

Nauset Environmental Services, Inc.

an Air Quality Company

10 January 2014

NES Job #3-1585
Report No. NES/IAQ-14/1596

David Smythe
CapeConstruction, Inc.
P.O. Box 1888
South Weston, MA 02666-1888

Re: Mold/moisture inspection with Scope of Work (SOW)
at 930 Cheyanne Road – St. Theresa’s Church (Weston)

Dear Mr. Smythe:

Nauset Environmental Services, Inc. (NES) is pleased to submit this letter report on the mold/moisture inspection at the former St. Theresa’s Church property at 930 Cheyanne Road. Following written authorization, NES sent William Vaughan, PhD, QEP, CIEC to this property on 8 January 2014. This report is CONFIDENTIAL and proprietary and can only be distributed by or with the approval of the Client to whom it is addressed.

BACKGROUND: During recent years after the church relocated, the property has been basically unoccupied, leaks have developed and the space has not had adequate climate control. These issues have led to condensed moisture and direct water intrusion that have soaked up in drywall in places and led to visible mold growth (VMG) with a strong suspicion of hidden mold growth in damp cavities. Both of these situations are referred to as **Condition 3 contamination**. NES was authorized to carry out a mold/moisture inspection of the building and develop a Scope of Work to address problems found.

EXECUTIVE SUMMARY: The initial sensory inspection found considerable visible mold growth (VMG) in the lower level where leaks had pooled enough to wick up into the drywall and many areas of condensation mold growth (CMG). There was no noticeable biological/moldy odor in the lower level due to the cold conditions (39F) that would have suppressed mold growth. The moisture meter revealed NO currently damp conditions in several areas of drywall tested.

Exterior drainage control was poor and inadequate from the downspouts and there were rotted windows that have led to several leaks that appear to have supported VMG.

A Scope of Work is provided to address these findings.

ON SITE ACTIVITIES – Dr. Vaughan arrived at 930 Cheyanne Road on 8 January 2014 at about 09:15 am. David Smythe opened the building and escorted Dr. Vaughan to the lower level where there was the greatest concern. He then left and Dr. Vaughan was alone for the inspection. During his inspection Dr. Vaughan used a Tramex “Moisture Encounter Plus” non-penetrating moisture meter (MM) to assess the relative dampness of various surfaces to a depth

of just over an inch. [This MM is compared to a Tramex “test box” regularly to ensure proper operation.] He also used a calibrated Extech Hygro-Thermometer Pen (Model 445580) to measure temperature and relative humidity. Photographs during the inspection are found in Attachment A.

OBSERVATIONS: Observations at 930 Cheyenne Road during the 8 January site visit are provided below:

General

- The weather was very cold (28F) and dry with moderate S-SW winds.
- There was no noticeable biological/moldy odor noted on entering the lower level due to the cold temperatures at the time that would have suppressed active growth. [Moldy/biological odors come from *currently active* “microbial volatile organic compounds (MVOCs)” that are released from active colonies digesting the organic matter on which they are growing.]
- The lower level had minimal climate control at the time of this inspection resulting in a temperature of 39F with a relative humidity of 29%, conditions that would suppress mold growth and the generation of odors.
- The flooring was 12”x12” vinyl floor tile. Most of the walls were painted concrete. The improved portion of the space (west side nearest the road) had drywall and kitchen cabinets as well as two finished bathrooms.

Exterior

- Several of the downspouts at the south and east end of the building were improperly discharging water close to the foundation (see photos) such that water could pool and penetrate into the lower level, increasing damp conditions.
- There were wood-framed windows on the south and north side that had rotted (see photos) enough that water could leak into the lower level hall and pool there (see further discussion below). These windows also had obvious gaps/openings that allow outdoor air to enter the lower level.
- There were a couple of open vents into the crawlspace below the altar that exchanged air with the lower level (see photos) elevating the moisture level and leading to increased potential of dew point condensation on cooler surfaces, especially in summer months (see further discussion below).

