CAHI™ CONNECTICUT ASSOCIATION OF HOME INSPECTORS, INC.

MONTHLY

News and Views from the Connecticut Association of Home Inspectors, Inc. January 2008

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Meeting Dates

Jan 12 ***CT Law Seminar***

Jan 23 ***Septic Systems*** **– Brad Korth, Korth Engineering**

Feb 27 ***Water Analysis*** **- Maryellen Diluzio, EnviroTech**

Mar 26 ***Inspection Safety*** **- Daniel Friedman**

Apr 23 ***Radon Mitigation Systems*** **- Jay Dockendorff, RSA Laboratories**

May 23 ***Wood Destroying Insects*** **- John O'Brien, Mastershield**

Holiday Inn
201 Washington Ave
North Haven
(203) 239-6700

Corrosion Control

Submitted by Tom Hauswirth

TECH BRIEF

A NATIONAL DRINKING WATER CLEARINGHOUSE FACT SHEET

Summary
Corrosion occurs because metals tend to oxidize when they come in contact with water, resulting in the formation of stable solids. Corrosion in water distribution systems can impact consumers' health, water treatment costs, and the aesthetics of finished water.

Various methods can be used to diagnose, evaluate, and control corrosion problems. Techniques for controlling it include distribution and plumbing system design considerations, water quality modifications, corrosion inhibitors, cathodic protection, and coatings and linings.

Corrosion Can Cause System Problems

What problems does corrosion cause?
Corrosion can cause higher costs for a water system due to problems with:

- decreased pumping capacity, caused by narrowed pipe diameters resulting from corrosion deposits;
- decreased water production, caused by corrosion holes in the system, which reduce water pressure and increase the amount of finished water required to deliver a gallon of water to the point of consumption;
- water damage to the system, caused by corrosion-related leaks;
- high replacement frequency of water heaters, radiators, valves, pipes, and meters because of corrosion damage; and
- customer complaints of water color, staining, and taste problems.

How is corrosion diagnosed and evaluated?
The following events and measurements can indicate potential corrosion problems in a water system:

Consumer complaints: Many times a consumer complaint about the taste or odor of water is the first indication of a corrosion problem. Investigators need to examine the construction materials used in the water distribution system and in the plumbing of the complainants' areas. (See table on page 6.)

Corrosion indices: Corrosion caused by a lack of calcium carbonate deposition in the system can be estimated using indices derived from common water quality measures. The Langelier Saturation Index (LSI) is the most commonly used measure and is equal to the water pH minus the saturation pH (LSI = pH water – pH saturation). The

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President's Corner

Bernie Caliendo

Like it or not, 2008 is here. We hope you all had a great holiday season and my best to you all for a prosperous and happy New Year!

This past year may have been a taste of what's to come in the real estate market, and in particular, in Connecticut. The sub-prime mortgage industry has collapsed and its repercussions have been felt throughout the economy. Surprisingly the price of homes on the market are still overpriced but the qualifications to be approved for a mortgage have become more stringent. The home inspection industry in our state is at a standstill. There's not much work out there for a profession that has almost tripled since licensing took effect in 2001.

The expenses to operate a small business continues to escalate with transportation costs, office expenses (whether you operate an office in or out of your home), utility bills are through the roof, even the cost of groceries is getting out of hand and the talk of a possible recession looms over all of us. With a continuing war on terrorism and a presidential election coming fast, who knows who will lead us or what tomorrow will bring.

What will this new year bring for CAHI… is another story. We've got some fantastic speakers lined up with some never before presented topics and some updated ones to boot! A special ½ or all-day seminar or bus trip is in the works and it's just a matter of time before you are all informed and invited to attend. We encourage all our members to visit our web site. There is updated information on legislation, pending SOP changes, licensing board info and the 2008 schedule. Our links pages provide a wealth of information, knowledge and continuing education available… FREE! Log in and participate in the members only, anonymous message forum. Check your listing on the "find an inspector" membership page and make sure your information is correct. If it is not, e-mail CAHI at: info@ctinspect.com with your correct info and we will make the changes for you. Don't forget, if you have your own web site, we can set up a link from your company's name right to your site.

