# Moisture Assessment

Weatherization Energy Auditor Single Family

**Learning Objectives**

By attending this session, participants will be able to:

* Analyze the symptoms of moisture problems in houses.
* Identify moisture sources.
* Explain moisture terms and concepts.
* Demonstrate how to measure relative humidity.
* Demonstrate how to use a psychrometric chart.
* Apply moisture control strategies.
* Use moisture assessment tools.

**Key Terminology**

Absolute humidity

Condensation

Dehumidification

Dew point

Dry bulb

Evaporation

Hygrometer

Moisture meter

Psychrometric chart

Relative humidity (RH)

Saturation

Sling psychrometer

Vapor pressure

Vapor retarder

Vented crawl spaces

Wet bulb

**Supplemental Materials**

Handouts & Resources

Boles, Bill. “Missteps with Mold.” Home Energy 19 June 2006. <www.homeenergy.org>.

“Building Science Basics.” *Health House Rx.* Feb. 2001.

Dampness and Mold in Buildings.” CDC.gov. Centers for Disease Control and Prevention. <www.cdc.gov>.

de Marne, Henri. “Q&A: Moldy Basement Room.” Journal of Light Construction July 1999. <www.jlconline.com>.

Fisette, Paul. “Q&A: Causes of Attic Mold.” *Journal of Light Construction* Nov. 2004. <www.jlconline.com>.

“Foundation Drainage Panels.” *Toolbase.org.* NAHB Research Center. <www.toolbase.org>.

Health and Safety Series: Mold and Moisture." *WxTV*. Montana Weatherization Training Center. <www.wxtvonline.org>.

Hellevang, Kenneth. “Remove Mold for a Healthy Home.” *Ag.ndsu.edu.* NDSU Extension Service. <www.ag.ndsu.edu>.

Lstiburek, Joseph and John Carmody. “Fundamentals of Moisture in Houses.” *Home Energy.* Nov./Dec. 1995. pp. 11-16. <www.homeenergy.org>.

MacPhaul, David and Christy Etter. “Mold Remediation Guidelines.” National Institute of Building Sciences. <www.wbdg.org>.

“Managing Mold in Your Florida Home: A Consumer Guide.” Florida Solar Energy Center. <www.fsec.ucf.edu>.

Powell, Kevin. “Q&A: What to Do About Mold on Framing Lumber?” Journal of Light Construction Mar. 2004. <www.jlconline.com>.

Prowler, Don. “Mold and Moisture Dynamics.” Rev. Heinz Trechsel. *WBDG.org*. National Institute of Building Sciences. <www.wbdg.org>.

Psychrometric chart.

Rosenbaum, Marc. “Q&A: Why Does Mildew Grow in a Closet?” Journal of Light Construction Feb. 1992. <www.jlconline.com>.

Sample Weatherization Mold Inspection and Release Forms.

U.S. Department of Energy. Weatherization Assistance Program. “Energy-Related Mold and Moisture: Training Overview and DOE Guidance” PowerPoint presentation.

U.S. Department of Energy. Weatherization Assistance Program. “WPN 05-1 in re: Energy Related Mold and Moisture.”

U.S. Department of Labor. Occupational Safety and Health Administration. “Mold Fact Sheet.” 2005. <www.osha.gov>.

U.S. Environmental Protection Agency. “A Brief Guide to Mold, Moisture, and Your Home.” <www.epa.gov>.

Van der Meer, Bill. “Avoiding Moisture Problems.” WTC Technical Update 1.1 (Feb. 2003). Weatherization Training Center at Pennsylvania College of Technology. <www.pct.edu>.

Online Platform Lessons

Use these online interactive training modules as prerequisites before students attend the course or as in-class computer lab sessions. To access the lesson, users must first create an account at [www.nterlearning.org](http://www.nterlearning.org).

i- 3.2 Moisture <https://www.nterlearning.org/web/guest/course-details?cid=249>

Relevant Standard Work Specifications

1.401 – Air Sealing

1.402 – Drainage

1.404 – Space Conditioning

Classroom Props & Activities

Sling psychrometer and chart

Moisture meters: contact and non-contact meters as illustrated in slide

Small piece of lumber that has been soaked in water overnight

Small piece of dry lumber

**Practice use of psychrometric chart:** Let a student use the sling psychrometer to take dry bulb and wet bulb readings in the classroom. Record the readings on the board and have students use the psychometric chart to determine the RH in the room. Repeat outdoors. Discuss the difference in measured RH (if any) and possible causes (e.g., air conditioning, number of people in classroom).

**Moisture meter demonstration:** Use the contact and non-contact meters to measure moisture content of the wet and dry lumber. The non-contact type will detect moisture-soaked materials behind materials that appear dry on the surface (e.g., drywall). Have fun—move it on your shirt and note that it will register a moisture reading on your body. Allow students to use the meters to test the moisture content of the dry and wet lumber.

**Class Overview**

* Use the presentation and in-class discussion to teach students how to look for symptoms of moisture problems, sources of moisture, psychrometrics, solutions to moisture problems, and tools used to diagnose moisture problems.
* Go through the definitions listed on slide #10. Do a simple demonstration to reinforce the principles of absolute humidity, relative humidity (RH), and dew point as follows:
	+ Take two clear plastic drinking cups of different sizes.
	+ Write the temperature of 75° on the larger cup and write 50° on the smaller cup. This indicates that 75° (the larger cup) will hold more moisture than 50° (the smaller cup).
	+ Pour water from a separate container into the larger cup until it is ¾ full. State that this simulates 75% RH. Now pour the water from the larger cup into the smaller cup until it overflows slightly. Spilling a little water adds drama and drives home the point that RH can never be more than 100% and water will always condense out when dew point is reached.
	+ Explain that this is an example of how colder air can hold less water than warmer air. The overflow simulates that dew point has been reached where water changes state from a vapor to a liquid state.
	+ Now pour water from the container into the 75° cup until it overflows, explaining that this is an example of how adding more moisture (absolute humidity) affects RH.
* Click through the psychrometric chart slides to add lines sequentially, explaining the significance of each. Discuss how RH applies to human comfort and weatherization, e.g., how air sealing homes can increase interior RH. Refer to the “IAQ” and “Comfort and Climate” sections from the Energy Auditor Single Family curriculum for more resources.
* Demonstrate moisture meters as described above.