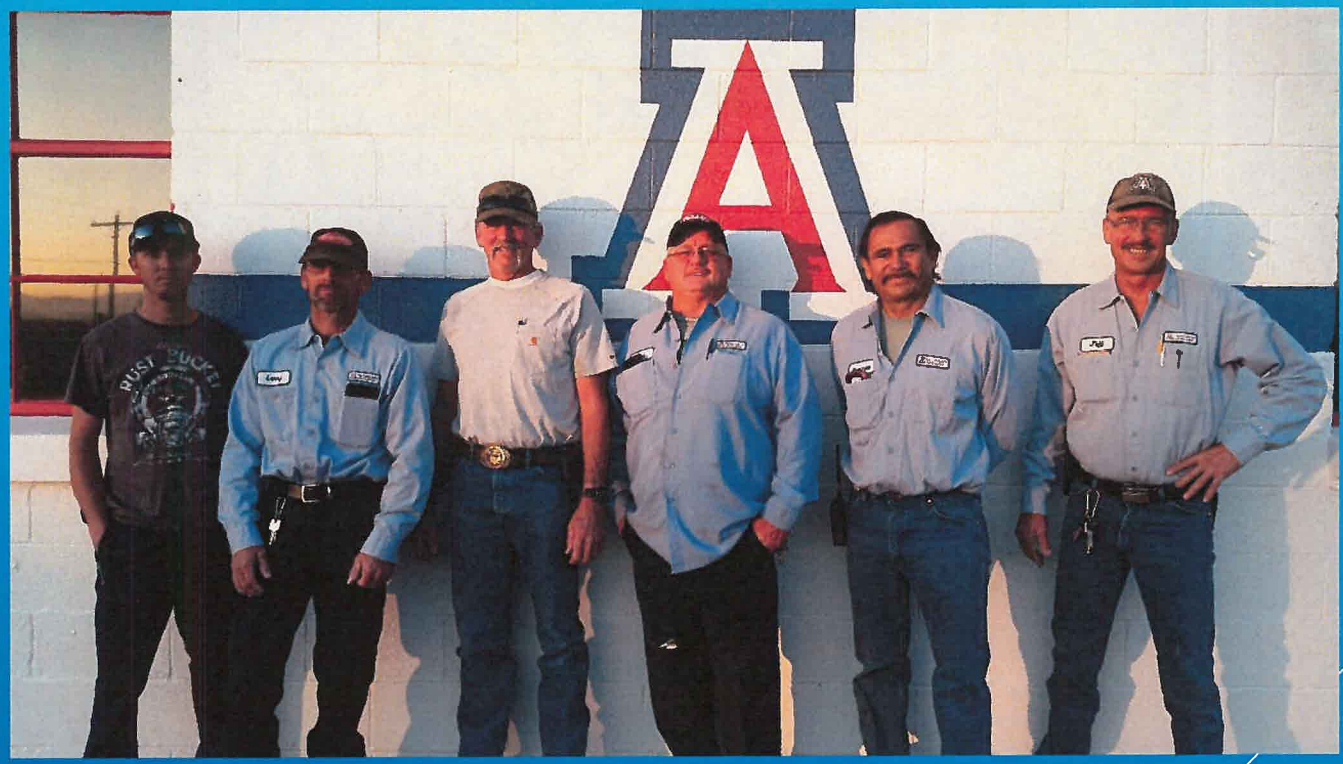
On June 25th, 943 people assigned to fight this fire

Including 274 misc. overhead personnel
- 45 engines
- 26 fire fighting crews
- 10 helicopters
- 5 bulldozers
- 10 water tenders

Cost to fight: $27 million



Mt. Graham International Observatory Maintenance Department
September 12, 2017



From left to right: Gary Bowman, Larry Thomas, Keith Taylor, Doug Roden, Armando Alvarado, Jeff Moffitt

THANK YOU!