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Assessing the History of a Water Source

For years NASA has been searching the heavens for traces of water proposing that its presence is evidence of life beyond this earth. Water is indeed necessary for the existence of life as we know it. From the Hebrew Scriptures (Genesis 1:1) we know that all of creation was formed out of the waters and the organization of the waters occurred after light had been separated from darkness. Plants, animals, humans, and even microscopic forms of life need water to live. And water is an amazing material. It generally appears in three forms: solid, liquid and vapor. As a liquid or vapor it can penetrate and pass through nearly any material. When it becomes ice (solid) it expands and becomes less dense so that it floats on nearly any liquid. If ice didn't float, nearly all the life in fresh water lakes and ponds would freeze to death in the winter. Water is also necessary in most cleaning operations including within our bodies, where water is used to purify our blood.

But water can also cause much damage. The first recorded damaging water event is the worldwide flood reported in the Hebrew Scriptures (Genesis 6 through 9) and many other old world documents and cultural stories. Since then unwanted water infiltration has promoted mold growth, the decay of wood materials, the corrosion of steel or iron materials, the oxidation of metals, the erosion of construction materials, the spalling of materials from the freezing-thawing, etc.

Unwanted water is the most common cause of damage in buildings. The source of the unwanted water may be a roof leak, gutter overflow, a pipe break, the condensation of excessive airborne moisture, evaporation or infiltration of excessive groundwater from under the building, the wicking of groundwater from the soil, spilling of water, overflow from a toilet or bathtub, infiltration or overflow of water from fire extinguishing operations, etc.

We have been called on many times to not only determine the source of the water causing the damage, but also to determine the history of the water damage. A determination of the history of the water damage may help to determine the source, to determine repair, to evaluate coverage by insurance, and/or to determine whether or not previous building owners could have been aware of the condition.

This article presents a procedure that helps with the determination of the history of water damage. This article does not provide an exhaustive procedure, but lists considerations for a typical evaluation. As a specific evaluation proceeds the engineer may uncover information that results in the development of additional considerations.

The history of the water damage can usually be described by one of the following scenarios:

- a single occurrence;
- an on-going continuous condition;
- an occasional recurring event;
- an old on-going condition that had existed, had been repaired, and now is not occurring;
- and an old condition or event that had existed, had been repaired, but has recurred.

A consideration of the physical evidence, the eyewitness reports, and the physical properties of the materials involved in combination with experience of the characteristics of water damage usually helps to eliminate one or more of these scenarios.

The first step of an evaluation is to ask the eyewitnesses to tell the story leading up to the discovery of the water damage and the events and activities surrounding the discovery, especially potential water related events such as the weather, swimming pool usage, lawn watering, and the usage of plumbing fixtures. Details such as the date or day, the time, the season, the activities going on at the time of discovery, or the progression of the damage may also be helpful.

We have found that the reports by eyewitnesses are usually helpful when the eyewitness is interested in having the problem resolved. However, when the eyewitness is trying to lead the engineer to a predetermined conclusion (intentionally or inadvertently), or when the eyewitness' recollection is poor, we have found that the reported sequence, timing, events, general observations, etc. may not agree with the physical evidence or physical properties of the materials. For example, water may be required to flow up an inclined surface to be agreement with the reported eyewitness observations.

Following are general considerations for determining the scenario for the history of water damage:

- Is the water damaged area wet at the time of the examination? This indicates that the exposure to unwanted water has continued or that the exposure occurred recently and the materials have not dried as of yet. Measuring the moisture content of the building materials may help to track the sources and locate other physical evidence.

- Is the moisture staining dark or light? Light staining is more indicative of short term exposure to water. However, staining from a short term water event may be dark if the water passed through a material with a dark pigment.
- How does the size and area or the severity of the water damage compare with the probable rate of wetting and the probable interval of the wetting? A large area of damage emanating from a slow or intermittent water source is indicative of events occurring over a period measured in weeks or months. A mechanical engineer may be needed to help determine the amount of water expected to discharge from a leaking water supply line.
- Do the surfaces of the wood materials exhibit discoloration or decay? A graying of wood materials usually takes a period of time measured in weeks: decay usually takes months or years.
- Are there multiple rings of staining or discoloration? Multiple rings indicate that the wetting has occurred repeatedly. The rings also indicate varying amounts of leakage have occurred.
- Does the damage exhibit mineral deposits or efflorescence (puffy white salt crystals)? Heavy deposits or heavy efflorescence indicates that the exposure to water occurred over an extended period of time usually measured in weeks.
- Is there patching, paint coverage, or other material coating over the staining, mineral deposits, efflorescence, blistered/peeled finishes, etc.? Coverage of these with some type of coating

indicates that the water damage initiated prior to the application of these. The eyewitness may be able to provide information regarding when these were applied.

- Do adjacent materials exhibit a consistent degree and/or uniformity of water damage such as, staining, discoloration, mineral deposits, etc.? For example, if water damage terminates abruptly at the joint between two components or materials, the one with the lesser or lack of water damage was probably installed after the water exposure initiated. The eyewitness may be able to provide information regarding when materials were replaced.
- What is the source of the water? Is the source consistent with a sudden exposure to water, an ongoing exposure, or a repeated intermittent exposure? For example, a poorly or inadequately installed gutter would immediately allow unwanted exposure to water from gutter overflow.
- What is the condition of the water supply line, sanitary pipe, water fixture, flashing, roof membrane, shingles, gutters, downspouts, etc.? Do the components of the source of the water exhibit mineral deposits, efflorescence, staining, rings of staining, oxidation, discoloration, etc.? The condition of the components at the source of the water and the components along the trail of the water may be evaluated as previously discussed.
- What is the condition of the window frame, door frame, or wood trim at the water damage? Mold growth or severe discoloration indicates that there has been a repeated and on-going exposure to excessive water. Peeling or checking of the stain or paint or the buckling of drywall tape may indicate exposure to a large quantity of water.

- Does the eyewitness report of the extent of the water coverage agree with the observed extent of damage, staining, cleaning, etc.?
- Does the eyewitness report agree with the pattern and location of the physical evidence?
- Does the eyewitness report agree with the severity of the damage?
- Sometimes there are apparent inconsistencies in the reported events and/or the physical evidence. Additional questions posed to the eyewitness regarding this may help to resolve these apparent inconsistencies.
- Finally, are the proposed explanations of the water incident (including the engineer's proposed explanation) consistent with the extent of the water damage and the severity of the water damage? Test the proposed explanation of the history of the water exposure by considering what other physical damage would appear or what other observations would have been made and then look for the evidence of these other physical damages or observations.

After considering these general questions, some of the scenarios for the history of the water damage will probably be eliminated. If a more detailed evaluation is necessary the engineer may develop and/or consider other questions or discover other information peculiar to the subject evaluation that may assist in eliminating all but one scenario. One of the most valuable assets in an evaluation is a knowledge base of water damage developed on personal or corporate experience and experiences gathered from others in the industry, and the ability to apply this knowledge base to the situation in an objective manner.