

**MOLD REMEDIATION  
POST - REMEDIATION VERIFICATION (CLEARANCE) REPORT**

**YNMAN RESIDENCE  
463 PRECIOUS  
SAN ANTONIO, TEXAS**

Prepared for

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

by

**ETC INFORMATION SERVICES, LLC**

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Project No. 7A-020  
March 23, 2008

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

**Re: Post - Remediation Verification (Clearance) Report  
Ynman Residence, 463 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 17, 2007, and a Mold Remediation Protocol was prepared on July 8, 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. The residence is ready for occupancy.

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, subject to some minor recleaning.

## **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 July 8, 2007, and was the basis for the remediation conducted by Blackmon-Mooring of San Antonio, Texas.

Remediation was necessary because of excessive moisture and mold around the door and under the windows in the Living Room, Breakfast Room, and Master Bedroom and visible water damage and mold growth in the Kitchen cabinetry adjacent to HVAC closet and in the HVAC closet itself. Rainwater intrusion through the back door and windows was the identified cause of damage in the Living Room, Breakfast Room, and Master Bedroom, and condensate leaks were the causes of damage in the Kitchen and HVAC closet.

### 3.0 Observations

#### 3.1 October 23, 2007

1. Containment was in place for the Kitchen and HVAC closet. The containment area was accessed by a tunnel, which also led to an additional, contiguous containment for the back door and a third containment for the front window. A narrow section of the Living Room was included in the Kitchen containment.
2. The Kitchen cabinets had been removed, and the lower wall finish at the common wall with the HVAC closet and the left side of Bathroom 2 had been removed. The hot water heater had been removed but the AHU was in place. Exposed areas in the Kitchen were visibly clean. The HVAC closet and return air plenum were generally clean, but there was a small patch of several square inches on a support for the AHU platform that apparently represented mold growth.
3. The back door with framing and trim had been removed, and there was a piece of plywood fastened to the exterior of the doorway acting as a temporary construction door. Framing adjacent to the doorway had been partially exposed. Exposed areas were visibly clean.
4. The framing under the front window had been exposed. Exposed areas were visibly clean.
5. There was some damage to the moisture barriers where framing on exterior walls had been exposed.
6. Vinyl flooring was in place in the Kitchen area.
7. Each window had mini-containment in place, and lower framing under windows had been exposed. The framing under the all windows was visibly clean.
8. All carpeting and carpet pad materials had been removed from the house.
9. There was dark staining on tackboards in the Hallway. The staining did not extend into the bedrooms, and the staining may have been due to carpet cleaning.
10. AHU coils appeared to have been cleaned in place, but there was some residual debris and dust.

11. The cavity under the bathtub in Bathroom 2 was exposed to the containment area for the Kitchen. There was some debris in this cavity but there was no evidence of water damage under the tub.
12. Framing and slab surfaces in all remediated areas had normal moisture content.
13. Contents were present in many rooms, outside of containment.
14. Indoor air quality in the residence was as indicated in the table below.

Location	Temperature °F	Relative Humidity %	Dew Point °F	Carbon Dioxide ppmv	Carbon Monoxide ppmv
Outside - front	63.0	35	34	399	0
Kitchen Containment	86.9	26	47	667	0
Outside Containment	89.2	28	51	523	0
Outside - front	74.4	21	31	-	-

The results were satisfactory.

### 3.2 December 20, 2007

1. Indoor air quality was satisfactory with respect to chemical, physical, and microbiological parameters.
2. The support for the AHU platform should be recleaned.
3. All stained tackboards should be removed.
4. The AHU closet and coil compartment should be cleaned to remove excess dust and debris.
5. The installation of the AHU should be completed with respect to insulation of lines and permanent closure of openings in the closet.

6. The hot water heater must be reinstalled.
7. Following recleaning of the support for the AHU, containment and equipment should be demobilized from all remediation areas, and remediated areas should be reconstructed.

### **3.3 January 25, 2008**

1. The support for the AHU platform has been removed and replaced. No further work is needed at that location.
2. The Air Handler Unit (AHU) and ductwork have or will be replaced by SAHA. This will correct issues related to the AHU, closure of the AHU closet and return air plenum, and insulation of lines.
3. The Hot Water Heater has or will be moved to the Garage. This will correct issues related to the sharing of the return air plenum.
4. All containment material and remediation equipment have been demobilized.
5. All stained tackboards should be removed.

### **3.4 February 4, 2008**

1. The support for the AHU platform has been removed and replaced. No further work is needed at that location.
2. The AHU and ductwork had been replaced and that the AHU Closet had been finished properly.

