

**MOLD REMEDIATION  
FINAL  
POST - REMEDIATION VERIFICATION (CLEARANCE) REPORT  
SMITH RESIDENCE  
514 PRECIOUS  
SAN ANTONIO, TEXAS**

Prepared for

**SAN ANTONIO HOUSING AUTHORITY  
SAN ANTONIO, TEXAS**

by

**ETC INFORMATION SERVICES, LLC**

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**March 2008**

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Project No. 7A-020  
March 18, 2008

Mr. Timothy Alcott  
San Antonio Housing Authority  
1315 N. Elmendorf  
San Antonio, Texas 78207

**Re: Post - Remediation Verification (Clearance) Report - Final  
Smith Residence, 514 Precious, San Antonio, Texas**

Dear Mr. Alcott:

A copy of the report for the Post - Remediation Verification (Clearance) investigation of the referenced property is being forwarded to you for your information and necessary action. An Indoor Environmental Quality Evaluation was prepared for this residence May 15, 2007, and a Mold Remediation Protocol was prepared on June 1, 2007. The report and Protocol should be consulted for a full review of the scope of remediation work.

The sources of water intrusion in this house appear to have been corrected. The results of this investigation indicated that remediation was successful.

We will be happy to answer any questions concerning this report. It has been a pleasure working with you on this important assignment. We look forward to being of continuing service to you.

Sincerely,

**ETC INFORMATION SERVICES, LLC**

Donald J. Schaezler, Ph.D., P.E., CIH  
President

## 1.0 INTRODUCTION

The subject residence has been recently inspected and sampled for remediation of water damage and mold contamination. The purpose of the inspection was to determine the status of remediation by visual inspection, measurement of moisture content in building materials, and collection of air and surface samples. The purpose of this letter is to summarize the results of the inspection and to document that the remediation has been successfully completed.

## 2.0 Background

A previous report by ETC Information Services, LLC, (“Indoor Environmental Quality Evaluation,” prepared for SAHA by ETC Information Services, LLC, May 2007) recommended remediation by a licensed contractor. A Remediation Protocol was subsequently prepared June 1, 2007, and was the basis for the remediation conducted by Blackmon-Mooring of San Antonio, Texas.

Remediation was necessary because of visible water damage and mold around the back door and under the windows in the Living Room and Dining Room and visible water damage and mold growth in the Kitchen cabinets. Rainwater intrusion through the back door and windows was the identified cause of damage in the Living Room and Dining Room, and counter top and/or plumbing leaks were the potential causes of damage in the Kitchen. Minor damage was also noted and planned for minor remediation at the AHU Closet and the Master Bathroom.

A Post-Remediation Verification Report was prepared July 31, 2007. This report found that the remediated surfaces were clean. However, surfaces at the back door had been impacted by infiltration through the temporary construction door. That area needed removal of some impacted framing. In addition a minor plumbing leak was discovered at the Kitchen sink. This report should be consulted for additional details.

A Post-Remediation Verification Report was prepared November 11, 2007. This report confirmed that remediation surfaces were clean and that airborne mold levels were satisfactory. However, it found excess epithelial cells in the Master Bathroom and recommended additional cleaning. This report should be consulted for additional details.

On December 20, 2007, the following observations were made at the subject residence:

1. Additional removal had been done at the head of the tub, and framing was visibly clean.

2. Newly discovered stains were present in the Master Bedroom. The stained areas were dry, but some of the stains were quite dark and must be cleaned. The stained areas had been hidden by furnishings.
3. In general, the house was not clean; quite a lot of debris was present throughout. Air samples for epithelial cells were deemed not to be appropriate because of the debris.
4. The refrigerator had been cleaned and was in the Kitchen.
5. Stained tackboards had not been removed.
6. The coils in the AHU had not been adequately cleaned. They may be occluded to the point that more drastic cleaning or replacement is necessary.
7. Insulation of refrigerant lines and closure of the plenum has not been completed. No filter is present. The hot water heater has been reinstalled, but the drip pan was not installed.

