

Water Treatment Program Scope of Work

(For all Open and Closed Loop Systems)

To: Rick Hicks

CMI Management

Prepared by:



Jon Miller, CWT
Account Manager

Bond Water Technologies
Water Treatment Recommendations for CMI Management

Cooling System Treatment Program -

BOND 5009M CWT- This highly concentrated blend of advanced terpolymers and scale inhibitors provide optimal protection of evaporative cooling systems. The use of this advanced scale and sludge inhibition has been formulated for use where make up water phosphate concentrations exceed the capabilities of other programs. The corrosion inhibitors in BOND 5009M provide protection for both ferrous and non-ferrous metals in cooling systems.

Biocides

Control of microbiological growth is another important portion of any cooling water treatment program. It is widely known that microbiological organisms can develop tolerances for biocides. For that reason, we recommend two types to prevent the chance of immunity buildup by any particular strain of microorganisms.

BOND 18 This oxidizing bromine based microbiocide can be fed directly into evaporative cooling water systems to remove biomasses and control microbiological growths that can foul and reduce the efficiency of water systems.

Cooling System Program Service

The following testing and services will be provided during service visits:

- Makeup and tower water analyses for each system; performed each month.
 - Recommendations for adjustment of feed rates to maintain desired residuals of inhibitor and biocide.
 - On-Site delivery, chemical treatment will be added directly to the chemical storage tanks.
 - Twice annual corrosion coupon analysis where corrosion racks are available.
 - Annual lab test of each condenser water system to confirm field testing.
 - Boroscope inspection of open equipment the report including digital photos.
 - Check out and adjustment of TDS/Conductivity control system as required for targeted TDS control of blowdown.
 - Site testing kit and operator training for program feed and control monitoring by plant personnel between visits.
 - Audit and review of plant program by your Bond local technical support representatives.
-

Bond Water Technologies
Water Treatment Recommendations for CMI Management

Cooling System Testing Parameters

The following tests will be performed on monthly service calls

- Conductivity
- pH
- Chlorides
- Total Alkalinity
- Total Hardness
- Scale Inhibitor Residual (Molybdate)

Cooling System Data -

- In order to maintain the broader spectrum of control, a stabilized halogen product, BOND 18 will be used. This will be particularly useful in the high demand summer months.
 - The algae and slime control in the main cooling tower will be accomplished with a dual automatic biocide feed system. This program will utilize the automatic addition of two biocides. This biocide will work to inhibit the growth of Legionella, slimes, algae and all microorganisms in the main cooling towers.
 - The current Advantage Microtron controller with dual biocide feed capabilities is functioning properly and will be utilized in order to treat the cooling tower properly.
 - All chemical feed pumps are working properly and will be utilized in our chemical treatment program.
 - Bond 5009M Scale and Corrosion inhibitor will give superior efficiency to your cooling tower system. Energy costs will drop with this increased efficiency.
 - The addition of the water treatment chemicals in all mechanical systems will utilize appropriately sized container that will provide adequate inventory between service visits. This should reduce the amount of time required by your engineering staff to help keep these containers from running empty between service visits.
 - Test kits will be provided for onsite operator testing. This will allow you to monitor the water treatment program and provide feedback to our service personnel between visits.
 - A digital copy of your service report will be supplied after each service visit.
-

Bond Water Technologies
Water Treatment Recommendations for CMI Management

Legionella Testing

Testing is critical to ensure that the proper treatment residuals are maintained in your cooling system to prevent a Legionnaires Disease outbreak. Bond Water Technologies will provide Annual Legionella testing per the contract. Any additional testing will be \$325.00 per sample.

Corrosion Coupon Testing

In order to measure how rapidly the corrosion process is occurring inside of each loop system, corrosion coupon testing is recommended. On every existing coupons rack 1 set of coupons per year will be installed and analyzed to measure exact corrosion rates.

Closed Loop System Program

Closed recirculating systems such as chilled water, hot water, sweetwater and ice builder type systems require treatment to inhibit corrosion and corrosion product fouling. In most instances, water loss from these systems is minimal. Water is typically contained within the system equipment and piping. Therefore, solids do not concentrate and scale formation is not normally a concern.

Closed loop systems are typically maintained at pH levels between 8.0 and 9.0. pH excursions below 7.5 can increase ferrous metal corrosion rates while pH levels above 9.5 create corrosion concerns for copper and copper bearing alloys. Molybdate, nitrite, polyphosphate and triazole corrosion inhibitors are the most common inhibitors utilized in closed recirculating systems.

In some applications, it may be necessary to apply a biocide periodically to reduce microbiological contamination.

Closed Loop System Treatment Program

BOND 5011 CST – This liquid product is an effective corrosion inhibitor for closed water systems. BOND 5011 can be applied to hot and chilled closed loop systems and is compatible with glycols. It provides superior corrosion protection to multi-metal systems where nitrites or chromates cannot be used.

The corrosion inhibitors blended in this product are effective in protecting both ferrous and non-ferrous metals. BOND 5011 is easily fed into closed systems using a chemical feed pump, chemical by-pass feeder or hand-pump.

When the system is presently maintaining sufficient treatment residual, no more will be needed unless the system loses water by leaks or repairs.

Chemical Feed and Control

Unlike, the open recirculating water system, which is subjected to evaporation and airborne contaminants, or the once-through system in which the water for cooling is used only once and then discharged, the closed system requires very little makeup and is not usually susceptible to deposition.

The residual of corrosion inhibitor is tested using a Molybdate test kit.

Closed Loop System Program Service

The following testing and services will be provided during service visits as part of our service program.

