AMBASSADOR
CONSTRUCTION CONSULTANTS, INC.

To:

Re: Mold and water dripping in attic

From: Marko E. Vovk
Forensic Moisture Investigator
Ambassador Construction Consultants Inc.
1501 Spring Garden
Lakewood, Ohio 44107
Civil Engineer / ASHI Certified Professional Home Inspector / 203K Certified / State Licensed Radon Inspector / State Licensed Lead Assessor / State Licensed Termite Inspector / State Licensed Termite inspector / Certified Indoor Environmentalist / Certified Air Balancer / Structural Inspector / Over 7000 Home Inspections Performed / Over 750 Environmental
Inspections performed / Over 1000 Microbial or other samples taken.
216-431- TEST (8378) Voice mail and downtown office
216-924-TEST (8378) Car
216-421-0790 Home fax
Clevelandmold@AOL.Com
www.houseinvestigations.com

Date: 2-15-04 Cold Snow Cover / 22.8 F / 46.4 RH / Dew point 7.5
Inspection time 11:30 PM – 1:30 PM

Dear,

On the morning of 2/15/04, you employed Marko E. Vovk from Ambassador Construction Consultants Inc. to visually perform a non-destructive, partial, and visual inspection of the XXXXXXXX Township property. The following are the opinions of the inspection that transpired on 2/15/04.

Based on my education, training, and experience, there were several observations and conclusions made about the above referenced property.

Facts in issue:

- The home is seven years old and you are the original owner.
- The home has had a defective furnace in the past and you had a contactor replace it. It is unusual that a furnace would need replacement so soon after installation.
- You removed gutter-heating cords that existed in the gutters last year.
- The heating company that installed your furnace also installed a humidifier. They set the humidifier and they service you HVAC system. This company did not provide information on proper use or proper maintenance, of this humidifier.
- You have had major ice dams in recent weeks.

- You have significant fungal reservoir development on most attic sheathing.
- You have moisture spots and moisture accumulation on walls, ceilings and floors.

The following are field data from temperature, moisture, and humidity mapping:

Moisture and humidity mapping results

The entire home was mapped for room temperature, room humidity, surface temperatures, and moisture content. Approximately 80 different readings were taken and documented on field notes. Only several of the 80 readings are documented on this diagnostics report. The sling psychrometer[1] was used for baseline testing results and the digital hygrometer[2] was used for the data collection. All surface moisture mapping was conducted using the Tramex moisture-testing gauge and an infrared laser. All values are represented in mathematical terms to determine the potential cause of fungal development.

Nomenclature or abbreviations for all below field data

T=temperature Fahrenheit
ST= Surface temperature buy infrared surface laser thermo gauge
N=north wall, S=south wall, E=east wall, W=west wall, C=ceiling temperature,
F=floor temperature DP=dew point, I=inner wall (inner walls tend to be warmer)
EX=exterior exposed wall (exterior walls tend to be cooler)
M=mold on surface that is being tested for surface temperature
B=Basement 1=First Floor 2=Second Floor

Most equipment used for this evaluation is calibrated and with NIST certifications. For numerical purposes and a mathematical analogy, we plotted the wet attic insulation temperatures in the attic above the bathroom to determine if the environment in the home was desirable for fungal amplification.

Location	Room T	Humidity	Dew Point	ST N	ST W	ST S	ST E	ST C	ST F	ST OTHER
B kids	70.6	36.7	42.4	60.4	62.8	61.8	60	64	62.0	
B utility	67.0	39.7	41.6		58.2	58.6	62.6	71.4	64.4	57.2WET
1 living				65.2	68.6	68.8	65.8	68.2	68.2	
1 kitch	68.5	43.3	45.4		64.4		69.6	68.2	65.4	
2Bd SW				69.0	65.2	66.2	66.2	68.6	67.6	60.2MOIST
2BD	70.2	50.7	51.1	66.4	68.2	68.6	66.2	67.8	68.8	57.2STAIN
2BD NE	69.3	48.7	49.3	63.2	66.2	68.6	58	68.2		49WINDOW
ATTIC	46.5	53.4	30.7	23.4	25.8	27.4	26.2			
DRAIN TILE IN SUMP	50	75.6								
EXTERIOR	22.8	46.4	7.5							

[1] This baseline test does not need calibration. All gauges used are first compare to the sling results. If equipment is within 3 %, it is used data gathering,
[2] VelociCalc with NIST Cert.

