Indoor Air Quality Monitor

August 2004 North Dakota Department of Health

Eye on Events

Mold Management in Healthcare Facilities Training

The University of Minnesota, College of Continuing Education will hold its 10th annual "Healthcare Facilities Construction and Mold Management Course" Sept. 19 through 21, 2004, at the Radisson Hotel Metrodome in Minneapolis, Minn. The first day, participants will focus on responding to mold in health-care facilities. The remaining days will focus on managing indoor air quality during construction projects at health-care facilities. For more information or to register, call 612.624.4000.

Mold and Moisture Training Course

The University of North Dakota, Environmental Training Institute will hold a mold and moisture course Dec. 8, 2004, in Fargo, N.D. The course is directed towards contractors, building owners, building managers, health professionals, building inspectors and maintenance personnel. Topics will include health effects, prevention and cleanup. For more information or to register, visit www.eti.und.edu or call 701.777.0384.

Placement of Radon Mitigation Systems

A smoke test can show air flow and pressure differences

If installed correctly, a radon mitigation system, or sub-slab depressurization system, can effectively lower the levels of radon gas and humidity indoors. However, an incorrectly installed system will likely be ineffective at controlling either.

One of the first and most critical steps in installing a sub-slab depressurization system is to select a suction point. A good suction point location will provide for large pressure field extension under the floor, making the system more effective. A poor location will result in limited pressure field extension, making the system less effective.

Many variables can affect where a suction point should be placed. Some of these variables are easily identified by a visual inspection; for example, the presence of drain tile or a foundation footer under the floor. Other variables can be more difficult to see, such as the permeability of the soil or the presence of a sub-slab pipe chase.

Conducting diagnostic tests before the installation of a sub-slab depressurization system can help to identify a good location for the suction point. The tools you will need to conduct a diagnostic test include:

- A drill with a 1/4" to 1" concrete drill bit.
- A shop vacuum with enough hose to reach outside.
- A source of smoke (a smoke tube or bottle works best) or a micro-manometer.
- Duct tape.
- Poly-urethane caulking and/ or vinyl patch cement.
- A sealable sump pit lid (if a sump pit is present).

Begin the diagnostic test by drilling a few test holes in the concrete. The test holes should be drilled in different rooms and spread out across the floor. Generally, suction points should be located next to a footing.

If a sump pit is present, seal it with a sump lid and caulking. Also, use caulking to seal any cracks in the foundation. Openings in the floor that allow air flow, especially closest to the suction point, will directly affect the pressure field.

The next step is to use duct tape to seal the suction hose of the shop vacuum over one of the test holes. The vacuum's exhaust hose should be stretched outside to prevent high levels of radon gas from being exhausted indoors.

(Suction Point ... Cont. page 2)

Inside This Issue ...

(Suction Point ... From page 1)

Use the smoke or micro-manometer to determine if there is a pressure change at the other test holes when the vacuum is turned on and then off. A change in the movement of the smoke would indicate a change in the pressure between the two areas. It may be useful to have one person operate the shop vacuum while another conducts the diagnostics at the test holes. Systematically move the vacuum to the other test hole locations and repeat the diagnostic tests.

The suction point should be located at the test hole where the shop vacuum produced the greatest pressure difference over a larger area. If none of the suction points produce an adequate pressure field, additional test holes may need to be drilled. If the problem persists, other alternatives may need to be considered.

For more information, contact Jesse Green, North Dakota Department of Health, at 701.328.5188 or by e-mail at jmgreen@state.nd.us.

Indoor Heating Oil Spills and Indoor Air Quality

Indoor fuel oil spills can have serious indoor air quality consequences. The vapors from fuel oil spills or leaks are extremely penetrating and volatile.

Fuel oil spills occur in residences for various reasons. Many occur during the filling of home heating fuel oil tanks that are located inside the home. Fuel oil tanks may be overfilled to the point of running over or to the point where improperly vented tanks become pressurized when the cold fuel warms within the tank. Spills also have occurred when the delivery nozzle is inadvertently inserted into the wrong opening, such as a vent pipe.