- Makeup and system water analyses for TDS, inhibitor & pH.
 - Recommendations for adjustment of feed rates to maintain desired residuals of inhibitor.
 - Microbiological testing will be performed annually (or as needed) during the service visit.
 - Summary report of test results, adjustments, concerns, and recommendations.
 - Site testing kit and operator training for program feed and control monitoring by plant personnel between visits.
 - Inspection of system for corrosion, scale and micro-biological conditions.
-

Bond Water Technologies
Water Treatment Recommendations for CMI Management

- Audit and review of plant program by Bond corporate and local technical support representatives.

Closed Loop System Program Service

The following tests will be performed on monthly service calls

- Conductivity
- pH
- Inhibitor residual (Sodium Molybdate)

BOND Water Technologies Support

Support within Bond takes many forms. Listed below are several examples of the support your facility will receive from Bond Water Technologies:

Emergency Medical Information -- In case of an emergency medical situation, call 1-800-328-0026.

Material Safety Data Sheets – All MSDS information is available on our website at www.Bondwater.com. Additional product information is also available by contacting the Headquarters at 301-721-BOND. Your Water Treatment Specialist is also available and will provide all necessary product information including MSD sheets.

Technical Support -- Bond's Water Care Specialist is fully supported by our Technical Support Group which includes our service laboratory, engineering, product management, and technical service staffs.

Program Guide Manual -- A Program Management Manual specifically designed for your chemical program, gives you access to all pertinent chemical, feed, and control information in one concise package.

Laboratory Analyses -- Complete laboratory analyses are available through our support laboratory. Special analytical analyses can also be performed at our off-site lab.

Test Reagents, Chemical Inventory, and Equipment -- Test Equipment, Chemical Inventory, and Equipment are located in our local Maryland Headquarters.

Please keep in mind that our customer support is enhanced when your staff is willing to participate in program monitoring and testing, forming a viable business partnership.

Bond Water Technologies
Water Treatment Recommendations for CMI Management

Drum Handling and Disposal

Bond fully understands your concerns with chemical drum handling and disposal. Returnable drums are available for many products in both 30 and 55-gallon sizes.

Hands Free Chemical Feed (Safety Feed) will eliminate drum handling and disposal entirely. Bond's innovative water treatment products offer safer application & concentrated formulations for easy handling/shipping, reduced inventory requirements, and an endless shelf life.

All products will be delivered to the point of use and where appropriate will be pumped directly into the storage container. This will be performed using an electric transfer pump via cam-locked hoses into the container.

If the use of drums is necessary at your location, Bond Water Technologies makes drum disposal very simple for our customers. All we ask is that you contact your BOND Water Treatment Specialist and inform him of the number of containers to be returned. At that time, these drums will be scheduled for return to Bond for recycling at no additional cost to you.

Training

As your water treatment consultants, Bond's goal is to work closely with your facility's personnel in the successful operation of your water systems. We strive to maintain clean and efficient heat transfer surfaces with the least expenditure for chemicals that can be achieved. However, all involved need a complete understanding of their role in the success of the program. Bond will help the appropriate personnel to fully understand why we need water treatment. We want the operators to fully understand the tests that are necessary to provide a successful program. The more your personnel know regarding the chosen program the more they will get involved.

Bond Water Technologies
Water Treatment Recommendations for CMI Management

Bond's operator and management training program focuses on the following areas:

◆ **Water: Characteristics and Impurities**

◆ **Boiler Water Treatment**

- (1) Pre-Treatment Equipment
- (2) Basic Boiler Operation
- (3) Boiler Water Treatment Program
- (4) Mixing and Feeding of Chemicals
- (5) Testing
- (6) Safety

◆ **Cooling Water Treatment**

- (1) Cooling System Theory
- (2) Problems in Cooling Systems
- (3) Cooling Water Treatment Program
- (4) Closed System Treatment Program
- (5) Mixing and Feeding of Chemicals
- (6) Testing
- (7) Safety

◆ **Control and Feed Equipment**

- (1) Theory
 - (2) Workings
 - (3) Repairs
 - (4) Calibrations
-

Bond Water Technologies
Water Treatment Recommendations for CMI Management

It is the ultimate goal of Bond's training program to provide operator and management personnel with all the necessary knowledge to:

- I.** Ensure that sufficient product is being supplied to protect the system. Variations in water quality and other parameters are unpredictable and these variations can result in periodic changes in the control parameters of the designed programs. Personnel must know the proper actions to be taken in order for the plant to remain efficient and to extend the life of the equipment, without the unnecessary waste of chemical, water or energy.

 - II.** Enable you to minimize the repair and maintenance cost associated with replacement and cleaning of equipment. In addition, our future oriented strategy addresses the cause of potential problems in your system. Prevention training includes educating operating personnel on those components of the system which may be limiting the overall performance of the system. Bond has the capability to help you diagnose any inadequacies which may exist in the system. Your Bond representative can then assist you in determining the cost/benefit associated with any system modification. It would be the desire of Bond Water Technologies to, on a yearly basis, provide operator and management personnel continued training to keep them current on updates, etc. in the plants systems.

 - III.** To provide your operators and management personnel with the ability to recognize problems before they cause a shutdown and be able to take appropriate corrective action should an upset occur. Bond's response training instructs operators on how to make temporary adjustments to their treatment program when an upset occurs. Since many times a variety of changes may result from a single response we believe that it is crucial that the operator understand the impact of each of his actions. Once the operators have a good understanding of the cause/effect relationship, they are equipped to take the proper corrective action immediately.
-