

ERMI ANALYTICAL REPORT

Client: David [REDACTED]
[REDACTED]
[REDACTED] TX [REDACTED] [REDACTED]
[REDACTED] [REDACTED]

Sample by: [REDACTED]
[REDACTED] [REDACTED]

Site Address: [REDACTED]
[REDACTED] TX [REDACTED] [REDACTED]

Project name: [REDACTED]

Sample Location:

.

Sample Type: Swiffer **Status:** Post-Remediation

Client Reference:

Client Comments:

Date of Sampling: November 20, 2018

Date Sample/s Received: November 26, 2018

Date of Report: December 05, 2018

Reported and Released By: David Lark, Mycologist.

Our Reference: 183641

P.O. 12498 **EB**

PURPOSE OF THIS REPORT:

- 1) To detect mold present by Quantitative Polymerase Chain Reaction (QPCR) analysis of fungal DNA and determine relative mold species in the sample/s taken from within the premises.

- 2) Provide an Environmental Relative Moldiness Index (ERMI and HERTSMI-2) calculated on the basis of the mold species detected and evaluate the ERMI as an index of the severity of the mold present within the premises where sampling was conducted.

1 INSTRUCTIONS

- 1) The sample/s collected at the property was submitted by the client.

- 2) The purpose of the sample/s submitted for analysis was to detect and report on mold DNA present using QPCR detection methods as set out in the attached report and interpret these findings.

2 COMMENTARY

- 1) The sample/s collected was referred under the chain of custody to our laboratory for analysis and reporting.

- 2) The sample/s received was labelled and in an intact condition.

- 3) This is an Analytical Report only and may not be in a format acceptable for litigation purposes because different Jurisdictions have differing requirements.
Please contact EnviroBiomics for further assistance.

- 4) Unless EnviroBiomics has either performed the assessment from which this sample/s originated or has been provided with the requisite certification from the sample/s as per Reference [8], the results contained in this report should not be relied upon as the sole criteria for granting "clearance" or post remediation verification by any party.

- 5) In accordance with our Terms & Conditions, this document and its contents are intended for the Addressee only and contains opinions held by the Author who prepared this report based on material available at the time of preparation and expressed for the purposes of consideration by the Addressee and is not for general publication without written consent.

- 6) Copyright of this report is retained by the Author and the Addressee is granted an exclusive license to its contents and uses only when payment for this report is received in full. The sample/s collected was referred under the chain of custody to our laboratory for analysis and reporting.

- 7) Extraction or copying of this document, except in full, without the written consent of EnviroBiomics is unauthorized.

3 RESULTS

3.1 QPCR MOLD ANALYSIS

The results of the mold DNA detected in the sample submitted for analysis were tabulated as follows:

Group 1; Water Damage Molds	
Species	SE/mg
Aspergillus flavus/oryzae	6
Aspergillus fumigatus	N.D.
Aspergillus niger	49
Aspergillus ochraceus	81
Aspergillus penicillioides	53
Aspergillus restrictus	N.D.
Aspergillus sclerotiorum	5
Aspergillus sydowii	38
Aspergillus unguis	N.D.
Aspergillus versicolor	18
Aureobasidium pullulans	294
Chaetomium globosum	17
Cladosporium sphaerospermum	3,670
Eurotium (Asp.) amstelodami	523
Paecilomyces variotii	18
Penicillium brevicompactum	7
Penicillium corylophilum	N.D.
Penicillium crustosum	N.D.
Penicillium purpurogenum	19
Penicillium Spinulosum	34
Penicillium variabile	16
Scopulariopsis brevicaulis/fusca	13
Scopulariopsis chartarum	N.D.
Stachybotrys chartarum	43
Trichoderma viride	3
Wallemia sebi	45
Sum of Logs	30.6

Group 2; Common Indoor Molds	
Species	SE/mg
Acremonium strictum	N.D.
Alternaria alternata	18
Aspergillus ustus	32
Cladosporium cladosporioides1	776
Cladosporium cladosporioides2	3,652
Cladosporium herbarum	6
Epicoccum nigrum	938
Mucor amphibiorum	N.D.
Penicillium chrysogenum	50
Rhizopus stolonifer	N.D.
Sum of Logs	14.7

SE = Spore Equivalent
 SE/mg = SE/milligrams of sample
 ND = None Detected

Sample Size	4.9 mg
ERMI Results= (G1-G2)	15.9

4 CONCLUSIONS

4.1 The table at 3.1, shows the Spore Equivalent per milligram detected for each of the 36 environmental molds analyzed.

Mold species listed under Group 1 are known as Water Damage Mold.