We hope you are enjoying our expanded newsletter. We are trying to bring you relevant information you can use, locally and nationally written articles, and updated information to keep you informed and more knowledgeable to compete in today's marketplace.

Last but not least, when you attend all our seminars, please sign in upon entering the seminar room and don't forget to take your CE attendance certificate at the conclusion of the presentation.

Thanks & again happy New Year,

Bernie

January Keynote Speaker

This month's meeting topic is **Septic Systems.**

Our meeting will feature Brad Korth from Korth Engineering. He will present "Septic System Design" & unique methods in difficult situations.

2 hours of Continuing Education Credits

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saturation pH refers to the pH at the water's calcium carbonate saturation point (i.e., the point where calcium carbonate is neither deposited nor dissolved). The saturation pH is dependent upon several factors, such as the water's calcium ion concentration, alkalinity, temperature, pH, and presence of other dissolved solids, such as chlorides and sulfates. A negative LSI value indicates potential corrosion problems.

Sampling and chemical analysis: The potential for corrosion can also be assessed by conducting a chemical sampling program. Water with a low pH (less than 6.0) tends to be more corrosive. Higher water temperature and total dissolved solids also can indicate corrosivity.

Pipe examination: The presence of protective pipe scale (coating) and the condition of pipes' inner surfaces can be assessed by simple observation. Chemical examinations can determine the composition of pipe scale, such as the proportion of calcium carbonate, which shields pipes from dissolved oxygen and thus reduces corrosion.

Can system design affect the potential for corrosion?

In many cases, corrosion can be reduced by properly selecting distribution and plumbing system materials and by having a good engineering design. For example, water distribution systems designed to operate with lower flow rates will have reduced turbulence and, therefore, decreased erosion of protective layers. In addition, some piping materials are more resistant to corrosion in a specific environment than others. Finally, compatible piping materials should be used throughout the system to avoid electrolytic corrosion.

Other measures that help minimize system corrosion include:

- using only lead-free pipes, fittings, and components;
- selecting an appropriate system shape and geometry to avoid dead ends and stagnant areas;
- avoiding sharp turns and elbows in the distribution and plumbing systems;
- providing adequate drainage (flushing) of the system;
- selecting the appropriate metal thickness of piping, based on system flow and design parameters;
- avoiding the use of site welding without replacing the pipe lining;
- reducing mechanical stresses, such as flexing of pipes and "water hammer" (hydraulic pressure surges);
- avoiding uneven heat distribution in the system by providing adequate coating and insulation of pipes;
- providing easy access for inspection, maintenance, and replacement of system parts; and
- eliminating the grounding of electrical circuits to the system, which increases the potential for corrosion.

How can system corrosion be reduced?

Corrosion in a system can be reduced by changing the water's characteristics, such as adjusting pH and alkalinity; softening the water with lime; and changing the level of dissolved oxygen (although this is not a common method of control). Any corrosion adjustment program should include monitoring. This allows for dosage modification, as water characteristics change over time.

pH adjustment: Operators can promote the formation of a protective calcium carbonate coating (scale) on the metal surface of plumbing by adjusting pH, alkalinity, and calcium levels. Calcium carbonate scaling occurs when water is oversaturated with calcium carbonate. (Below the saturation point, calcium carbonate will redissolve; at the saturation point, calcium carbonate is neither precipitated nor dissolved. See the section on "corrosion indices," page 1.) The saturation point of any particular water source depends on the concentration of calcium ions, alkalinity, temperature, and pH, and the presence of other dissolved materials, such as phosphates, sulfates, and some trace metals.