Kitchen

- There was heavy VMG in patches in the kitchen area – along the lower south wall where a large cabinet had been removed, in the area where the refrigerator had been (perhaps associated with a leak) and across the “passage” on the north side where the kitchen cabinets back on the ladies room wall that appears to have been impacted by a leak on the floor that wicked up into the drywall (see photos). VMG on wet drywall resulting from a leak is referred to as **Condition 3 contamination**, calling for professional mold remediation.

- There was light, white condensation mold growth (CMG) on the kitchen cabinet doors on both sides of the “passage” (see photos) through the kitchen area.

CMG forms in the thin layer of water that condenses when high dew point air contacts cooler surfaces. The dew point temperature of the air is loosely related to relative humidity but is specifically defined as that temperature at which the air gives up some of its moisture to a surface cooler than that temperature. This condensation occurs frequently in bathrooms on ceilings when the room is not ventilated. It forms in other rooms primarily in the transition season when a building’s surfaces are warming up from winter and damp outdoor air enters through windows or doors or when windows and doors are opened after an air conditioner has chilled those surfaces.

As far as mold is concerned, mold spores contain digestive enzymes that are inactive when dry. When there is moisture, even a thin layer, spores on those surfaces are activated and start to digest even the thinnest layer of organic matter that may have blown in from outdoors or been created by indoor activities such as cooking. Once the mold digests enough organic matter it can produce structures that search for additional organic matter nearby. If the moisture dries up or the organic matter is depleted, the mold goes dormant, waiting for more moisture. Hence, CMG builds up slowly over time until it is visible to the human eye. [NOTE: Mold spores are so small that they cannot be “seen” without a microscope. What is observed are tiny colonies that may or may not be linked together.] CMG is characterized by a general pattern that is fairly uniform over and on a surface as opposed to a denser pattern that develops in the presence of considerably more moisture such as wet drywall influenced by a leak.

- There was a small capacity (30 pint) dehumidifier operating on a kitchen counter with its output directed into the main room (see photo). This dehumidifier had obviously been installed recently since its box was on the floor of the main room and there were two older dehumidifiers in the general area that were not operating. This 30 pint capacity is far too small for the intended area (see recommendation below).

Main room

- There were evident leaks associated with the rotted windows on the north and south walls (see photos).
 - The north window leak led to standing water that was sufficient to spread to one pew stored nearby showing water staining, mold growth and wicking, to a center post table where its stand rusted and left a pattern on the floor (see photo) and toward the center of the west side of the area where VMG developed from wicked up water from the puddle (see photos).
 - The south window leak led to staining on the painted concrete wall (see photo).
- There was evidence of leaks near and under the south door (see photo) that had led to some VMG in the main room and likely hidden mold growth behind the shelf assembly in the adjacent closet, also referred to as **Condition 3 contamination**.
 - Standing water from those leaks may have led to the staining and wicking evident on a pew stored on that side of the room (see photo).

- There were isolated areas of heavy VMG on the wall backing on the kitchen (see photos), perhaps linked to leaks in the kitchen from the refrigerator or sink.
- There was also extensive CMG along the walls, especially the north wall (see photos), where high dew point temperature air had condensed (see discussion above).

- ❖ The sources for the entry of this high dew point temperature air are the gaps/leaks around the lower level windows and the vents into the crawl space at the west (street side) end of this space and under the altar area (see photos). These vents were thought to “ventilate” the area with fresh air BUT are now understood to allow high dew point temperature air enter the space during summer months leaving copious amounts of condensation on surfaces cooler than the dew point temperature and supporting CMG on surfaces that have a coating of organic matter. [For perspective, in the summer of 2013, the Cape experienced several weeks of elevated dew point temperatures including an extended period of 70+ F dew points that would have condensed on the cooler surfaces of the crawl spaces and foundation walls in contact with the ground.]

