

MOLD REMEDIATION

M. GONZALEZ RESIDENCE
475 PRECIOUS, SAN ANTONIO, TEXAS 78237

Prepared for

SAN ANTONIO HOUSING AUTHORITY
SAN ANTONIO, TEXAS

by

ETC INFORMATION SERVICES, LLC

Donal~ J. Schae~19~ Ph.D., P.E., CIH

June 2007

Mold Remediation Protocol
M. Gonzalez Residence, 475 Precious, San Antonio, Texas 78237

Prepared by

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

**Licensed Mold Assessment Consultant (License M4C9336, expires
0210312008) June 1, 2007 (~~Jf 12**

Note: This Remediation Protocol is based on a limited investigation of conditions existing at the time of the site inspection. The extent of water damage and/or fungal contamination and infestation has not been fully delineated. The remediation Protocol presented here addresses known or suspected problem areas. The Protocol can be expected to change as new information is obtained before or during remediation and repairs.

The mold contamination covered by this Protocol is for a house with one major contamination area and several minor areas. The mold contamination probably affects surface areas of more than 25 contiguous square feet. Therefore, the mold assessment and remediation work is required to be performed by persons and companies licensed by the State under the Texas Mold Assessment and Remediation Rules.

Conditions that caused excessive moisture and mold growth on affected materials include rain water intrusion through windows and doors and shower overspray. These conditions should be remedied prior to or during the remediation process. Other causes of microbial contamination may be discovered during remediation.

Mold-contaminated materials will be remediated by removal or cleaning of all directly affected building materials and by cleaning of some contents that were likely indirectly affected.

RECOMMENDED REMEDIATION ACTIVITIES

In general, the procedures in Attachment A should be implemented as applicable by the remediation contractor and as specified in this Plan. Some items in Attachments A and B do not apply to this project.

Summary

Water damage and mold growth are expected to be present in wall cavities surrounding the back door. More minor damage is also present, in separate areas, at the Master Bathroom tub and at several windows. Structural, mold remediation should include the following areas:

- a. Back door and lower walls and trim of Living Room/Dining Room (as needed)

- b. Living Room/Dining Room carpeting
- c. Master Bathroom lower wall and trim at head of tub
- d. Lower walls and sills at several windows, as required
- e. AHU, return air plenum, and HVAC Closet

Authorized: _____

R-2

Mold Remediation Protocol M. Gonzalez Residence 475 Precious, San Antonio, Texas 78237

Project No. 7A-020 June 2007

Contents and surfaces in the impacted rooms will also be cleaned.

Damaged areas will be remediated by removal of specified contaminated porous building material, such as sheetrock and flooring, and treatment of contaminated semi-porous materials such as wood and concrete. Wall cavities will be inspected, remediated/cleaned, and dried. An estimate of the quantity of removal or treatment is provided below in Table R-i. The materials are also depicted on Figure R-1.

TABLE R-1 SUMMARY OF QUANTITIES OF INTERIOR MATERIALS TO BE REMEDIATED

Room/Area	Component	Quantity	Process
Living Room! Dining Room	Walls-sheetrock	54 sq. ft. (partial),	Remove/dispose (1)
	Carpeting	360 sq. ft. (all)	Remove/dispose (3) Remove/dispose (2)
AHU Closet	Door and framing	1 each	
	AHU	1 each	Remove and clean off site
	Hot water heater	1 each	Clean (4)
Master Bathroom	Walls-sheetrock	2 sq. ft. (partial)	Remove/dispose (1)

Notes:

(1) Sheetrock will be removed from floor to two feet/sill level/tub level and disposed. Insulation in that space will be discarded. Adjacent wall finishes visible from the exposed cavities will be inspected. Framing will be cleaned.

(2) Remove and dispose.

(3) Remove and dispose carpet, pads, and stained tackboards. Clean, disinfect, and dry slab. (4) Remove, HEPA-vacuum, wipe with disinfectant. Move to a clean room or put back in place.

