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Janice:

I visited the Gracy House on April 2nd to investigate concerns about the indoor air quality and the possibility of fungal growth (mold) indoors. After a visual examination, sensitive measurements, and sampling for laboratory analysis, I would like to make the following observations and recommendations.

Observations:

Cellar: There is visible fungal growth (mold) on some building materials in the cellar. The sources of excess moisture have been variously:

- Infiltration and moisture migration through the foundation walls and evaporation from areas of open soil (photos).
- Condensation on material surfaces below the dew point temperature due to past elevated relative humidity.

Some removal of materials, careful cleaning, installation of an effective vapor barrier, and then control of airborne moisture levels will be necessary to establish healthy conditions in the cellar.

Main Floor and Second Floor:

- The air in the cellar contains mold spores and some of that air is circulated up into the occupied spaces above due to the stack effect and other convective or pressure differential induced air movements.
- Some visible mold growth (photos) and a distribution of fungal particulates is present in the main floor and upper floor.
- There is significant moisture damage to paint and wallpaper and some of the window sills, frames, and the adjacent plaster on the second floor (photos).

Sampling:

Four samples were taken onsite to be analyzed in the laboratory:

- Air Sample #1: in the basement.
- Air Sample #2: on the main floor.
- Air Sample #3: outdoors for comparison.
- Surface Sample #4: settled dust in the office.

Microscopic examination of the samples revealed:

- An elevated level of *Aspergillus/Penicillium* spores and a significant level of Hyphal Fragments was present on the random surface in the cellar. *“Fungi that are indicators of initial or recent indoor moisture infiltration are Cladosporium,*

Aspergillus and Penicillium. (“Assessment and Sampling Approaches for Indoor Microbiological Assessments” G. Clark, the Synergist, Nov. 2001).

- Very high concentrations of *Aspergillus/Penicillium* spores were present in the air samples taken on the main floor and second floor.
- Elevated levels of *Paecilomyces-like* fungal spores were present in the air samples from the main and second floors.

Considerations:

When materials are dampened by direct wetting or by condensation, mold growth can occur. If there is sufficient moisture in the indoor air it will condense on surfaces below the elevated dew point temperature (please review the enclosed EPA and Commonwealth information on dew point). The EPA states that materials that remain damp for as little as 48 hours are suspected of mold growth. Most surfaces in this cellar have been subject to conditions that can promote biological growth.

Once mold grows on surfaces it must be removed by appropriate cleaning methods or by the removal of the affected materials under controlled conditions if the materials can't be adequately or cost effectively cleaned (not killed, “treated”, “encapsulated”, or painted over). *“The purpose of mold remediation is to remove the mold to prevent human exposure and damage to building materials and furnishings. It is necessary to clean up mold contamination, not just to kill the mold. Dead mold is still allergenic, and some dead molds are potentially toxic. The use of a biocide, such as chlorine bleach, is not recommended as a routine practice during mold remediation.....in most cases, it is not possible or desirable to sterilize an area; a background level of mold spores will remain in the air (roughly equivalent to or lower than the level in outside air). These spores will not grow if the moisture problem in the building has been resolved.”* page 18; EPA: Mold Remediation in Schools and Commercial Buildings.

As described in the ANSI/IICRC S520-2008 Standard and Reference Guide for Professional Mold Remediation, building material surfaces with actual mold growth meet the criteria for Condition 3 status, and all material surfaces within air communication of Condition 3 materials should be considered Condition 2: surfaces with mold spores, Hyphae, and destructed fungal cell parts that have been distributed through the “stack effect”, or by other convective or differential pressure induced air movements.

Fungal Remediation Guidelines, Cellar and Second Floor:

- All water damaged and moldy materials should be remediated in strict accordance with the ANSI/IICRC S520-2008 Standard and Reference Guide for Professional Mold Remediation, and the EPA's Guidelines: Mold Remediation in Schools and Commercial Buildings, with particular attention paid to the personal protection and containment procedures described (please review Chapter 11: “Structural Remediation” attached). Some materials will need to be removed in order to access, inspect, and clean areas reasonably suspected to have been dampened
- All contents and indoor building surfaces that have mold growth or that have been in air communication with moldy materials should be HEPA vacuumed and/or damp wiped, or otherwise appropriately cleaned, to remove all surface mold (Condition 3) and distributed fungal spores, hyphae, and destructed fungal cell parts (Condition 2); please review the details in information that I have provided.
- **Appropriate containment should be established (critical barriers and negative air conditions) in the cellar and on the second floor.** After all debris and superfluous materials have been removed, carefully remove and bag all water damaged, or moldy porous building materials (all fiberglass in the cellar and all stained or compromised wallpaper on the second floor; photos) along with any semi-porous or non-porous materials that are compromised or that cannot be effectively cleaned (all plastic sheeting

in the cellar and all compromised paint and plaster on the second floor; photos) and any other degraded or compromised materials.