3. The hot water heater had been removed from the return air plenum and reinstalled in the Garage.
  
4. All tackboards had been removed.

## 4.0 Sampling and Discussion

### 4.1 October 23, 2007

#### 4.1.1 Air Samples

Nine air samples were collected. Five samples were collected inside of the Kitchen containment area. 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. There were low but typical levels of culturable fungi, dominated by *Cladosporium*. No culturable *Aspergillus* and only a trace of *Penicillium* were present.
3. Indoor air, inside of the Kitchen containment, had low levels of total fungal spores with a wide diversity of spore types. There were no culturable *Penicillium* and no culturable *Aspergillus*.
4. The results for the Kitchen remediation area **were consistent with successful remediation.**

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, cotton fibers, epithelial cells, and fiber glass.
2. Indoor air in the Kitchen containment had low levels of pollen, cotton fibers, epithelial cells, and fiber glass.
3. These results **were consistent with successful remediation.**

#### 4.1.2 Surface Samples

Three surface samples for clearance were collected. The results are summarized in the tables at the end of this report. The results and their significance are summarized below:

1. The sample from framing at the remediation area in the Kitchen had non-detectable spores and hyphal fragments. The results **were satisfactory.**

2. The sample from the Back Door base plate and rear jamb had moderate levels of spores and hyphal fragments but were below the outdoor sample levels. The results are deemed to be **satisfactory**.
3. The sample from the Air Handling Unit platform support had high levels of *Penicillium/Aspergillus* type spores. (NOTE: The wood member in question was ultimately removed and replaced.)
4. All final conditions **were satisfactory**.

## **5.0 Conclusions**

1. Remediation of contaminated framing has been successfully completed in the containment areas.
2. All sheetrock, trim, flooring, framing, and cabinet materials were removed as specified.
3. All surfaces tested were clean or were replaced.
4. Indoor air quality inside and outside of containment, was satisfactory with respect to chemical, physical, and fungal parameters.
5. A new AHU and new ductwork were installed. The closet was clean and well-sealed. The AHU is ready for operation. The hot water heater has been moved from the return air plenum to the Garage.
6. The causes of the water damage and mold contamination that were identified have been remediated. The deficiencies at the back door were corrected during reconstruction.

## **6.0 Recommendations**

1. The residence is ready for occupancy.

**TABLE 1 - BIOAEROSOL SAMPLING RESULTS  
MAJOR GENERA/TYPES – October 23, 2007 - Method A001**

Ref. No.	Description-Air Samples	Concentration, Counts/M <sup>3</sup> (%)							
		Ni	Bas	Sm/Myx	Cl	Cur	Pn/As	Total Fungal Spores	HyF
<b>Outside</b>									
11	Outdoor air – front 1	13 (2)	53 (8)	40 (6)	307 (48)	13 (2)	40 (6)	639	253
18	Outdoor air - front 2	0	147(8)	147(8)	1,270 (66)	53 (3)	120 (6)	1,937	53
<b>Outdoor Average</b>		7 (1)	100 (8)	93 (7)	787 (61)	33 (3)	80 (6)	1,287	153
<b>Inside of Kitchen Containment</b>									
36	Kitchen	0	13 (5)	27 (11)	53 (22)	13 (5)	40 (17)	239	53
38	Kitchen	0	0	0	67 (55)	27 (22)	0	121	80
39	Living Room at Kitchen	0	0	13 (11)	13 (11)	0	80 (67)	119	27
<b>Containment Average</b>		0	4 (3)	13 (8)	44 (28)	13 (8)	40 (25)	160	53
See Table 5 for abbreviations.									

**TABLE 2 – CULTURABLE AIR FUNGI SAMPLING RESULTS  
MAJOR GENERA/TYPES – OCTOBER 23, 2007 - Method A003**

Ref. No.	Description – Air Samples	Concentration, CFU/M <sup>3</sup> (%)							
		Al	As sp.	Chae	Cl	Pn sp.	NSF	Sta	Total Fungi
<b>Outside</b>									
12	Outdoor air – front 1	0	0	0	471 (91)	12 (2)	24 (5)	0	519
19	Outdoor air - front 2	0	0	0	459 (89)	0	59 (11)	0	518
<b>Outdoor Average</b>		0	0	0	465 (90)	6 (1)	42 (8)	0	518
<b>Inside of Dining Room/Kitchen/Living Room Containment</b>									
37	Kitchen	0	0	0	12 (20)	0	47 (80)	0	59
40	Living Room at Kitchen	0	0	0	35 (43)	0	47 (57)	0	82
<b>Average</b>		0	0	0	24 (33)	0	47 (67)	0	71
See Table 5 for abbreviations.									

**TABLE 3 – OTHER PARTICLES - SAMPLING RESULTS  
OCTOBER 23, 2007 - Method A002**

Ref. No.	Description – Air Samples	Concentration, Counts/M <sup>3</sup> (%)			
		Pollen Unidentified	Cotton Fibers	Skin Cells	Glass Fiber
<b>Outside</b>					
11	Outdoor air – front 1	40	107	613	0
18	Outdoor air - front 2	0	160	293	13
<b>Outdoor Average</b>		20	133	453	7
<b>Inside of Living Room/Kitchen Containment</b>					
36	Kitchen	0	453	1,360	93
38	Kitchen	13	253	1,880	93
39	Lvg Rm at Kitchen	0	80	200	40
<b>Average</b>		4	262	1,150	75
See Table 5 for abbreviations.					

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

Ref. No.	Description - Swab Samples	Concentration, Counts/cm2 (%)						
		Sm/Myx	Bas	Chae	Sta	Pn/As	Total Fungal Spores	HyF
8	Kitchen framing at AHU and Bath 2	0	0	0	0	0	<0.4	<0.4
9	Sill plate & studs at back door	0.4 (15)	0.2 (8)	0.4 (15)	0	80 (0.8)	2.6	0.2
10	AHU platform support	0	0	0	0	9,500 (100)	9,500	0.8

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