Removal of cement floor and underlying soil due to indoor fuel oil contamination from an overfilled tank.

Homeowners should take the following steps to help prevent an indoor fuel oil spill:

- If a fuel oil tank is removed, the fill pipe should be removed too.
- Don't put a fuel oil cap on any pipe other than the fuel oil tank fill pipe.
- Ensure that the fuel oil fill pipe is clearly marked.

Fuel oil delivery personnel can help by verifying the correct fill pipe and ensuring fuel tanks are not overfilled.

If a fuel oil spill occurs indoors, homeowners should consider these initial steps:

- Keep flames and other sources of ignition away from the area.
- Shut down the furnace to minimize vapor distribution through the building.
- Open windows.
- Don't track oil from the spill area to clean parts of the house.
- Clean up free oil - use generous amounts of adsorbent material such as kitty litter.
- Cover any stains with the adsorbent material to help neutralize and control the odor.
- Contact the oil delivery company to report the spill.

After the initial spill control steps are taken, promptly removing all sources of contamination is the best method of removing a vapor problem. Concrete and wood may not be able to be cleaned effectively and may need to be replaced. Soils contaminated with fuel oil also should be removed and disposed of at an approved landfill facility.

If the source of vapors is not promptly removed, the vapors may be readily adsorbed into clothing, carpeting and various building materials. These items may then become their own source of fuel oil vapors.

Monetary impacts accrue from the necessity to replace the materials that were contaminated directly, as well as various household items and building materials that have adsorbed fuel oil vapors. For this reason, if a spill occurs, it is essential to remove or remedy the source of the vapors as soon as practical.

For more information, contact Jesse Green, North Dakota Department of Health, at 701.328.5188 or by e-mail at jmgreen@state.nd.us.

IAQ Colleague

Ron Schiller, Indoor Air Quality Program U.S. EPA Region 8

This issue's Indoor Air Quality Colleague is Ron Schiller. Ron is the indoor air coordinator for Region 8 of the U. S. Environmental Protection Agency (EPA) in Denver, Colo.

Ron was born and raised in California. He is a graduate of California State Polytechnic University, Pomona with a bachelor's degree in agricultural biology.

After graduating college, Ron spent three years in the Peace Corps in northeast Thailand. In the Peace Corps, he helped with water tank and sewer construction projects, as well as with fruit tree and fish pond projects at elementary schools.

Ron also worked in the EPA Pesticide Management Program before moving into Indoor Air Quality.

Ron said, "I prefer working the Indoor Air Program. Because the activities are all voluntary, people actually want to work with us."

When not at work, Ron enjoys spending time with his wife, Sandy, and two children, Daran (10) and Linda (7). Ron enjoys traveling with his family and frequent camping trips in the Rocky Mountains.

Tool Talk: Indoor Air Quality Equipment Review

The indoor air quality tool for review in this issue is the u-tube manometer. A manometer is a tool used to quantify a pressure relationship between two gases or the pressure of a gas relative to ambient air pressure. Depending on the fluid used, manometers are only practical for measuring small pressure differences. Due to size limitations, manometers are limited to measuring less than one pound per square inch (PSI) using water and less than 15 PSI using mercury.

In indoor air quality, a manometer can be used to determine pressure differences between two areas of a building. Because pressure differences are what drives air flow, measuring pressure differences between areas in a building can reveal the air flow patterns in a building. Understanding air flow patterns within a building is the first step to assessing the air flow pathways of potential airborne pollutants.

U-tube manometers are simple and versatile instruments. They are constructed from a simple u-shaped glass tube open at both ends. The side of the tube is marked to measure length, usually in inches. The tube is filled to the zero mark with a liquid, typically water or oil.