It is important to note that pH levels well suited for corrosion control may not be optimal for other water treatment processes, such as coagulation and disinfection. To avoid this conflict, the pH level should be adjusted for corrosion control immediately prior to water distribution, and after the other water treatment requirements have been satisfied.

Lime softening: Lime softening (which, when soda ash is required in addition to lime, is sometimes known as lime-soda softening) affects lead's solubility by changing the water's pH and carbonate levels. Hydroxide ions are then present, and

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they decrease metal solubility by promoting the formation of solid basic carbonates that "passivate," or protect, the surface of the pipe.

Using lime softening to adjust pH and alkalinity is an effective method for controlling lead corrosion. However, optimum water quality for corrosion control may not coincide with optimum reduction of water hardness. Therefore, to achieve sound, comprehensive water treatment, an operator must balance water hardness, carbonate levels, pH and alkalinity, as well as the potential for corrosion.

Dissolved oxygen levels: The presence of excessive dissolved oxygen increases water's corrosive activity. The optimal level of dissolved oxygen for corrosion control is 0.5 to 2.0 parts per million. However, removing oxygen from water is not practical because of the expense.

Therefore, the most reasonable strategy to minimize the presence of oxygen is to:

- exclude the aeration process in the treatment of groundwater,
- increase lime softening,
- extend the detention periods for treated water in reservoirs, and
- use the correct size water pumps in the treatment plant to minimize the introduction of air during pumping.

What about the use of corrosion inhibitors?

Corrosion inhibitors cause protective coatings to form on pipes. Although they reduce corrosion, they may not totally arrest it. Therefore, the success of any corrosion inhibitor hinges upon the water operator's ability to:

- apply double and triple the design doses of inhibitor during initial applications to build a protective base coat that will prevent pitting; (Note that initial coatings typically take several weeks to form.)
- maintain continuous and sufficiently high inhibitor doses to prevent redissolving of the protective layer; and
- attain a steady water flow over the system's metal surfaces to allow a continuous application of the inhibitor.

There are several commercially available corrosion inhibitors that can be applied with normal chemical feed systems. Among the most commonly used for potable water supplies are inorganic phosphates, sodium silicates, and mixtures of phosphates and silicates.

Inorganic phosphates: Inorganic phosphate corrosion inhibitors include polyphosphates, orthophosphates, glassy phosphates, and bimetallic phosphates. Zinc, added in conjunction with polyphosphates, orthophosphates, or glassy phosphates, may help to inhibit corrosion in some cases.

Silicates: The effectiveness of sodium silicates depends on both pH and carbonate concentrations. Sodium silicates are particularly effective for systems with high water velocities, low hardness, low alkalinity, and pH of less than 8.4. Typical coating maintenance doses of sodium silicate range from 2 to 12 milligrams per liter. They offer advantages in hot-water systems because of their chemical stability, unlike many phosphates.

Before installing any technology for delivering corrosion inhibitors, several methods or agents first should be tested in a laboratory environment to determine the best inhibitor and concentration for each water system.

Is cathodic protection an option?

Cathodic protection is an electrical method for preventing corrosion of metallic structures. However, this expensive corrosion control method is not practical or effective for protecting entire water systems. It is used primarily to protect water storage tanks. A limitation of cathodic protection is that it is almost impossible for cathodic protection to reach down into holes, crevices, or internal corners.

Metallic corrosion occurs when contact between a metal and an electrically conductive solution produces a flow of electrons (or current) from the metal to the solution. The electrons given up by the metal cause the metal to corrode rather than remain in its pure metallic form. Cathodic protection stops this current by overpowering it with a stronger, external power source. The electrons provided by the external power source prevent the metal from losing electrons, forcing it to be a "cathode," which will then resist corrosion, as opposed to an "anode," which will not.

