Nauset Environmental Services, Inc.

an Air Quality Company

22 August 2013

NES Job #3-1517
Report No. **NES**/IAQ-13/1554

Mary & Les Jones
4 Aunt Sarah's Way
Springfield, MA 02253

Re: Mold/moisture inspection
for 191 Old Town Road (Manchester)

Dear Mr. & Mrs. Jones:

Nauset **E**nvironmental **S**ervices, Inc. (**NES**) is pleased to submit this letter report on the investigation of mold/moisture conditions at 191 Old Town Road. In response to verbal authorization **NES** sent William M. Vaughan, PhD, QEP & CIEC to the property on 21 August 2013 to inspect for mold/moisture conditions in the crawl spaces at either side of the house. 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 a home inspection the right side crawl space under the workshop was found to have collapsing insulation and heavy mouse infestation. Those conditions have since been addressed with insulation removal, vacuuming and a bleach treatment. **NES** was authorized to carry out a mold/moisture inspection to document existing conditions in that crawl space and address conditions in the left crawl space under the master bedroom.

EXECUTIVE SUMMARY The results from this inspection found slightly elevated dampness in the floor joists under the workshop BUT no readily observable visible mold growth or associated odors that might be associated with active mold growth or mice. There were no suspect odors in the vicinity of the inaccessible left crawl space.

A collection of suggested action items is provided.

ON SITE ACTIVITIES – Dr. Vaughan arrived at 191 Old Town Road on 21 August about 12:30 pm. Mr. Jones escorted to areas of concern and was present during this 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.] Dr. Vaughan 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 191 Old Town Road are provided below. [NOTE: Directions left-right and front-back, are referenced to viewing the house from the street.] Action items to improve conditions are highlighted in gray in the text below.

General

- The outdoor conditions were sunny and warm (upper-70s) with moderate breezes.
- There was NO noticeable moldy odor, noted on entering the right crawl space or the basement adjacent to the left crawl space. [Moldy 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.]

Exterior

- The downspouts along the front and right sides of the house were discharging water too close to the foundation (see photos) allowing water to accumulate along the foundation with the possibility of seeping through the concrete or coming under the foundation, especially into the crawl spaces.

  - Improve the installation of the downspouts by:
    - Terminating them 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.

- The downspouts at the rear of the master bedroom addition discharge into piping that appears to lead to dry wells (see photos).

Right crawl space

- There was no moldy or rodent odor evident on entering this crawl space.
- There was a residential dehumidifier operating there and discharging outdoors to dry the structure from the previous damp conditions.

- There was no longer any subfloor insulation in this crawl space (see photos). NOTE: Crawl spaces that are not maintained as part of the living space should be left uninsulated so that any high dew point temperature air will condense on the floor and not on the warmer structures.

  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, crawls spaces and vented basements primarily in the transition season when a building's surfaces are warming up from winter and damp outdoor air enters through vents. In insulated crawl spaces it will condense on the

cooler fiberglass and nearby wood, often loading down the fiberglass so it collapses but also dampens the exposed wood so that it might develop condensation mold growth (CMG). Keeping the joists and sub floor uninsulated allows the water to condense on the floor, not on the structure.

- This crawl space had a concrete floor along the right side with exposed dirt to the left against the foundation to avoid compromising the foundation structure (see photos). This dirt allows water to evaporate up into the crawl space. The dirt should be covered with a 6-10 mil vapor barrier to minimize moisture entry into the space.
- There were air vents in the foundation (see photos) and wooden hatch. These openings let in the moisture that caused the fiberglass insulation to collapse under the weight of the condensed water. All air vents should be closed.