On January 25, 2008, the residence was again inspected, and the following recommendations were made:

1. Remove and replace subfloor in Master Bedroom with dark stains. Paint subfloor areas with other stains in the Master Bedroom and the center rear bedroom with Fosters 40-20.
2. Complete removal of all old tackboards, removal of old AHU and ductwork and installation of new items, movement of the HWH to the Garage.
3. Do final cleaning after items 1 and 2.
4. Perform clearance testing by sampling indoor air in the Master Bathroom and the adjacent indoor area.

On March 4, 2008, clearance sampling was performed at the subject residence. Follow up samples were collected March 12, 2008. The results of these samples are the subject of this report.

### **3.0 Observations**

#### **3.1 March 4 and 12, 2008**

1. Recommendations from January 25, 2008, had been completed, and the house was visibly clean and apparently ready to occupy.

## 4.0 Sampling and Discussion

### 4.1 March 4, 2008

Eight air samples were collected. Four samples were collected inside at the Master Bathroom and Master Bedroom. Four samples were collected from outdoor air for reference. The results are summarized in the tables at the end of this report. The results and their significance are summarized below:

1. Outdoor air had low but typical levels of total fungal spores, dominated by *Cladosporium*. There were low proportions of a variety of other spores, including *Penicillium/Aspergillus* type spores.
2. Outdoor air had typical levels of culturable fungi, dominated by *Cladosporium*. No culturable *Aspergillus* and only a trace of *Penicillium* were present.
3. The Master Bathroom had higher levels of total fungal spores. *Penicillium/Aspergillus* type spores were elevated with respect to outdoor air.
4. The Master Bathroom had somewhat higher levels of culturable fungi but no *Aspergillus* and only a trace of *Penicillium* species.
5. The Master Bedroom had higher levels of total fungal spores. *Penicillium/Aspergillus* type spores were elevated with respect to outdoor air.
6. The Master Bedroom had similar levels of culturable fungi and no *Aspergillus* or *Penicillium*.
7. The results were satisfactory with respect to culturable fungi, but with respect to total fungal spores. Fungal spores were not an issue previously, and no problems in the target area of the Master Bathroom and Master Bedroom were apparent. It was decided to resample for total fungal spores.

### 4.2 March 12, 2008

Four air samples were collected. Three samples were collected inside at the upstairs hallway, the Master Bathroom, and the Master Bedroom. One sample was collected from outdoor air for reference. The results are summarized in the tables at the end of this report. The results and their significance are summarized below:

1. Outdoor air had typical levels of total fungal spores, dominated by Basidiospores, *Cladosporium*, and Ascospores. There were low proportions *Penicillium/Aspergillus* type spores.
2. The upstairs hallway had typical levels of total fungal spores, less than the levels in outdoor air. The spores were dominated by *Cladosporium* and had very low levels of *Penicillium/Aspergillus* type spores.

3. The Master Bedroom had lower levels of total fungal spores, dominated by *Cladosporium*. There were low levels of *Penicillium/Aspergillus* type spores, lower than in outdoor air.
4. The Master Bathroom had lower levels of total fungal spores, dominated by *Cladosporium*. There were low levels of *Penicillium/Aspergillus* type spores, lower than in outdoor air.
5. The results **were satisfactory**.

In addition to fungi, other particulates in air were measured. The results are summarized in a table at the end of this report. The results and their significance are summarized below:

1. Outdoor air had low levels of pollen and epithelial cells.
2. Indoor air in the Hallway had moderate levels of epithelial cells.
3. Indoor air in the Master Bathroom had low, typical levels of epithelial cells.
4. Indoor air in the Master Bedroom had low, typical levels of epithelial cells.

#### 4.3 July 23, 2007

The results of the successful surface sampling and clearance are included in the attached tables.

