HOMEYER
CONSULTING SERVICES, INC.

TECHNICAL UPDATE
May 2009 Edition

AMMONIA IN CLOSED LOOP SYSTEMS
A HIDDEN MENACE

Copper is an amphoteric metal and therefore does not like high or low pH. Most heat exchangers are made of copper. Evaporator tubes, package units, air handlers, and quite a bit of distribution piping are copper. This becomes a sizeable investment for most facilities, and sustainability can become an issue if the correct steps are not taken to protect it. Don't expect if you don't inspect.

Ammonia testing is generally overlooked and this key parameter is a warning sign that trouble is brewing.

How is ammonia formed in a Closed Loop

Over 78% of our atmosphere is Nitrogen. As a result, many bacteria use the nitrification process as part of their metabolism. The nitrosifiers actually secrete ammonia. Ammonia has very high pH and if these troublesome creatures decide to take up residence on your copper…goodbye copper.

Over 90% of piping failures in Cooling Systems will be attributed to Biologically Induced Underdeposit Corrosion conditions. The figures to the right show the underdeposit process and how it can affect your systems.

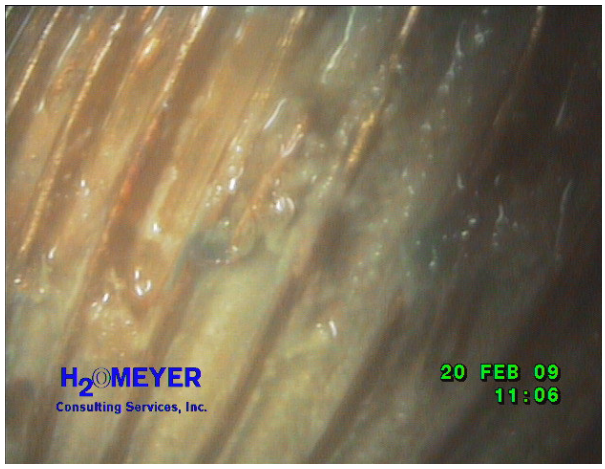

Figure 1: Microbiological growth on tube surface

Homeyer Consulting Services, Inc. has developed standards and reaction protocols for ammonia levels in Closed Loop Systems for our client base. Testing and trending of the ammonia levels is an easy indicator of what may be lurking. Elevated ammonia levels indicates the need for testing for the strains of bacteria that secrete ammonia and then acting accordingly to control them.

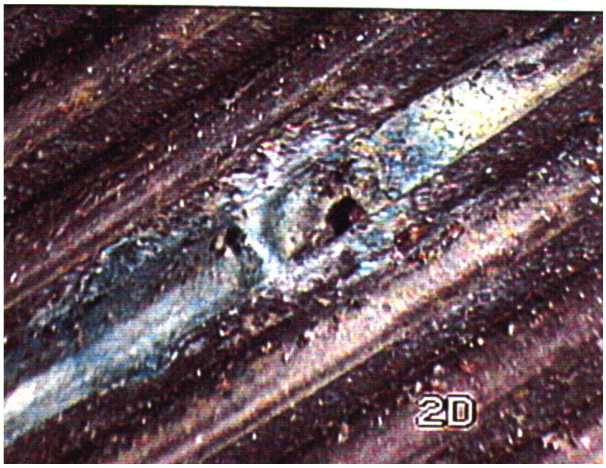

Figure 2: Underdeposit corrosion cell that lead to copper tube failure

The average 800,000 square foot property has over $24 million of replaceable physical plant protected by treated water. Most organizations take this very large fiduciary responsibility and hands it over to their Water Treatment Firm. This violates every financial auditing process in the book. Take a look at your last service report from your Treatment Supplier to see if they are addressing the items related to copper protection and copper corrosion.

Recommendations to evaluate the ammonia threat:

- Conduct periodic audits by an independent Water Consulting Laboratory specializing in treated water, which include both ammonia and biological testing. Then challenge your Water Treatment Firm to pay more attention to your closed loops.
- If the ammonia levels are above 2.0 PPM, this is an early indication that your copper is at risk.
- Anaerobic bacteria counts above 50 cells/ml, copper levels above 0.5 PPM, or copper corrosion rates above 0.1 mils/yr are also bad signs for copper.

Homeyer Consulting Services, Inc. is the nation's largest Industrial Water Consulting Firm consulting to over 3,500 sites in 10 countries. We consult to major Property Management Firms, Data Centers, Universities, Pharmaceutical Firms, Hospitals, and Industrial Plants. We specialize in HVAC and Process Related Waters used for heat exchange.

(978) 851-0100 – FAX (978) 851-2898 – http://www.homeyer.com