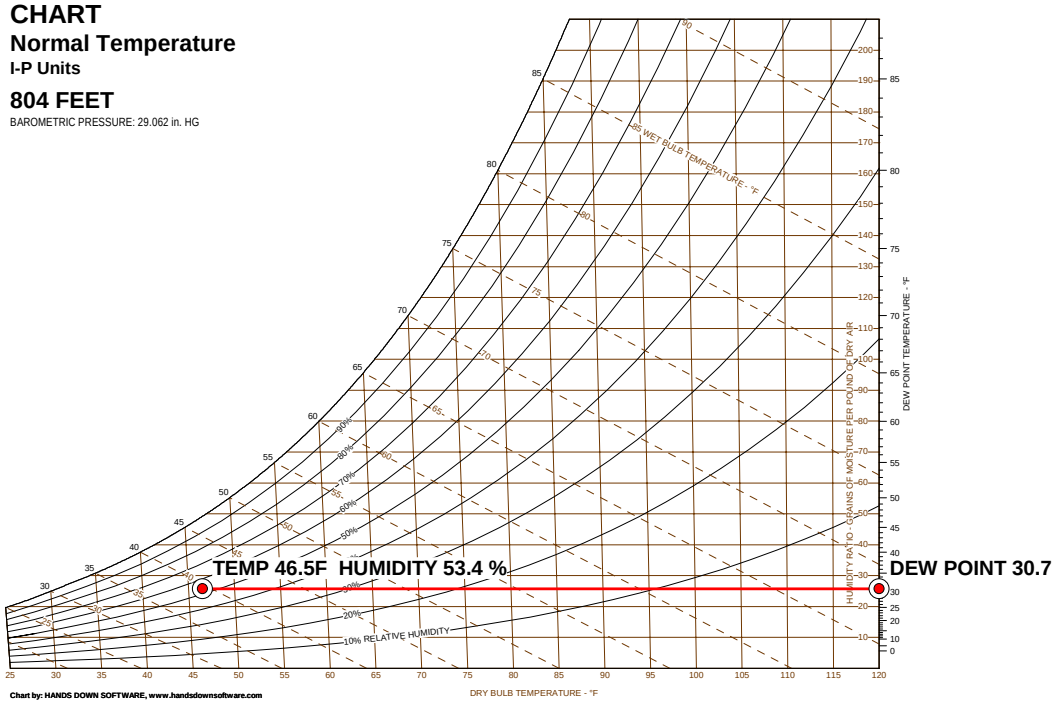
Diagnostic evaluation of why the attic sheathing and insulation is wet and saturated at many locations.

Attic sheathing and timbers were saturated at the time of inspection.

the infrared temperature instruments show the low temperatures in the attic.

ATTIC MOISTURE CONDTIONS

PSYCHROMETRIC CHART
Normal Temperature
I-P Units
804 FEET
BAROMETRIC PRESSURE: 29.062 in. HG