- At this time adjacent surfaces that may have been affected but are currently hidden can be inspected to see if more removal is required. **Remove any materials that prevent the visual inspection of surfaces that are reasonably suspected to have been dampened.** Remediation technicians should examine the removed materials and the newly exposed surfaces (e.g. framing, blocking, sheathing, etc.) for moisture damage and fungal growth caused by direct wetting or by condensation. The careful removal of materials should continue until only clean or cleanable materials remain. Please call me with any questions, or to discuss an increase in the work scope or a necessary enlargement of the areas of containment.
- **When all removal is completed, and only clean or cleanable surfaces remain, all exposed surfaces should be cleaned in accordance with the Standard.** Clean from high to low and from the source of make-up air towards the negative air equipment.
- Every interior surface and all contents have been within air communication of the contaminated materials (Condition 2 surfaces) and should be cleaned in accordance with the instruction in Chapters 11 and 13 of the Standard: Structural and Contents Remediation.
- **SPECIAL NOTE:** Because the air is always moving upwards in the structure it may be possible to safely occupy the main floor after the cellar and main floor are completely remediated provided that the second floor is sealed off effectively and there is no water leakage or excess moisture transfer down from the second floor. The cellar remediation should be finished first, then the main floor remediation. After a third-party clearance assessment with sampling is successful in these areas it might be determined that the main floor is safe for occupancy while remediation of the second floor is postponed indefinitely. However, there should be periodic inspections of the second floor and the attic to identify and address any changes that may occur that would threaten the integrity of these spaces or of the building overall.
- During and after remediation the indoor relative humidity should be monitored and controlled at levels that prevent condensation and additional biological growth.

Note to the Remediators:

- Monitor and maintain the indoor relative humidity below the level that will cause dew point issues.
- All remediation workers should be familiar with the ANSI/IICRC S520-2008 Standard, all Government Guidelines, and this Report.
- All removed materials should be disposed of properly.
- Any asbestos or lead should be handled in the appropriate manner.
- All interior and exterior areas should be left clean and free from impact.
- No biocides, strong chemicals, or coatings of any kind are to be used without prior approval.
- Following the remediation work, Clearance Criteria should include:
 - All sources of leakage or excess moisture should have been professionally and successfully addressed. Leakage should be repaired and dew point issues (condensation on cooler surfaces) should be prevented.
 - No dust or debris should remain.
 - Visible fungal material, mold damaged materials, water damaged materials, and moldy odors should not be present.
 - Laboratory Analysis of samples taken onsite should indicate that the kinds and concentrations of mold and mold spores present indoors are similar to those found outdoors.

- The subject areas should be returned to Condition 1 status as described in the ANSI/IICRC S520-2008 Standard.
- After all water damaged materials have been removed and all moldy or contaminated materials have either been removed or cleaned/disinfected, all surfaces should be thoroughly dried and then approved low and no-VOC sealers should be applied to all unsealed porous and semi-porous building material surfaces. I recommend the AFM SafeCoat products: SafeSeal for wood product, HardSeal for solid wood, WaterShield for vertical masonry materials.
- After a successful third party post-remediation Clearance Assessment of all subject areas, and the proper sealing of the remaining surfaces, any insulating or renovation work can begin. Fiberglass insulation should not be used in areas that could become damp: e.g. in the cellar.

Recommendations:

Cellar.

- All infiltration and moisture migration into the cellar should be minimized through exterior landscaping and/or gutter and downspout adjustments or maintenance, or other means.
- A substantial vapor barrier (30 mil or better) should be placed over all open soil. The material should extend a nominal distance up the foundation wall.
- When every reasonable effort has been made to remove moisture inputs from the cellar, and all exposed unfinished surfaces have been appropriately sealed, an energy efficient and automatic, low temperature, filtering, dehumidification system should be installed, capable of holding the relative humidity well below 50% year-round. The best and most efficient dehumidifiers available are the ThermaStor SanteFe units, please review the specifications on their website: thermastor.com and call me for assistance.
- Dehumidification should be monitored with a wireless thermo-hygrometer placed in the cellar (I recommend the Meade TM005X wireless thermo-hygrometers or similar units). Dehumidification may have to be accompanied by additional heating or insulation efforts to allow for efficient drying.

The Occupied Spaces:

- All living spaces have been in air communication with the moldy materials in the crawlspace and basement. All interior surfaces should be HEPA vacuumed and/or damp wiped with water or water and detergent to remove distributed fungal spores and Hyphae. No biocides or strong chemicals should be used in any indoor cleaning process without prior approval.
- All excess moisture inputs should be prevented. Future water leakage of any kind should be addressed immediately by qualified and experienced professionals.
- The indoor relative humidity should be monitored and controlled in direct correlation to the coolest surface temperatures to avoid dew point issues.
- Cleaning of the occupied spaces should include damp wiping and HEPA vacuuming only. Dry dusting and sweeping should be avoided indoors.

Please review all the information that I have provided and then call me with any questions or to discuss any issue in greater detail.

Walt Baenziger

Additional Information:

Photos

Laboratory Analysis Reports

Additional Information on Fungal types

EPA and Commonwealth of Massachusetts Information on Dew Point.
The IICRC S520 Standard Chapter 11 “Structural Remediation”
The IICRC S520 Standard Chapter 13 “Contents Remediation”
EPA: Mold Remediation in Schools and Commercial Buildings
A List of Qualified Mold Remediation Companies

“Environmental Services for Home and Business”

4 School Street, Westfield, MA 01085

413-568-7701 fax 413-568-6416

homeenvironmentalservices.com

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