The gray background on Group 1 table highlights the main mold (DNAs) detected in this report, which was selected based on their value being higher than tenfold of the geometric mean of the corresponding mold on the 2007 USA survey of molds. [9]

Using the full spectra of data obtained by MSQPCR for all molds detected in the panel, the ERMI was found to be:

Environmental Relative Moldiness Index (ERMI)	15.9	Interpretation	Q4
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ERMI score was developed by the US government for environmental mold safety (mold related asthma) and the score table is a general recommendation.

For patients with CIRS condition, in general, an ERMI score of 2 or less is considered safe. For more information please consult with your doctor for the best advice on how to interpret the results.

4.2 The interpretation was made with reference to the following table:

Level	ERMI Value	Interpretation	Comment
Q 1	Less than - 4	Low Relative Moldiness Index	Further investigation is not needed to determine the sources of the mold.
Q 2	-4 to < 0	Low - Medium Relative	Further investigation may be needed to determine the sources of the mold if occupants have been reactive, sensitized, genetically predisposed or otherwise immuno-compromised.
Q 3	0 to < 5	Medium- High Relative	
Q 4	5 to < 20	High Relative Moldiness Index	Source and cause of mold should be determined and remediation is undertaken, reducing the ERMI to levels below Q2.
	> 20	Very High Relative	

4.3 According to Vesper [9] ERMI Scores have an Standard Deviation (S.D.) of +/-3 and should be assessed with this in mind.

4.4 Further assessment was performed by calculating the HERTSMI-2 score from this data, which was found to be:

Species	Spore E./mg	Weighting
Aspergillus penicillioides	53	4
Aspergillus versicolor	18	4
Chaetomium globosum	17	4
Stachybotrys chartarum	43	6
Wallemia sebi	45	0
HERTSMI-2 Score =		18

4.5 The interpretation was made with reference to the following table:

Color-coded interpretation ⁹	
If 10 or below	In only 1.7% of cases, re-occupancy of building following mold remediation has led to relapse of CIRS-WDB symptoms
If between 11 to 15	Borderline. Further remediation and re-assessment is indicated
If greater than 15	Re-occupancy is ill-advised until further remediation and re-assessment are conclusive.

4.6 A spore equivalent may reflect the presence of any other fungal structures (i.e. mycelia) containing the same number of target genes as a spore.

4.7 Genetically close-related species may be detected in the indicator assay.

As reported	Includes
Eurotium (Asp.) amstelodami	E. chevalieri, E. herbariorum, E. rubrum and E. repens.
Penicillium spinulosum	P. glabrum, P. lividum, P. pupurescens, and P. thomii.
Trichoderma viride	T. koningii and T. atroviride.
Aspergillus restrictus	A. caesillus and A. conicus.
Mucor amphibiorum	M. circinelloides, M. hiemalis, M. indicus, M. mucedo, M. racemosus, M. ramosissimus.
Rhizopus zygosporus	R. homothalicus, R. microsporus, R. oligosporus, R. oryzae.
Penicillium crustosum	P. camembertii, P. commune, P. echinulatum, P. solitum.

EnviroBiomics, Inc.