There are two basic methods of applying cathodic protection. One method uses inert electrodes, such as high-silicon cast iron or graphite, which are powered by an external source of direct current. The current impressed on the inert electrodes forces them to act as anodes, thus minimizing the possibility that the metal surface being protected will likewise become an anode and corrode. The second method uses a sacrificial anode. Magnesium or zinc anodes produce a galvanic action with iron, so that the anodes are sacrificed (or suffer

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Norwich, CT

Course Time:
8:00am – 5:30pm both days

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Here are a few examples of what previous attendees say about this course and Trudy Smith, our award-winning instructor:

"Very informative, well-prepared class."
"Trudy's enthusiasm and ability to translate complex technical concepts into everyday language was fabulous."
"Awesome experience! I would recommend this to all my inspector friends."

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corrosion), while the iron structure they are connected to is protected.

Are commercial pipe coatings and linings effective?
The nearly universal method of reducing pipe corrosion involves lining the pipe walls with a protective coating. These linings are usually mechanically applied, either when the pipe is manufactured or in the field before it is installed. Some linings can be applied even after the pipe is in service, but this method is much more expensive. Mechanically applied coatings and linings differ for pipes and water storage tanks. The most common types of pipe linings include coal-tar enamels, epoxy paints, cement mortar, and polyethylene.

Water storage tanks are most commonly lined to protect the inner tank walls from corrosion. The most common types of water storage tank coatings and linings include coal-tar paints and enamels, vinyls, and epoxy.

Typical Water Quality Complaints That Might Be Due to Corrosion

Customer Complaint	***Possible Cause***
Red water or reddish-brown staining of fixtures and laundry	Corrosion of iron pipes or presence of natural iron in raw water
Bluish stains on fixtures	Corrosion of copper lines
Black water	Sulfide corrosion of copper or iron lines or precipitations of natural manganese
Foul taste and/or odors	Byproducts from microbial activity
Loss of pressure	Excessive scaling, tubercle (buildup from pitting corrosion), leak in system from pitting or other type of corrosion
Lack of hot water	Buildup of mineral deposits in hot water system (can be reduced by setting thermostats to under 60 degrees C [140 degrees F])
Short service life of household plumbing	Rapid deterioration of pipes from pitting or other types of corrosion

Source: U.S. Environmental Protection Agency

Where can I find more information?
Information for this fact sheet was obtained from three primary sources: *Technologies for Upgrading Existing or Designing New Drinking Water Treatment Facilities, EPA/625/4-89/023; Corrosion Manual for Internal Corrosion of Water Distribution Systems, EPA/570/9-84/001; and Corrosion in Potable Water Supplies*, EPA/570/ 9-83/013. All of these documents are free and may be ordered from the U.S. Environmental Protection Agency (EPA) Office of Research and Development by calling (513) 569-7562.

If these publications are no longer available from the EPA, call the National Drinking Water Clearinghouse (NDWC) at (800) 624-8301. A photocopied version of the 209-page document Technologies for Upgrading

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Existing or Designing New Drinking Water Treatment Facilities, item #DWBKDM04, costs $30.05. There is no charge for the other two documents listed above; however, postage charges apply to all orders.

Also, the NDWC's Registry of Equipment Suppliers of Treatment Technologies for Small Systems (RESULTS), version 2.0, is a public reference database that contains information about technologies—including those related to corrosion—in use at small water systems around the country. For further information about accessing or ordering RESULTS, call the NDWC at (800) 624-8301 or (304) 293-4191. You may also obtain more information from the NDWC's World Wide Web site at http://www.ndwc.wvu.edu.

For additional copies of "Tech Brief: Corrosion Control," item #DWBRPE52, or for a copy of the previously published "Tech Brief: Filtration," item #DWBRPE50, or "Tech Brief: Disinfection," item #DWBRPE47, call the NDWC at the number printed above.

Carbon Monoxide Detectors Can Save Lives

CPSC Document #5010

The U.S. Consumer Product Safety Commission (CPSC) recommends that consumers purchase and install carbon monoxide detectors with labels showing they meet the requirements of the new Underwriters Laboratories, Inc. (UL) voluntary standard (UL 2034). The UL standard, published in April 1992, requires detectors to sound an alarm when exposure to carbon monoxide reaches potentially hazardous levels over a period of time. Detectors that meet the requirements of UL 2034 provide a greater safety margin than previously-manufactured detectors.