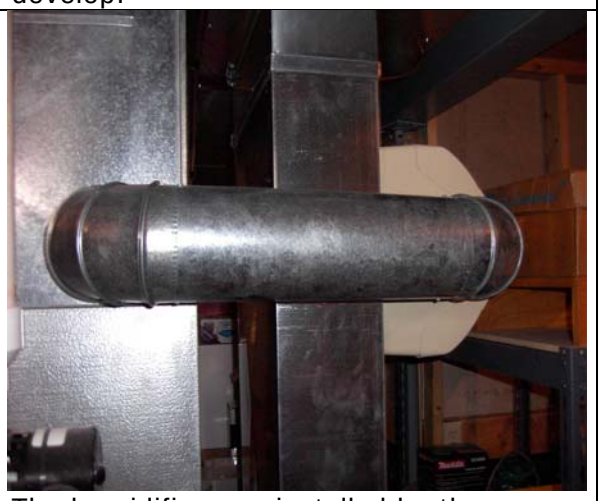
THE CALCULATED DUE POINT IN THE ATTIC WAS FOUND TO BE 30.7 F. Most attic surfaces were at or below the dew point. Condensation was severe and much of the insulation was wet.

The following images are the present conditions that exist with this dwelling.

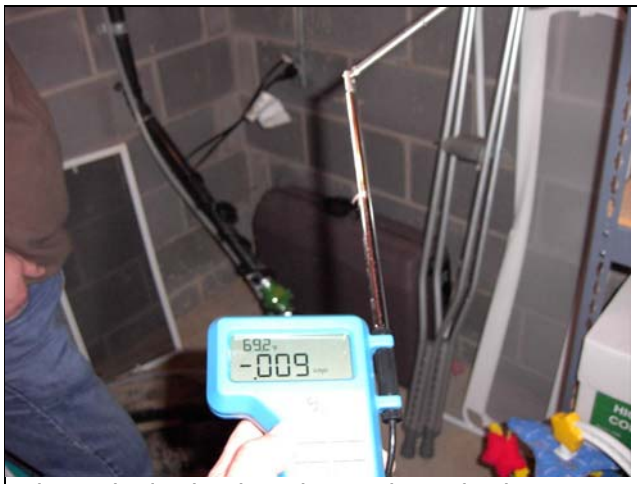
Ice dams are active and are being caused by inadequate soffit venting.

Dew points are forming on windows and wood causing fungal reservoirs to develop.

The furnace company set the humidifier on to high and did not warn the homeowner of potential outcomes. Due to this condition, the home became contaminated with fungal spores.



The humidifier was installed by the furnace company several years ago. The furnace company services this unit as it does the HVAC system. The furnace company should have provided the homeowner with directions for proper use.

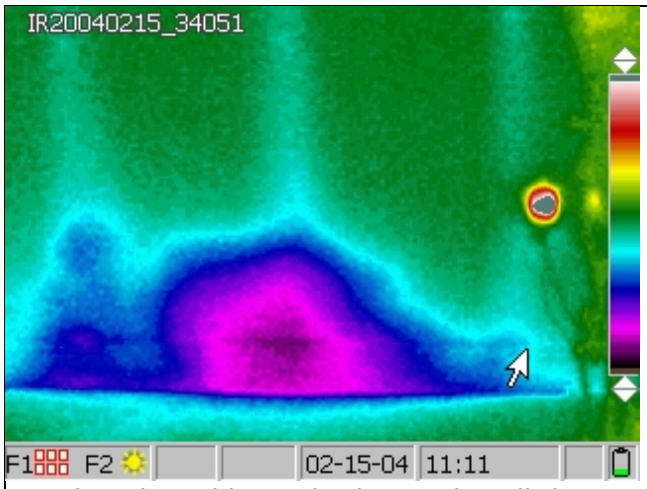


The VelociCalc Plus shows that the basement is slightly depressurized. The heating system was not properly balanced during construction. If it were balanced, the builder would have provided the HVAC balance calculations and data.

The VelociCalc Plus was used to traverse the drain tile that terminates into this sump pump pit. The following readings war obtained: 145,144,151,150,139,172,130,144,165,1 163,160,146, and 90 CFM.