To use a u-tube manometer, simply expose each end of the tube to separate gases or areas. Plastic hose or tubing may be used extending from the ends of the tube to the gas being measured. Ensure that the tubing does not have any leaks. Leaks in the system will allow air to escape or enter the system and thereby cause an invalid measurement. The manometer also must be kept vertical.

The liquid in the tube will react to a pressure difference by moving from one side of the tube to the other. The amount of liquid that transfers through the tube from one side to the other depends on the degree of pressure difference, which is measured by the markings on the side of the tube. The measurement is the difference in height of the two columns. Typically, the results are given in inches of water column.

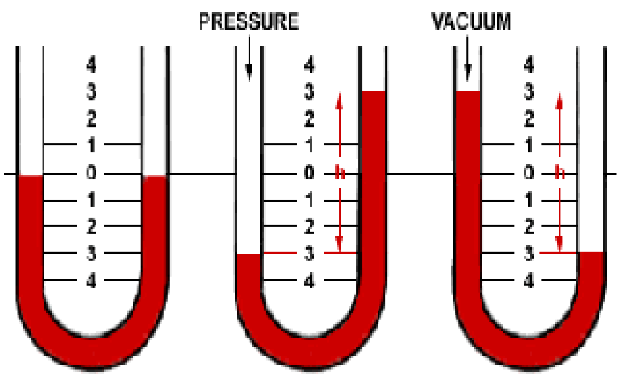
Due to its accuracy and ease of operation, the u-tube manometer is considered a primary standard of measure for pressure by the National Institute of Standards and Technology, formerly the National Bureau of Standards.

A u-tube manometer with measurement marks between the two ends of the tube.

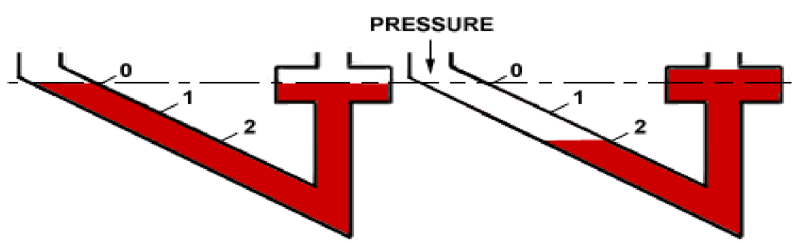
For measurements of slight pressure differences, the manometer can be made more sensitive by inclining one end of the tube. By doing this, slight changes in pressure are more easily observed by a change in level of the liquid on the inclined side.

U-tube manometers are inexpensive, ranging in price from $14 to about $50. More specialized manometers may exceed $200. They can be purchased from a safety equipment supplier, some hardware stores or online.

For more information, contact Jesse Green, North Dakota Department of Health, at 701.328.5188 or by e-mail at jmgreen@state.nd.us.



The illustration above shows the principles of pressure measurement with a u-tube manometer. The image on the left indicates that the two ends of the tube are exposed to gases that are at equal pressure. A tube that is left open with both ends exposed to the same gas will give this reading. This is called static pressure. The image in the middle depicts what would occur if pressure were applied to the gas exposed to the left side of the tube. The image on the right shows what would occur if a vacuum were applied.



The illustration is of an inclined manometer with a reservoir. The incline allows for more subtle pressure measurements to be observed.

The Indoor Air Quality Monitor is published quarterly by the North Dakota Department of Health, Indoor Air Quality Program.

Dr. Terry Dwelle, State Health Officer
Dave Glatt, Chief, Environmental Health Section
Terry O'Clair, Director, Division of Air Quality
Ken Wangler, Manager, Indoor Air Quality Program
Jesse Green, Editor

North Dakota Department of Health
Division of Air Quality
1200 Missouri Ave.
Box 5520
Bismarck, ND 58506-5520
Phone: 701-328-5188
Fax: 701-328-5200

Questions? Comments? Suggestions? Something to add to the next issue? Call Jesse Green at 701.328.5188