Bathrooms

- The pooled water from the leaking north window drained toward the center where the bathrooms are located and wicked up into the drywall such that many areas near and leading into those bathrooms supported VMG (see photos).
- The dampness in the bathrooms also led to CMG on the upper levels of walls and doors (see photos).

SUMMARY & DISCUSSION:

With concern for “cleaning” mold-impacted areas where VMG is evident or suspected, it is important to understand the following terms:

- **MOLD CONTAMINATION** -The terms Condition 2 and 3 used describe mold contamination are part of the August 2008 American National Standards Institute/Institute for Inspection Cleaning and Restoration Certification (ANSI/IICRC) S520-2008, “Standard and Reference Guide for Professional Mold Remediation.” **Condition 2** involves evidence of settled spores from a contaminated area, a condition documented to some extent by “disturbed” air samples. **Condition 3** refers to “actual mold growth and associated spores ... active or inactive, visible or hidden.”

There are several sources of moisture intrusion into the lower level of this former church building that need to be addressed and corrected.

The obvious surface CMG and many areas of VMG associated with wicking as well as suspect hidden mold growth, all considered **Condition 3 contamination**, need to be addressed by professional mold remediation.

A Scope of Work is presented below to address the safe mold remediation of **Condition 3** and **Condition 2**, settled spore, mold contamination in this lower level.

RECOMMENDATIONS (Scope of Work):

It is important to realize that moisture and biological growth are intimately linked. Moisture/leak control is essential since **even a 99.9+% effective mold remediation effort will leave spores behind that will multiply and produce new colonies if additional water/moisture is provided!** Hence this SOW includes moisture-control items as a priority as well as mold remediation measures.

MOISTURE

There are several improperly installed and non-functional downspouts on the building that need attention because they are adding water to the foundation where it can seep into the space. Improve the installation of the downspouts by:

- Installing functional drywells

Or

- Terminating downspouts 1.5-2 feet from the ground
- Adding an angled elbow
- Installing an extension to discharge at least four to five feet from the foundation
- Avoiding easy disturbance of the extended downspout segments by pop riveting or screwing them together, NOT just pushed together.

With the observation of rotted windows that are leading to leaks into the lower level along with a leaking door on the south side:

- Replace the rotted windows.
- Ensure that the window wells are protected from the weather so that water does not accumulate there to add to water intrusion.
- Replace the south door and ensure that the drain at the bottom of the stairs leading to it is functional so that water will not accumulate there in a dam and seep into the lower level.

With the observation of vented crawlspaces under the altar that readily communicate with the lower level:

- Close the vents to prevent high dew point temperature (i.e. high relative humidity) air from entering the interior.
- To reduce evaporation of soil water into the crawlspaces:
 - Cover the soil in these spaces with at least 10 mil plastic sheets.
 - Overlap the sheets by about two feet.
 - Secure the sheets in place with tape to minimize disruption by workers needing access.

To control the humidity in the lower level, see the dehumidifier suggestion at the end of this SOW. [Should condensation be a problem in the future, one may need to consider a larger ducted dehumidification system.]

MOLD

In light of the potential Condition 2 and actual Condition 3 contamination in the lower level, contained work areas should be set up for mold removal/remediation by a professional mold remediator. An appropriate mold remediation professional would be one with remediation training and individual credentials recognized by the American Council on Accredited Certification (www.acac.org) and/or the IICRC (www.iicrc.org).

Mold remediation should proceed within negative pressure containment for various areas to reduce cross-contamination and provide the ability to evaluate separate areas for the adequacy of remediation. Because the mold contamination is the result of leaks (VMG) and poor moisture management over the years (extensive CMG) there will be settled spore, **Condition 2 contamination**, to deal with as well as the combination of hidden and visible **Condition 3 contamination**.