## **5.0 Conclusions**

1. Remediation of contaminated framing has been successfully completed in the containment areas.
2. All sheetrock, trim, flooring, tackboards, and cabinet materials were removed as specified.
3. All surfaces tested were clean.
4. Indoor air quality inside and outside of containment, was satisfactory with respect to chemical, physical, and fungal parameters, including epithelial cells.
5. The causes of the water damage and mold contamination that were identified have been remediated.

## **6.0 Recommendations**

1. The residence is ready for occupancy.

**TABLE 1A - BIOAEROSOL SAMPLING RESULTS  
MAJOR GENERA/TYPES – March 4, 2008**

Ref. No.	Description-Air Samples	Concentration, Counts/M <sup>3</sup> (%)							
		Alt	Asc	Bas	Cl	Pn/As	Sm/Myx	Total Fungal Spores	HyF
<b>Outside</b>									
1	Outdoor air – front at 402 Precious	40 (3)	40 (3)	0	867 (71)	53 (4)	13 (1)	1,213	867
10	Outdoor air - front at 514 Precious	27 (6)	13 (3)	13 (3)	307 (68)	27 (6)	0	454	720
<b>Outdoor Average</b>		<b>33 (4)</b>	<b>27 (3)</b>	<b>7 (1)</b>	<b>587 (70)</b>	<b>40 (5)</b>	<b>7 (1)</b>	<b>833</b>	<b>793</b>
<b>Inside</b>									
8	Master Bath	93 (5)	200 (11)	13 (1)	520 (30)	573 (33)	0	1,759	1,240
9	Master Bedroom	40 (3)	80 (5)	27 (2)	507 (35)	147 (10)	320 (22)	1,467	773
<b>Indoor Average</b>		<b>67 (4)</b>	<b>140 (9)</b>	<b>20 (1)</b>	<b>513 (32)</b>	<b>360 (22)</b>	<b>160 (10)</b>	<b>1,610</b>	<b>1,010</b>
See Table 5 for abbreviations.									

**TABLE 1B - BIOAEROSOL SAMPLING RESULTS  
MAJOR GENERA/TYPES – March 12, 2008**

Ref. No.	Description- Air Samples	Concentration, Counts/M <sup>3</sup> (%)							
		Alt	Asc	Bas	Cl	Pn/As	Sm/Myx	Total Fungal Spores	HyF
<b>Outside</b>									
2	Outdoor air - front	27 (1)	707 (19)	1,760 (47)	1,000 (27)	160 (4)	267 (4)	3,747	<13
<b>Inside</b>									
3	Upstairs Hall	480 (17)	187 (7)	133 (5)	1,670 (60)	53 (2)	107 (4)	2,763	413
4	Master Bedroom	0	173 (17)	13 (1)	627 (63)	120 (12)	27 (3)	1,000	333
5	Master Bath	67 (7)	93 (10)	0	640 (66)	93 (10)	27 (3)	973	227
<b>Inside Average</b>		<b>182 (12)</b>	<b>151 (10)</b>	<b>49 (3)</b>	<b>978 (62)</b>	<b>89 (6)</b>	<b>53 (3)</b>	<b>1,580</b>	<b>324</b>
See Table 5 for abbreviations.									

**TABLE 2 – CULTURABLE AIR FUNGI SAMPLING RESULTS  
MAJOR GENERA/TYPES – March 4, 2008**

Ref. No.	Description – Air Samples	Concentration, CFU/M <sup>3</sup> (%)							
		Al	As sp.	Bi/Dr	Cl	Pn sp.	NSF	Pi	Total Fungi
<b>Outside</b>									
12	Outdoor air – front at 402 Precious	12 (4)	0	71 (23)	118 (38)	12 (4)	35 (11)	12 (4)	308
19	Outdoor air - front at 514 Precious	35 (3)	0	24 (2)	988 (84)	0	47 (4)	24 (2)	1,178
<b>Outdoor Average</b>		<b>24 (3)</b>	<b>0</b>	<b>48 (6)</b>	<b>553 (74)</b>	<b>6 (1)</b>	<b>41 (6)</b>	<b>18 (2)</b>	<b>743</b>
<b>Inside</b>									
17	Master Bath	0	0	0	788 (74)	12 (1)	71 (7)	94 (9)	1,059
18	Master Bedroom	35 (4)	0	24 (3)	600 (74)	0	47 (6)	0	813
<b>Average</b>		<b>18 (2)</b>	<b>0</b>	<b>12 (1)</b>	<b>694 (74)</b>	<b>6 (1)</b>	<b>59 (6)</b>	<b>47 (5)</b>	<b>936</b>
See Table 5 for abbreviations.									

