



Foaming Cooling Tower

By James McDonald, PE, CWT
Technical Support Manager

You walk into work one day and see white tufts of foam shooting out the top of your cooling tower and floating down onto the nearby cars and equipment. The Plant Manager calls you into his office and says, "Make it stop before I get complaints and bills for car washes and new paint jobs!" Your mind races for a solution, and then you remember reading about cooling tower foaming in the March 2006 issue of the *CROWN Solutions, Inc. Technical Resource*.

Foaming Causes

There are multiple reasons for a cooling tower to have foaming. Your cooling tower may have one or a combination of these causes at work. Causes for cooling tower foaming can include:

- Chemical overfeed,
- Over cycling,
- Excessive suspended solids,
- Protein byproducts from microbiological growth,
- High alkalinity,
- Process contamination, and
- Surfactants.

Chemical Overfeed

An overfeed of biocide or treatment chemical can cause foaming. Reduce the chemical feed, blow down the cooling tower, and add an antifoam if necessary. It usually does not take much antifoam to work, so be careful not to add too much antifoam because this can cause foaming too. *(If you do not have an antifoam on-hand, WD-40 has antifoam properties and will work in a pinch. Be aware that this adds oil to the system though.)*

Over Cycled

An over cycled cooling tower can foam. Blowdown the system to within control parameters.



Excessive Suspended Solids

Excessive suspended solids in a cooling tower due to nearby construction, a nearby dirt road, grain unloading, a dry summer, etc. can cause foaming in the cooling tower. Remember that cooling towers act as air scrubbers too. Any dirt in the air will eventually end up in the cooling tower water. Eliminate the source of the suspended solids, blow the system down, or use an antifoam.

Protein Byproducts from Microbiological Growth

If your tower has excessive microbiological growth, their waste and decomposition byproducts can cause "protein foam" in your cooling tower. Also, if your tower uses an intermittent biocidal feed instead of a continuous feed, the decomposition products during these biocidal events can cause "protein foam" in the cooling tower. Re-evaluate your biocide program and use an antifoam if necessary.

High Alkalinity

High alkalinity in a cooling tower can cause foaming. This can be especially true when softened, non-degassed reverse osmosis concentrate is used as makeup to the cooling tower. Because the RO concentrate is soft



water, you may be able to run at higher alkalinity levels; however, higher alkalinity can cause foaming. Re-evaluate your control parameters and increase blowdown if necessary to reduce foaming.

Process Contamination

Process contaminants such as oil can cause foaming in the cooling tower. Eliminate the contamination, blowdown the cooling tower to remove the contaminant, and use an antifoam if necessary.

Surfactants

Often times cooling tower sumps are located in the floor of a facility. If the floors are washed down with detergents, these detergents can end up in the sump and cause foaming. Also, never rule out the possibility that someone has simply poured a bottle of soap into your system. In an industrial setting this is probably not a possibility, but in a commercial or college setting you never know. Remove the surfactant if possible, blowdown the cooling tower, and use an antifoam if necessary.

Conclusions

As you can see, cooling tower foaming can have many causes and is the end result of other problems that need to be addressed. Cooling tower foaming can damage nearby equipment, ruin paint on cars, and may even be an inhalation source for Legionella bacteria.

The “big picture” when dealing with a foaming cooling tower is as follows, but will be unique for each system.

- Return the cooling tower to normal operating parameters.
- Eliminate the source of the foam.
- Blowdown the system to remove foam-causing contaminants.
- Apply antifoams/defoamers as required.