- Any workers in any containment should wear respiratory and clothing protection per the general guidance of IICRC S520-2008 Section 8 and Chapter 6.
- Air scrubbers should be cleaned from the previous job AND, *most importantly*, checked (preferably using a particle counter to document its collection efficiency) to be sure that the HEPA filters are seated/sealed properly to ensure that particles are being captured and NOT recirculated!
- With stronger indication of VMG and possible hidden mold contamination on the west (street) side of the lower level – kitchen and bathroom areas – probably two smaller areas should be contained under negative pressure near those places, extending out three-four feet into the main room. The main room then would be a third negative pressure containment, having mostly CMG on the surfaces. [Alternately, set up localized containment during remediation of focused areas and then consider the whole lower level, except the furnace room, as one containment.]
 - Because of the size of the main room, 2-3 air scrubbers should probably be operated there.
 - The kitchen and bathroom areas may call for an additional air scrubber each besides the negative air machine, especially during the air polishing phase (see description below).

Kitchen

- Remove the cabinets in both areas to expose drywall that may be impacted behind them. [The removal on the north side will likely reveal hidden mold growth in the wall cavity shared with the ladies room with the ladies room.]
- Remove the lower 2-3 feet of drywall near any VMG. Continue removal until at least two feet beyond the last VMG to ensure removal of latent colonies near the edge of leak-impacted areas.
- HEPA vacuum ALL exposed surfaces in these areas to address the CMG as well, while the air scrubbers are still operating.
- Treat the more impacted areas with a peroxide spray application, or equivalent.
- Seal heavily impacted reaming to isolate any residual mold structures.

- Seal the sill board/floor gaps with flexible caulk to isolate these hard to dry/clean areas

Main room – southwest

- The activities above associated with the kitchen will also address its common wall with the main room.
- In the closet off the south door
 - Remove the shelves and examine for hidden mold VMG in the drywall behind those shelves
 - Remove the lower 2-3 feet of drywall near any VMG. Continue removal until at least two feet beyond the last VMG to ensure removal of latent colonies near the edge of leak-impacted areas.
 - HEPA vacuum ALL exposed surfaces in this general area to address any CMG as well, while the air scrubbers are still operating.
 - Treat the more impacted areas with a peroxide spray application, or equivalent.
 - Seal heavily impacted framing to isolate any residual mold structures.
 - Seal the sill board/floor gaps with flexible caulk to isolate these hard to dry/clean areas

Bathrooms

These bathrooms have both surface CMG and obvious VMG associated with wicking up from past leaks. For both bathrooms, their entries and the nearby area to the men’s room in the northwest corner of the main room:

- Remove the lower 2-3 feet of drywall near any VMG. Continue removal until at least two feet beyond the last VMG to ensure removal of latent colonies near the edge of leak-impacted areas.
- HEPA vacuum ALL exposed surfaces in these areas to address the CMG as well, while the air scrubbers are still operating.
- Treat the more impacted areas with a peroxide spray application, or equivalent.
- Seal heavily impacted framing to isolate any residual mold structures.
- Seal the sill board/floor gaps with flexible caulk to isolate these hard to dry/clean areas

Main room

The major mold impact in this room is extensive CMG on the walls and ceiling. In this area:

- HEPA vacuum ALL exposed surfaces in the main room to address the CMG, while the air scrubbers are still operating.
- Check and clean the small closet in the southeast corner

When done with the above cleaning, “air polish” those areas. The “air polishing” referred to above is a final step to remove settled spores knocked into the air of the living space containments by the action of the vacuum brushes. This step is especially important for areas that are contaminated with settled spores, as these are likely to be, and the goal is to significantly

reduce these settled spores. The “air polishing” steps that can be carried out sequentially in various areas are:

- TURN OFF NEGATIVE AIR so that spores are not drawn in from adjacent, uncleaned areas.
- Set up at least 2-4 air scrubbers in each containment as noted above as opposed to operating it in the negative air mode. [NOTE: Continuing the use of negative air at this time can draw in spores from adjacent uncleaned areas, reducing the effectiveness of the prior cleaning effort.]
- Set up 4-8 oscillating fans across in the each containment to minimize stagnant air zones. Direct them to sweep the floor and other horizontal surfaces to minimize settling.