Authorized:

R-3

Mold Remediation Protocol .M. Gonzalez Residence .475 Precious, San Antonio,
Texas 78237 .Project No. 7A-020 .June 2007

Remediation in each Area

Containment

The major mold-contaminated area inside the residence will be remediated under full

containment, which will encompass the following areas:

- Living Room
- Dining Room

Containment will be achieved using a single layer of polyethylene sheeting over temporary framing (where necessary). Walls, and ceilings that will not be removed will serve as critical barriers without covering and will be cleaned thoroughly after remediation. Wall and ceiling openings (electrical outlets, light fixture boxes, etc.) will be sealed. Any flooring that will not be removed will be protected with padding and polyethylene sheeting.

One or more decontamination units, with at least two chambers, for entry and egress of personnel and materials will be required. Negative air pressurization with makeup from outside the residence and discharge through HEPA-filters to the outside will be required to control air movement. Air scrubbers will be used to control levels of dust in the house. Makeup and exhaust air locations must be chosen to achieve air movement through all areas. Dehumidifiers will be used to control relative humidity.

The other areas, including the Master Bathroom and the HVAC Closet/Return air plenum/AHU, and windows as needed, will be remediated with source or local containment.

Removal and Treatment of Materials

Living Room/Dining Room

1. Establish containment, as specified.
2. Remove all contents of the entire room. Clean, package as necessary, and move to onsite storage in a clean area.

3. Discard porous contents with direct water damage, if any.
4. Remove the back door, including framing and trim. Replace it with a temporary construction door to achieve security during remediation.
5. Remove and discard all carpeting, pad, and stained tackboard.
6. Remove and discard wall finishes designated for removal. Extend removals as necessary so that removals are at least one or two feet beyond all visible damage.
7. Remove and discard window stool and apron as necessary.
8. Remove and discard insulation within exposed wall cavities.
9. Evaluate the exposed structural wood as specified in Attachment A. Remove all wood with significant damage and provide thorough cleaning and drying of all other

Authorized: / 0/

exposed wood, followed by sealing. Do not remove structural members without adequate bracing, as directed by a professional engineer.

10. Clean, disinfect, and dry concrete where exposed.
11. Leave the containment in place until clearance has been achieved, as determined by the Licensed Mold Assessment Consultant. Modify negative air pressurization only at the direction of the Licensed Mold Assessment Consultant.

AHU Closet

1. Establish local or source containment, as needed to prevent contamination of adjacent areas.
2. Remove the AHU for offsite cleaning. Package it to prevent contamination of the house during its removal from the house.
3. Seal the supply air plenum/trunk duct.
4. Remove and clean the hot water heater. Store in a clean area.
5. HEPA-vacuum all surfaces in the return air plenum and HVAC Closet.

Master Bathroom

1. Plan on source containment of materials removed.
2. Remove and discard about one linear foot of base trim and two square feet of sheetrock wall at the head of the tub.
3. Remove and discard insulation within exposed wall cavities.
4. Evaluate the exposed structural wood as specified in Attachment A. Remove all wood with significant damage and provide thorough cleaning and drying of all other exposed wood, followed by sealing. Do not remove structural members without adequate bracing, as directed by a professional engineer.

Contents

Contents and surfaces in each of the rooms or areas within full containment should be carefully HEPA-vacuumed as part of the remediation process and prior to post-remediation verification (clearance).

As previously recommended, the residence should be thoroughly cleaned. HEPA vacuuming of all surfaces and HEPA vacuuming plus hot water extraction of upholstery and carpeting should be performed by a professional cleaning company. Badly soiled carpeting, such as that in most upstairs areas, should be replaced rather than cleaned, but the floor under the carpeting should be thoroughly cleaned. It would be prudent to do this cleaning prior to clearance and demobilization of containment.

Authorized: , ~V ~~"2 /07

R-5

Mold Remediation Protocol M. Gonzalez Residence 475 Precious, San Antonio,
Texas 78237

Project No. 7A-020 June 2007

Personal Protective Equipment

Full Personal Protective Equipment (PPE) shall be used for this project (except as noted below) and shall include the following:

- Disposable full body clothing with hood
- Booties, separate or integral
- Latex or Nitrile gloves, upgraded as necessary for use of chemicals
- N-95 disposable respirator for set-up of containment and equipment and for postremediation activities prior to clearance
- Full-face PAPR with HEPA cartridges, upgraded to organic vapor/HEPA cartridges or as required for use with chemicals.
- Eye protection

Modified PPE may be used where local or source containment is in place. This will consist of N-95 disposable respirator, work gloves, safety glasses, and other standard construction clothing and equipment.