- The moisture meter (MM) registered an acceptable reading of 15-16 % moisture in wood (MW) on a joist near the access door (see photo) and where the dehumidifier had been operating.
- The MM indicated 20-21+% MW in a joist near the middle of the crawl space (see photo). This unacceptable reading indicates that additional drying is called for, probably with the dehumidifier operating closer to the center of the space. [Mr. Jones relocated it several more feet into the space that the time of the in section.] Dehumidification should continue until MM indications at many locations are at least in the 15-18% MW range – NOT depending on the relative humidity of the air.
- The MM indicated an acceptable reading of 15-16% MW in subflooring in the middle of the space (see photo).

Left crawl space

- There were two open vents into this crawl space under the master bedroom (see photos) that Mr. Jones closed during the inspection to minimize damp air infiltration. These vents should remain closed as noted for the right crawl space.
- There were no noticeable biological odors (mold or mice) in the master bedroom or the adjacent space in the basement. Had there been excessively damp conditions in this crawl space, there would have been moldy odors. Had there been a mouse infestation, there would have been obvious mouse urine odors. Neither was present, implying no current indication of elevated biological activity associated with contamination in this inaccessible area.
- There was a phone wire hole through the joist into the left crawl space. No noticeable odors were sensed in the vicinity of this penetration.

- The MM was used to test the floor joist visible from the basement that was at the edge of this left crawl space (see photo) and then compare those readings to a floor joist in the basement.
    - The joist at the edge of the left crawl space registered 18-19% MW, a barely acceptable reading.
    - The comparison joist in the adjacent basement room registered an acceptable 10-12% MW.

SUMMARY & DISCUSSION:

This inspection has revealed places where exterior drainage can be improved as well as nearly acceptable conditions in the former problem area in the right crawl space but still calling for additional dehumidifier drying.

The challenge of assessing the inaccessible left crawl space (without disruptive inspection – see photo) was addressed by utilizing the sense of smell and instrumental readings. The MM was used to measure the relative dampness in a joist adjacent to the left crawl space and a similar joist one room further into the basement. Comparing the readings finds only slightly damper, but acceptable, conditions in the wood near the left crawl space compared to the wood on the left side of the basement a situation that implies no excessive dampness that would have soak the joist over time. In addition, without telltale odors in the master bedroom above and in the adjacent basement space, there is no indication that excess biological activity has been stimulated by dampness much less rodent activity.

SUGGESTIONS:

In addition to the action items highlighted in gray above, should one eventually wish to insulate the floor of the workshop over the right crawl space, consider using rolls of Reflectix, a product that staples to the bottom of the joists and is not friendly to mice.

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 at least Energy Star-rated dehumidifiers on the floor of the basement and throughout the year with adequate separation from solid objects and drain into condensate pumps or small bilge pumps discharging to a drain that leaves the building. 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.
- Turn off the water to the washing machine ANY TIME occupants leave for several days since rubber hose failure can occur in any season and cause massive water damage! **Better still**, treat the water valve as if it were a "switch" and turn off the water after each washing.
- If there are allergic or sensitized individuals living in the building, use a HEPA filter-equipped vacuum for routine cleaning to capture spores and irritants.

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The above discussion and recommendations are related to the information you provided and the conditions visually observable at the time of **NES**'s site visit on 20 August 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 (#0608032)

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Attachment A

Select Photographs Taken During the Inspection

191 Old Town Road

Downspouts discharging too close to the foundation

Downspouts at rear of left crawl space apparently discharging into drywells

View to left, front of right crawl space with exposed dirt against basement foundation

Viewing to left, front of left crawl space where two air vents are evident that should be closed

Vie of left, rear of right crawl space where a third vent is evident that needs to be closed

Acceptable MM reading of 15-16% MW in joist

rear

Unacceptable MM reading of 21+% MW in central joist

Acceptable MM reading of 15-16% MW in central subflooring

Right master bedroom wing over right crawl space

One of two air vents in to the right crawl space that was closed my Mr. Jones at the time of the inspection

Finished wall in basement against left crawl space
[Unknown sized “access” is purportedly behind this wall, perhaps only a third air vent.]

Fiberglass was pulled back to make MM reading of 18-19% MW in joist backing on left crawl space