- Periodically, use a leaf blower or strong fan to stir up the settled spores and general debris left over after the remediation activities above so that they can eventually be moved to the air scrubbers on drafts from the fans and be filtered out of the air. **BE CAREFUL NOT TO DAMAGE THE INTEGRITY OF THE ISOLATION BARRIERS WITH THE STRONG DRAFTS SINCE THAT WOULD SPREAD CONTAMINATION, defeating the purpose of this entire effort.** At the same time, re-orient the oscillating fans to sweep new areas and re-direct the exhaust from the air scrubber to blow over different surfaces.
- The air scrubbing and aggressive blowing can be sequenced to make optimal use of available equipment.
- Operate the oscillating fans and air scrubbers for at least 48 hours in each containment after the cleanup is completed, periodically revisiting the areas for leaf blower mixing and ALSO repositioning the smaller fans and scrubber exhaust.
- Shut down the fans and air scrubbers at least 12-18 hours BEFORE any post-remediation sampling.

[**After a successful remediation** is completed, consider painting the surfaces with a mold-resistant paint to inhibit the reappearance of CMG.]

Post-remediation sampling - To confirm the success of these remediation efforts, post-remediation verification air sampling *could* be carried out **BEFORE removing any containments**. [This post-remediation verification (PRV) sampling also needs to be carried out in a timely fashion, preferably within a few days to a week of the effort, so that ensuing moisture/humidity does not have a chance to mask an acceptable effort by regrowth. IF the space is kept dehumidified, the PRV effort can extend to a week or two. The PRV effort *should be carried out BEFORE any remodeling/renovation* to minimize the likelihood of enclosing residual spores behind new surfaces.] The goal for a successful remediation would be that that the moisture/leak indicator spores, *Aspergillus/Penicillium* like spores, are below 1,000 S/m³ for the disturbed samples and preferably closer to 500 S/m³ and that *Stachybotrys* is found at no more than single digit spore levels in a single sample and no longer be pervasive in most samples across the unit.

To avoid problems with mold in the future, be attentive to any and all water intrusion or condensation issues, taking general advice from The Mold Survival Guide for Your Home and for Your Health by Jeff and Connie May (2004). In particular:

- Respond quickly to correct any leaks that may develop or become evident.
- Operate a large capacity (at least 75 pints) Energy Star-rated dehumidifier on the floor of the lower level in the main room throughout the year with adequate separation from solid objects and in conjunction with a small bilge pump in the collection bucket or a condensate pump outside the unit that discharges the collected water to a suitable drain. The goal is to lower the humidity below 60%, so a modest dry setting is usually sufficient. Periodically clean the unit’s filter following the manufacturer’s instructions.
- If there are allergic or sensitized individuals working in the area, use a HEPA filter-equipped vacuum for routine cleaning of flooring and upholstery to capture spores and irritants.

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The above discussion and recommendations are related to background information provided and the conditions visually observable at the time of NES’s site visit on 8 January 2014 and are thus limited to these activities and timeframe. Future events and changes in the condition and operation of the building may well alter the conditions for biological activity/growth, especially moisture. Such changes will alter the relative significance of these recommendations and the effectiveness of their implementation. Thus the impact of such changes and cannot be considered part of the scope of this report/work.

I trust the above information is sufficient for your current needs. Please call us with any questions or to clarify points.