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San Antonio, Texas, 78230**



DAVID LARK
Mycologist

References

- 1) "Microorganisms in home and indoor work environments. Diversity, health impacts, investigation & control." Flannigan, B, Samson, R. A & Miller, J. D. 2nd Edn. 2011. CRC Press, Boca Raton, London & New York.
- 2) "Standard & Reference Guide for Professional Mold Remediation" IICRC s520 – Aug. 2008, 2nd Ed. Institute of Inspection, Cleaning & Restoration Certification, Vancouver, Washington 98661 USA.
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- 4) "Worldwide Exposure Standards for Mold & Bacteria - Assessment Guidelines for Air, Water, Dust Ductwork, Carpet & Insulation", 8th Ed., 2010 – Robert C. & Gail M. Brandys, OEHCS, Inc. IL. ISBN 0 -9774785-0-
- 5) "HVAC Hygiene Guidelines, 2009" Australian Institute of Refrigeration, Air Conditioning & Heating.
- 6) "Food & Indoor Fungi" Samson, R.A et al CBS-KNAW Fungal Biodiversity Centre, Utrecht, The Netherlands ISBN 978 90 70351 82 3.
- 7) "Post-Remediation Testing and Verification for Mold and Bacteria" 4th Ed., 2011-Robert C. & Gail M. Brandys, OEHCS, Inc. IL. ISBN 978-0-9774785-1.
- 8) "Development of an Environmental Relative Mouldiness Index" Vesper S. et al, Occupational Env. Med. 2007,49:829-833
- 9) Correlating Human Health Risk with Mold Specific QPCR in Water-Damaged Buildings; Shoemaker, R & Lark D, in Proceedings of the 14th International Conference on Indoor Air Quality and Climate, International Society for Indoor Air Quality and Climate, Ghent, Belgium, #658

ERMI ANALYTICAL REPORT

Client: David [REDACTED]
[REDACTED]
[REDACTED] TX [REDACTED] [REDACTED]
[REDACTED] [REDACTED]

Sample by: [REDACTED]
[REDACTED] [REDACTED]

Site Address: [REDACTED]
[REDACTED] TX [REDACTED] [REDACTED]
Project name: [REDACTED]

Sample Location:
N/A

Sample Type: Swiffer **Status:** Post-Remediation

Client Reference:

Client Comments:

Date of Sampling: January 06, 2019
Date Sample/s Received: January 09, 2019
Date of Report: January 18, 2019

Reported and Released By David Lark, Mycologist.

Our Reference: 190116

P.O. 12886 **EB** 2068

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Species	SE/mg
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Aspergillus fumigatus	1
Aspergillus niger	11
Aspergillus ochraceus	61
Aspergillus penicillioides	79
Aspergillus restrictus	1
Aspergillus sclerotiorum	3
Aspergillus sydowii	4
Aspergillus unguis	1
Aspergillus versicolor	N.D.
Aureobasidium pullulans	1,901
Chaetomium globosum	1
Cladosporium sphaerospermum	332
Eurotium (Asp.) amstelodami	70
Paecilomyces variotii	1
Penicillium brevicompactum	3
Penicillium corylophilum	N.D.
Penicillium crustosum	N.D.
Penicillium purpurogenum	N.D.
Penicillium Spinulosum	12
Penicillium variabile	1
Scopulariopsis brevicaulis/fusca	5
Scopulariopsis chartarum	N.D.
Stachybotrys chartarum	3
Trichoderma viride	2
Wallemia sebi	18
Sum of Logs	18.2

Group 2; Common Indoor Molds	
Species	SE/mg
Acremonium strictum	1
Alternaria alternata	39
Aspergillus ustus	4
Cladosporium cladosporioides1	511
Cladosporium cladosporioides2	70
Cladosporium herbarum	6
Epicoccum nigrum	1,222
Mucor amphibiorum	3
Penicillium chrysogenum	10
Rhizopus stolonifer	N.D.
Sum of Logs	12.1

SE = Spore Equivalent
 SE/mg = SE/milligrams of sample
 ND = None Detected

Sample Size	5.1 mg
ERMI Results= (G1-G2)	6.1

4 CONCLUSIONS

4.1 The table at 3.1, shows the Spore Equivalent per milligram detected for each of the 36 environmental molds analyzed.

Mold species listed under Group 1 are known as Water Damage Mold.

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4.4 Further assessment was performed by calculating the HERTSMI-2 score from this data, which was found to be:

Species	Spore E./mg	Weighting
Aspergillus penicillioides	79	4
Aspergillus versicolor	N.D.	0
Chaetomium globosum	1	0
Stachybotrys chartarum	3	0
Wallemia sebi	18	0
HERTSMI-2 Score =		4

4.5 The interpretation was made with reference to the following table:

Color-coded interpretation ⁹	
If 10 or below	In only 1.7% of cases, re-occupancy of building following mold remediation has led to relapse of CIRS-WDB symptoms
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