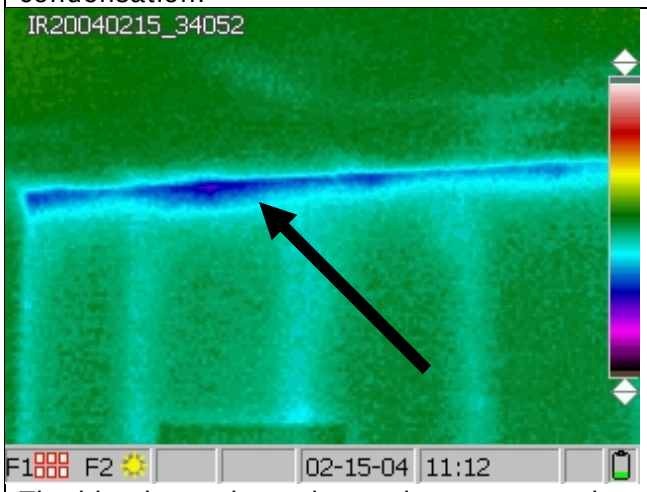
Smoke testing also showed that this sump pump is sucking moist latent air from the drain tile. The smoke is not being sucked into the drain-tile. The smoke is being pushed out.

The infrared image also shows the colder moist air leaving the sump pump pit. The temperature of this air was 50 F and the relative humidity was 75.6% See the purple color; this is the cooler moist air being sucked out of the sump pump pit.



We found a cold spot in the north wall that could be missing insulation or interstitial condensation.

This is an infrared temperature test of the cold spot seen in the infrared image.



The blue is condensation and wetness on the north wall. The north wall was wet and saturated in the attic from the dew point being reached.

This moisture stain was caused by the attic condensation. The attic is so wet the moisture is starting to come through the ceiling.

Executive Summary

This home has active moisture conditions that are causing fungal reservoirs to amplify. The humidity levels are so high the moisture is reaching dew points and many locations. Because of dew points, moisture is causing deterioration, fungal reservoir, and poor indoor air quality. These conditions are occurring on exterior walls, attic sheathing, and possibly interstitial cavities. These conditions are causing damage to the structure and contributing to indoor air pollution.

It is our professional opinion with reasonable certainty, that,

1. **The heating contractor that installed the new furnace and humidifier set the humidifier too high. The contractor supposedly left the setting high and never informed the home of the repercussion. This has now cause damage to the roof, sheathing, and home.**
2. **The builder did not balancing the heating system and did not properly cover the sump pump pit to minimize moisture migration. The builder should know his construction projects and should use proper building science techniques.**
3. **The builder should have known this was a severe weather environment and should have provided proper ventilation.**
4. **You should contact you doctor and let him know that your home humidity is causing damage and you are in the effort to diminish this condition. Should sensitive individual or child exist; the doctor should make proper recommendations.**

Solutions: (This would be the order I would choose)

1. **You must lower the humidity in this home. Shut down the humidifier on the furnace and seal up the sump pump pit.**
2. **Install a basement dehumidifier.**
3. **Alter living habits slightly, to help diminish the high level of indoor humidity.**
4. **Monitor the humidity and monitor further development.**
5. **Make sure all soffit and ridge vents are effective.**
6. **Remove all wet insulation and investigate the ceiling drywall for fungal reservoirs.**
7. **Employ a mold professional to remove fungal reservoirs and damaged sheathing.**
8. **It is very possible that the nails will start popping through the roof membrane and through drywall as you dry the home. A substantial amount of collateral damage may exist.**

If you have any questions pertaining to this matter, please feel free to contact me 431-TEST or 431-HOME.

Thank you,

Marko E. Vovk

Fee for the inspection and report was $295 and was paid in full at the time of inspection. Additional testing, reporting, non-destruction testing, thermo imaging, expert witness testimony, depositions will all require additional fees and to be paid prior to any scheduling. Expert witness and depositions are billed at ½-day rates of $450. Only several images out 95 were used for this report. Images can be purchased for $2 each and $150 storage fee. The digital lots will not be split up and must be purchased in its entirety. This report is to be considered expert and not factual. Additional reports can be purchased for $25 each. The images are the properly of Marko E. Vovk and cannot be duplicated without his permission.