Very truly yours,



William M. Vaughan, PhD, QEP, CIEC
President, Senior Scientist
QEP=Qualified Environmental Professional (since 1994)
CIEC=Council-certified Indoor Environment Consultant (#0608142)



Attachment A

Photographs Taken During the Inspection

Inspection photos



930 Cheyanne Road – former St. Theresa's Church

EXTERIOR



Improperly installed/maintained downspouts that allow water to be discharged at the foundation

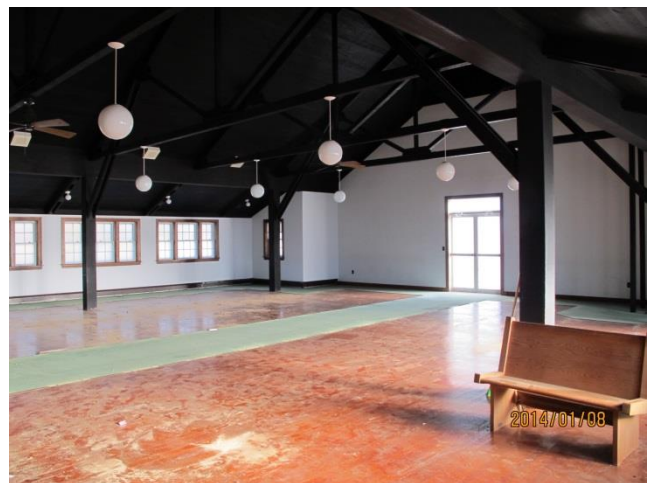


Rotted windows that allow water and outside air to enter the lower level hall



North side vent into the crawlspace under the altar

Main floor – NOT a focus for this inspection



KITCHEN (lower level)



Light CMG on kitchen cabinets (on either side of passage)



Cabinets on south side of “passage” backing on Ladies bathroom with VMG evident –suspect hidden mold growth as well



CMG on surface of wall behind former cabinet location with VMG near floor



VMG near former refrigerator location, indicating possible leak

MAIN ROOM



Back side of kitchen wall (see above) near refrigerator corner



Indication of leaking under south door leading to puddling that affected pew stored nearby (see below)



[[NOTE closet with large shelf assembly next to leaking door – possible hidden mold behind shelves]



Leaking windows along south wall adding moisture to the lower level



Haze of CMG along north wall

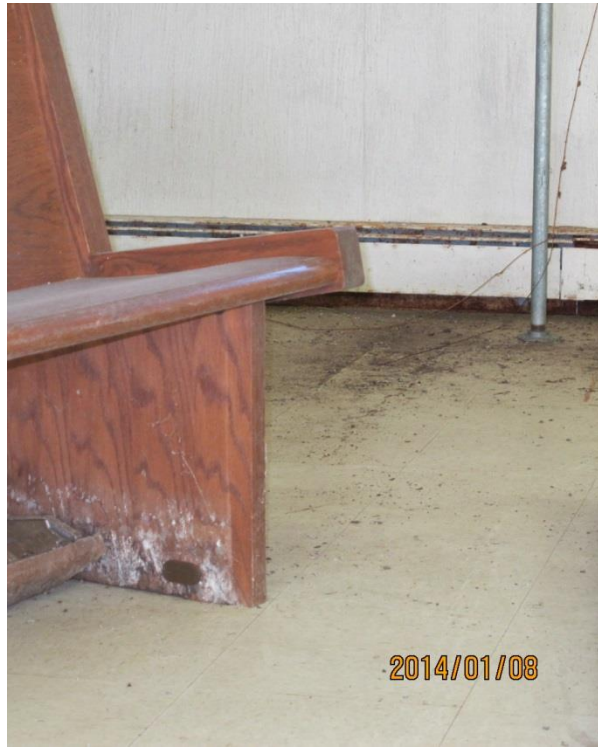


Leaking window on north wall

Impact of north wall leak



Mold growth on pew stored near north wall leak



BATHROOMS



VMG in main room near men's room



VMG outside men's room near north wall leak



CMG on walls and door of men's room



Entry to ladies room



Behind ladies room door (backing on cabinets)

CRAWLSPACES



South and north crawlspaces under altar with vents allowing outdoor air to enter