Occupancy

All occupants of and visitors to the residence shall be informed of mold remediation activities, systems in place to minimize exposure to persons and the building, and activities to avoid in order to maintain the integrity of these systems. Because of the repairs that will be necessary to downstairs and to the AHU, it will be prudent for the residents to vacate the home during remediation and reconstruction.

Post-Remediation Activities

Post-remediation activities will include the following activities, which will be performed by or under the on-site direction of a Licensed Mold Assessment Consultant (MAC):

1. Containment and negative pressurization shall remain in place until clearance has been established by the MAC.
2. The remediation areas shall be inspected for correct set-up, operation of equipment, general cleanliness, dryness of materials, and completion of the scope of work outlined in this Remediation Protocol, as defined in Attachment B. If any location is determined to be deficient, the

A1TACHMENT A

GENERAL PROCEDURES FOR WATER/MOLD REMEDIATION ACTIVITIES

Overview of Remediation Activities

1. Select a qualified remediation contractor. The contractor must have experience on similar projects and must have personnel and supervisors with certified training from a recognized organization, such as AIAQC, IAQA, or IICRC. The contractor and its personnel must be licensed and registered as required by the Texas Department of State Health Services.
2. Submit all Pre-Approval Items (Health and Safety Plan, Environmental Protection Plan, Mold Remediation Work Plan, MSDS for any chemicals used).
3. Obtain all necessary permits.
4. Establish Controlled Access Work Area.
5. Turn off HVAC system and seal supply and return openings. If the remediation areas are limited, parts of the system may stay in operation.
6. Establish Containment. Full containment means critical barriers, airlocks, decontamination chambers(s), negative pressurization with HEPA-filtered exhaust to the outside, and related procedures. Limited containment means critical barriers, slit entry with flap door, negative pressurization with HEPA-filtered exhaust.
7. Conduct remedial activities in accordance with the approved Mold Remediation Work Plan, Mold Remediation Protocol, and project plans and specifications.
8. Use appropriate personal protective equipment and decontamination procedures, in accordance with an approved Health and Safety Plan, Mold Remediation Work Plan, and Mold Remediation Protocol.
9. Double bag or wrap and seal all mold-contaminated materials (sheetrock, carpet, wood, etc.) in plastic bags and HEPA-vacuum the bags prior to removal from the containment area. Handle and dispose of these materials in accordance with an approved Environmental Protection Plan, and the Mold Remediation Work Plan.
10. Monitor remediation progress by observation, testing, and sampling.
11. After remediation is complete, leave the containment in place until clearance inspection and sampling indicate successful completion of the Scope of Work within the contained area, in accordance with the Mold Remediation Protocol.
12. After containment is removed, if specified, the entire residence, including areas outside the contained area (furniture, fixtures, floors, cabinets, etc.) should be HEPA-vacuumed and hard surfaces wiped down with an anti-microbial solution to insure complete removal of mold.
13. Perform final inspection of work and clearance sampling for compliance with Mold Remediation Protocol for all areas.

Detailed Guidance on Procedures

1. If cleaning of HVAC components is specified, wet-wipe (with antimicrobial solution) all supply and return vents for air-conditioning system, which will not be placed in containment, then dry surfaces, seal the openings, and shut system down. If HVAC system is to remain in use, wet-wipe (with antimicrobial solution) all supply and return vents for air-conditioning system, which will be placed in containment, then dry surfaces and seal the openings.
2. Establish single or double layer of 6-mil polyethylene (poly) to establish critical barriers; use temporary framing and staples and duct tape to hold in place

Authorized: _____ ~ / ~ 2

R-8

Mold Remediation Protocol .M. Gonzalez Residence .475 Precious, San Antonio, Texas 78237 .Project No. 7A-020 .June 2007