**TABLE 3 – OTHER PARTICLES - SAMPLING RESULTS  
March 12, 2008**

Ref. No.	Description – Air Samples	Concentration, Counts/M <sup>3</sup> (%)			
		Pollen Unidentified	Cotton Fibers	Skin Cells	Glass Fiber
<b>Outside</b>					
1	Outdoor air – front	27	0	27	0
2	Upstairs Hall	13	0	5,600	0
3	Master Bedroom	13	0	2,560	0
4	Master Bathroom	13	0	2,320	0
<b>Indoor Average</b>		<b>13</b>	<b>0</b>	<b>3,490</b>	<b>0</b>
See Table 5 for abbreviations.					

**TABLE 4 - SURFACE SAMPLES - FUNGAL IDENTIFICATION  
MAJOR GENERA/TYPES – JULY 23, 2007 - Method S001**

Ref. No.	Description - Swab Samples	Concentration, Counts/cm <sup>2</sup> (%)						
		Asc	Bas	Chae	Cl	Pn/As	Total Fungal Spores	HyF
9	Kitchen framing at sill plate under window corners	0	0	0	0	0	<0.2	<0.2
10	Living Room sill plates and studs at door	8 (100)	0	0	0	0	8	<0.2
11	Sill supports at rear window	0	0	0	0	0	<0.2	<0.2
12	Lower studs at rear wall (background)	0	0	0	0	0	<0.2	<0.2
See Table 5 for abbreviations.								

**TABLE 5 - ABBREVIATIONS FOR GENERA, SPECIES, AND TYPES OF FUNGI**

<b>Abbreviation</b>	<b>Description</b>
Acremonium	<i>Acremonium</i> sp.
Al	<i>Alternaria</i> sp.
An	<i>Aspergillus niger</i>
As	<i>Aspergillus</i> sp.
Asc	Ascocarps or Ascospores, the fruiting bodies of Ascomycetes
Aur	<i>Aureobasidium</i> sp.
Bas	Basidiospores
Bi/Dr	<i>Bipolaris</i> sp. and/or <i>Drechslera</i> sp.
Bo	<i>Botrytis</i> sp.
Chae	<i>Chaetomium</i> sp.
Cl	<i>Cladosporium</i> sp.
Cur	<i>Curvularia</i> sp.
Epicoccum	<i>Epicoccum</i> sp.
Fusarium	<i>Fusarium</i> sp.
HyF	Hyphal fragments
Mem	<i>Memnoniella</i> sp.
Muc	<i>Mucor</i> sp.
Nig	<i>Nigrospora</i> sp.
NSF	Non-sporulating fungi
Pn	<i>Penicillium</i> sp.
Phia	<i>Phialophora</i> sp.
Pi/Ulo	<i>Pithomyces</i> sp. and/or <i>Ulocladium</i> sp.
Pn/As	<i>Penicillium/Aspergillus</i> type spores
Sm/Myx	Smuts, Myxomycetes, or <i>Periconia</i> spores
Spo	<i>Sporotrichum</i> sp.
Sta	<i>Stachybotrys</i> sp.
Syn	<i>Syncephalastrum</i> sp.
Tae	<i>Taeniolella</i> sp.
Tri	<i>Trichoderma</i> sp.
UC	Unclassified conidia
Y	Yeast