# Trouble Shooting Blue-Green Staining and Copper Corrosion

**The complex issue of corrosion of copper water pipes is a frequent complaint heard by water treatment dealers. Primary concerns include deterioration of metallic plumbing, potentially harmful levels of copper in drinking water and aesthetic problems such as blue green stains or bitter taste. Addressing the concerns is often difficult due to the variety of corrosion mechanisms and the limited data on evaluating remediation techniques. The following list provides a simple approach to some of the reasons corrosion occurs.**

1). How old is the copper plumbing? Sometimes, new copper pipes leach copper into water, resulting in blue-green stains until an oxidized coating builds up inside of the pipe. The problem usually takes care of itself in 6 months or less. If unsafe copper levels are a concern, consider alternative water source such as bottled water or reverse osmosis to reduce high copper levels in drinking water supply during this time. Flushing stagnant water from pipes prior to drinking may result in lower copper levels also.

2). Is there a circulating hot water pump? Continuously flowing hot water leaches copper into water just by virtue of higher temperatures accelerating natural corrosion reactions. Is it on a timer? A timer can reduce and limit hot water circulation by circulating only at times of high use. This may minimize the blue green staining associated with copper pipes. Is pipe size consistent throughout circulating loop, occasionally smaller return lines are used and a pressure differential allows dissolved gas to come out of solution and contribute to staining?

3). Water supplies with a pH of 6-7 and lower are considered acidic and known to be corrosive to metals used in plumbing systems. Water treatment dealers can provide treatment options to adjust the pH to a protective level, including neutralizing filters and injection systems. The health limit for copper in drinking water is 1.30 mg/L. “First draw” water samples can be analyzed to determine the extent of the problem and identify water quality issues that may contribute to corrosion.

4). Has there ever been any pinhole leaks in plumbing material? Look at the holes, are they near joints? Work quality such as unreamed pipe ends or burrs that result in turbulent flow can contribute to corrosion. Flux-induced pitting can be expected to occur at or near soldered connections, but have been known to occur as much as eight feet from fittings.

5). What are the size of pipe and the peak flow rates of the application? If the flow is greater than recommended for the size of pipe, erosion corrosion can occur. Most experts agree to keep flow velocities less than 5 ft. /sec in hot water lines and less than 8 ft/sec in cold water lines. Excessive flow rates can be diagnosed by the bright shiny internal surface of the pipe with characteristic U-shaped pits, similar to horse shoes.

6). Microbial-induced corrosion is the result of bacteria slime forming inside pipes, creating an environment capable of corroding copper. Shock chlorination of the water supply and distribution plumbing can help control this form of corrosion.

7). Is there potential for water to sit stagnant in pipes for long periods of time? Water being the “universal solvent” can leach copper with long contact time alone. Modify the plumbing design to eliminate the “seldom used” branches.

8). Is there blue-green staining? Is it limited to one location or throughout the house? Cleaning or soap products containing blue green dyes can be the source of staining, switching to products without dyes may resolve the problem. Clean stains prior to changing products to evaluate.

10). Look for any dissimilar metals in contact in the plumbing system, especially where plumbing comes into building or connections at the hot water heater. “Galvanic corrosion” occurs with dissimilar metals when an electric current allows the less noble metal to dissolve into water. Small localized areas where the copper alloy isn’t continuous can allow this reaction to occur. Electrochemical reactions may occur even if duct work or gas lines are near or touching copper plumbing. Wrapping pipes with electrical tape will prevent static electricity effects. Dielectric unions can separate metals so this galvanic reaction is eliminated but disruptions of copper plumbing such as hot water heaters or plastic sediment filters may benefit from ground wires between connections to maintain metallic continuity. If cathodic protection is required, contact a qualified electrician.

11). Have neighbors complained of similar problems? There may be a localized grounding issue that is affecting more than just one household. Contact the municipal water supply to inquire about this concern.

12). Make sure any ground clamps on the water main are tight. Grounding cable TV or phone lines to the main can be problematic if the clamps are loose or if the copper is connected to a plastic lateral pipe from well. An electrical inspector can evaluate grounding to verify if the grounds are tied together at the electrical box and connected to a remote ground.