About 200 people die each year from carbon monoxide poisoning associated with home fuel-burning heating equipment. Carbon monoxide is a colorless, odorless gas that is produced when any fuel is incompletely burned. Symptoms of carbon monoxide poisoning are similar to flu-like illnesses and include dizziness, fatigue, headaches, nausea, and irregular breathing. Carbon monoxide can leak from faulty furnaces or fuel-fired heaters or can be trapped inside by a blocked chimney or flue. Burning charcoal inside the house or running an automobile engine in an attached garage also will produce carbon monoxide in the home.

The first line of defense against carbon monoxide is to make sure that all fuel-burning appliances operate properly. Consumers should have their home heating systems (including chimneys and flues) inspected each year for proper operations and leakage. Inspectors should check all heating appliances and their electrical and mechanical components, thermostat controls and automatic safety devices.

Properly working carbon monoxide detectors can provide an early warning to consumers before the deadly gas builds up to a dangerous level. Exposure to a low concentration over several hours can be as dangerous as exposure to high carbon monoxide levels for a few minutes - the new detectors will detect both conditions. Most of the devices cost under $100. Each home should have at least one carbon monoxide detector in the area outside individual bedrooms. CPSC believes that carbon monoxide detectors are as important to home safety as smoke detectors are.

Last Notice! Last Chance!
SIGN UP NOW!

CONNECTICUT LAW SEMINAR

Saturday, January 12th
8:30 – 11:30 am

Holiday Inn
201 Washington Ave
North Haven

Anyone who has attended our law seminars in the past and has heard our featured speaker, Kent Mawhinney, realizes he is the most informative and well received presenter on the required 3-hour CT Law course in the state today! Guest speaker Bernie Caliendo will give a brief overview of the new regulation that is moving along and, when adopted, will change the plumbing section of the Standards of Practice. He will also talk about a new board proposal on changing the continuing education requirements for home inspectors.

CAHI sponsors this course only once a year each January. We have entered a new CE cycle, so don't wait until June 2009 and be stuck trying to find a provider. This CT Law course is not available every month by any provider. Get it in your continuing education portfolio for license renewal now!

CAHI provides the best deal in the state. $99 for everything! Early time, a weekend date, continental breakfast and refreshments at the breaks, conference room setting, attendance certificates which meet the minimum requirements as set forth by the Home Inspection Licensing Board, free parking and easy on-off access to I-91 (exit 12 from north & south, take a right off either exit, the Holiday Inn is on the left).

Three ways to register:

- **Sign-up and pay on CAHI's web site**: www.ctinspect.com. Click on "Special Events" and select "Law Seminar". Fill out the form, click on check-out, fill in the credit card information (this is a secure page) and you're done.

- **US Mail**: Send your name, address and phone/email with a check for $99 made out to CAHI. Mail to: CAHI Treasurer, 75 Pond View Circle, Beacon Falls, CT 06403 must be received before 01/10/08.

- Pay at the door.

This course is open to everyone (members, non-members, inspectors, interns, trades people, etc). Home inspector interns are not required to complete this seminar during their internship. However, information at this seminar is invaluable to all and some content may be of help for the required CT Law Exam and Home Inspector Exam before licensure. CAHI recommends interns attend. Knowledge is the basis of your expertise.

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01/12/07
CONNECTICUT LAW SEMINAR

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Mail to: CAHI, 75 Pond View Circle, Beacon Falls, CT 06403

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The Licensing Board meetings are held at 9:30 am, Department of Consumer Protection, Room 117, 165 Capitol Avenue, Hartford.

The public is always welcome.

E-mail Bernie Caliendo for the latest meeting schedule at bsurehomeinspect@juno.com