3. For full containment, establish three-stage decontamination units with air lock entrance/exits for personnel and waste materials. Water will be available for contractor's employees to wash hands and face and PPE, and HEPA-vacuums will be available for cleaning of clothing and equipment.
4. For full containment, establish negative air pressure (at least 0.02 inches w.g.) with at least five air changes per hour using HEPA-filter exhausted negative air units. Makeup air will be obtained outside the residence, and the exhaust will extend outside the residence away from the makeup air and occupied areas. Makeup air will be drawn through coarse filter material.
5. For limited containment, establish negative air pressurization. Makeup and exhaust will be routed as convenient, preferably from and to the outside of the house.
6. Have all personnel in half-face APRs or better and in Tyvek suits, with hoods, booties, and gloves.
7. Contaminated furniture, furnishings, appliances, and personal items shall be HEPAvacuumed. Remove contents in damaged areas by cleaning, wrapping and packaging; If specified, re-clean offsite or in a clean area onsite; repackage and deliver back to site after remediation is complete.
8. Remove and discard fabric and paper items such as bedding, clothes, shoes, rugs, books, and magazines, which were water-soaked or have visible fungal/mold contamination.
9. Upgrade personnel to full face APRs or PAPR5. Use HEPA/organic vapor/acid gas cartridges for APRs.
10. Mist all visibly contaminated materials to be removed and the surface of wall and floor cavities exposed with antimicrobial solution using an airless sprayer. Mist the undersides of visibly contaminated materials as they become accessible, and wrap in polyethylene; tape securely and transport outside building via waste material airlock or decontamination unit. Materials that may be removed are listed below, with additional guidance.
11. Remove and discard all carpets and carpet pads, which were water-damaged or have visible fungal/mold contamination. These may need to be cut into smaller pieces before wrapping for disposal.
12. Remove and discard baseboards and carpet tackboards in water-damaged areas.
13. Remove and discard water-damaged sections of paneling, sheetrock, and other wall covering materials. Cut well beyond the visible damage lines; cut wall covering materials at a minimum of four feet above the floor. Remove insulation if present within the water-damaged sections. In fungal contaminated wall cavities it may be necessary to remove paneling and sheetrock to the full height of the ceiling, especially when water damage begins at the ceiling level.
14. Remove and discard all water-damaged flooring and subflooring. This may require removal of baseboards, some base cabinets, wall cabinets, toilets, tubs, and other structures built over the flooring. HEPA-vacuum or damp-wipe (with cleaner) these cabinets and structures, protect by

wrapping and packaging, clean offsite or in a clean area onsite; repackage and deliver back to site after remediation is complete.

15. Remove and discard all water-damaged and fungal infested ceiling and insulation materials. Cut sheetrock a minimum of two feet, in a perimeter fashion, beyond any visible stain or fungal infestation.
16. It should be assumed that all flooded base cabinets (bathrooms, kitchen, utility room, etc.) experienced the trapping of water under their bases, therefore, these flooded base cabinets must be removed. HEPA-vacuum or damp-wipe (with cleaner). Protect by wrapping and packaging, clean offsite or in a clean area onsite; repackage and deliver back to site after

Authorized: C/i% ~ R-9

- remediation is complete. All surfaces and wood must be free of excess moisture before reinstallation. In many situations, the level of fungi infestation will be such that these base cabinets must be discarded.
17. If remediation of the HVAC system is required, remove all filters and all contaminated materials in the air-conditioning system that have porous surfaces including return air ducts and supply air ducts. Clean or replace all contaminated, non-porous surfaces. Disinfect coils and drain pan.
 18. Clean slab surfaces with HEPA vacuum, disinfect with antimicrobial solution, and allow negative air machines to operate 24-hours before proceeding.
 19. HEPA-vacuum structural wood and other exposed surfaces in wall and ceiling cavities, then damp-wipe with antimicrobial solution. If wood has serious mold contamination, abrade moist wood to remove stains, HEPA-vacuum debris, and allow to dry. If stains are deeper than 1 mm, replace wood.
 20. Use dehumidifiers as necessary to control humidity and dryness of materials. This includes areas both inside and outside of containment.
 21. Use air scrubbers as necessary to control excess particle levels. This includes areas both inside and outside of containment.
 22. Evaluate residence for completeness of remediation specified and for any additional steps required.
 23. HEPA-vacuum all interior surfaces of contained areas.
 24. Operate negative air machines and maintain containment until all surfaces are dry and clearance samples pass established criteria in the Mold Remediation Protocol.
 25. Clean all surfaces in the structure, or those specified, by HEPA-vacuuming, including the carpeting both inside and outside of the contained area, and by damp-wiping of hard surfaces with an anti-microbial solution.
 26. Apply Anabec, Aegis, and sealer (or equivalent products) to all exposed wood in wall and ceiling cavities and to exterior sheathing.
 27. Remove critical barriers and dispose of as waste.
 28. Continue to operate negative air machines with HEPA filters in the air scrubbing mode during the final cleaning phase.
 29. Clean and demobilize all equipment.

