Copper

Copper is both an essential and beneficial element for plant and animal life. It rarely occurs naturally in a water supply, and its presence is generally not considered to be a health hazard. High copper concentrations give the water a bitter taste, which discourages people from drinking potentially harmful amounts. The recommended limit for copper in drinking water is 1.3 milligrams per liter (mg/1).

CAUSES:

Copper is usually present in drinking water as a result of the corrosion of copper plumbing. The more commonly occurring causes of corrosion are listed below:

Acidic Water: A soft, acidic water will dissolve small amounts of copper from the plumbing. The amount of copper in the water will increase with the length of time the water has been standing in the pipes.

Dissolved Solids: High concentrations of dissolved solids and chlorides increase the ability of the water to conduct an electrical current. The increase in conductivity accelerates corrosion by making it easier for the chemical reactions involved in corrosion to occur.

Galvanic Corrosion: Galvanic corrosion occurs when two different metals come in contact with each other. The differences between the two metals produce an electrical current, causing one of the metals to corrode. An example of this would be connecting a brass fitting to a galvanized pipe.

EFFECTS:

The most noticeable effect produced by copper is a blue-green stain on plumbing fixtures. The water itself may also have a blue color. Copper above 1.3 mg/l will give the water a very bitter, medicinal taste. To avoid drinking possibly harmful levels of copper or other dissolved metals, the faucet should be run for several minutes any time an "off" taste is noticed. This will flush any metal-containing water from the pipes.

Copper can cause a green "curd" to form when soap is added to the water. People with light colored hair or people using a hair coloring may notice a greenish color to their hair when washing it in water with an elevated copper concentration. Copper is also toxic to aquarium fish.

In some people, drinking water containing an extremely high amount of copper can cause temporary stomach cramps and general intestinal discomfort. This usually occurs only when copper concentrations are above 60 mg/l.

TREATMENT:

1. Acidic Water: Copper present as the result of acidic water may be eliminated by neutralizing the acidity of the water. This may be done by using a metering pump to add small amounts of an alkaline solution (such as soda ash and water) to the water, or by using a neutralizing filter. For further information, please refer to the Bulletin entitled "Corrosive (Acidic) Water."

2. Dissolved Solids: Corrosion due to a high concentration of dissolved solids may be treated by using a reverse osmosis filter to drastically reduce the solids content. However, this method of treatment is very expensive.

An alternative treatment would be to use a polyphosphate compound. The polyphosphates will not reduce the dissolved solids content of the water, but will help to protect the plumbing from corrosion by forming a protective coating on the exposed metal surfaces.

3. Galvanic Corrosion: Galvanic corrosion can be eliminated by placing a dielectric (plastic or rubber) joint between the two different metals to break the electrical current.