Authorized: _____ 7

() _____ R-10

ATTACHMENT B POST-REMEDICATION VERIFICATION PROCEDURES

Introduction

Remediation verification or clearance of remediation projects typically includes the following elements:

1. Observation of the building systems to ensure that sources of moisture intrusion or leakage have been corrected.
2. Observation of remediation methods to ensure that proper remediation procedures have been used, and that the scope of work completed satisfies the requirements of the Remediation Protocol.
3. Visual inspection of the work area after remediation has been tentatively completed to ensure that there is no visible mold growth or fungal rot, no excess dust or debris in the work area, and that surfaces do not have excess moisture content.
4. Field measurements of temperature, relative humidity, and moisture content of materials to ensure that conditions are consistent with clearance of remediation of mold contamination.
5. Surface sampling to ensure that cleaning has been adequate and that no more than background levels of fungal spores are present after remediation.
6. Air sampling to ensure that there are no hidden reservoirs of fungi or fungal spores and that the air has been cleaned sufficiently so that indoor air is qualitatively similar to outdoor air.

Field Measurements Criteria

1. Each remediation location in each room shall be measured for moisture content using field moisture meters. Materials shall have moisture contents less than the following:
Sheetrock: 0.5%
Wood: 15%
Concrete: 3.5%
Ceramic Tile: 3.5%
2. Each remediation area shall be sampled for temperature and relative

humidity. Relative humidity shall be less than 60%.

Authorized: ~A R-1.1

Mold Remediation Protocol .M. Gonzalez Residence .475 Precious, San Antonio, Texas 78237 .

Project No. 7A-020 .June 2007

Clearance Protocol .Surface Samples

1. **Select representative** locations within the remediation areas and collect composite surface swabs from each representative location.
2. Swabs should be handled to avoid contamination and should be used to collect materials from at least 100 cm² per swab. When sampling has been completed, return swab to tube, seal with tape, mark for identification, and package for shipment to the Licensed Mold Analysis Laboratory.
3. There should be at least one swab for each remediation area or one swab per 200 square feet of floor space within each remediation area. There should be at least two swabs from similar materials in background areas outside of remediation.
4. Submit the samples for enumeration of fungal spores and mycelial fragments and identification of fungal spores by microscopy. The analysis required is designated as SOOI by Aerotech Laboratories, Inc., Phoenix, Arizona, a leading laboratory for this type of work. The equivalent analysis by any AIHA-accredited (environmental microbiology) laboratory, licensed by the State as a Licensed Mold Analysis Laboratory, will be satisfactory.
5. The samples will be deemed satisfactory if any one of the following occurs:
 1. Total fungal spores are less than 10 times the detection limit for the analysis (approximately 1 count/cm²), or
 2. Total fungal spores are less than 10 times the average for the samples from the background areas.

In addition, there must be no more than trace levels of *Aspergillus/Penicillium*-like spores, *Stachybotrys* spores, or *Chaetomium* spores.

Clearance Protocol .Air Samples

1. Collect Air-O-Cell samples from each remediation area.
2. Air-O-Cells should be handled to avoid contamination and should be used to collect at least 75 liters of air per sample. When sampling has been completed, seal openings, mark for identification, and package for shipment to the

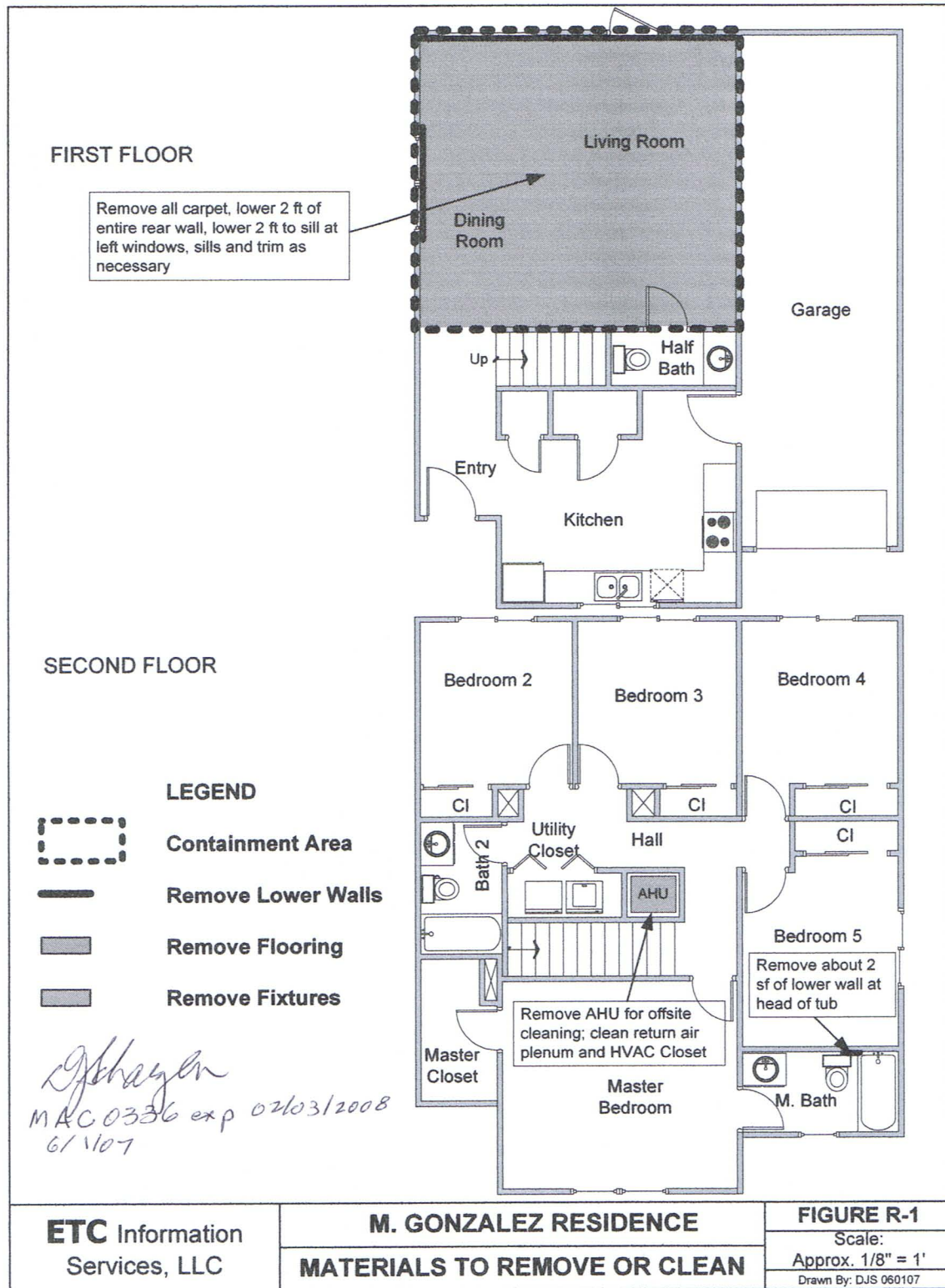
Mold Remediation Protocol .M. Gonzalez Residence .475 Precious, San Antonio, Texas 78237 .Project No. 7A-020 .June 2007

by Aerotech Laboratories, Inc., Phoenix, Arizona, a leading laboratory for this type of work. The equivalent analysis by any AIHA-accredited (environmental microbiology) laboratory, licensed by the State as a Licensed Mold Analysis Laboratory, will be satisfactory.

7. The samples will be deemed satisfactory if the following occurs:

1. Within the remediation area, the average of all samples is less than the average outdoor air value.
2. The diversity of spore population for the average of samples within the remediation area is similar to that for the average of outdoor air samples.

In addition, there must be no more than trace levels of *Stachybotrys* spores or *Chaetomium* spores, unless these spores are present in outdoor air.



Authorized: *DJS 6/1/07*