Selection Guide for Successful Cooling Water Treatment Programs
AWT Cooling Subcommittee
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Water is used to cool a wide range of system types serving industrial, commercial, and HVAC needs. These re-circulating water systems fall into one of three categories as follows:

- Closed loops.
- Non-evaporative semi-closed loops.
- Open evaporative cooling systems.

The water treatment programs needed to successfully protect each system type are more complex for open evaporative systems than for closed loop systems. Evaporative concentration of makeup water constituents, process contaminants, and airborne debris introduced via air scrubbing action at the cooling tower increase the potential for cooling system operating problems and the need for more complex treatment programs.

There are many factors to consider when selecting a cooling water treatment program.

The PRIMARY objective of cooling water management includes multiple tasks that all work together to achieve the PRIMARY objective including:

- Inhibit all system metallurgies against corrosion (prevent failure and operation interruptions).
- Control microbiological growths that can contribute to corrosion and deposit formations (prevent biofilm, MIC, and Legionella).
- Inhibit scale formations and deposit accumulations (optimize heat transfer & conserve energy & cost).

Once the PRIMARY objective is achieved in harmony with the following, then the SECONDARY objectives can be pursued aggressively. These would include a whole list of items:

- Conserve energy, water, and associated costs.
- Minimize maintenance costs and extend system longevity and reliability.
- Provide safety to all persons exposed.
- Be Green and protect the environment
- Conserve potable water supply by reusing other water sources for tower makeup.
- Obtain LEED points etc.

There are many different processes available to treat water. These fall into the two broad classifications of physical processes and chemical processes. The most cost effective programs to best protect the complete water system incorporate a coordinated combination of both physical and chemical processes.

The intent of this selection guide is not to provide a detailed discussion of all the processes available and the best combinations to protect the complete system. The intent is to encourage the buyer to request the seller to provide informative and factual information on

how the proposed treatment program will cost effectively protect the complete water system in question. Buyer categories include property owners, property managers/operators, and project designers including architects, design and consulting engineers who prepare and approve water treatment specifications and bids. The proposal needs to be specific for:

- The water supply chemistry for the specific facility site location.
- The water chemistry for the operating system including Langelier Index for calcium carbonate scale and Saturation Levels for common cooling system scalants including calcium carbonate, calcium phosphate, silica, and magnesium silicate.
- A statement of the system's capacity including water supply and wastewater discharge requirements to satisfy a specific facility operating load.
- Descriptions, sizing, and pricing for all physical water treatment processes (if any) to pre-treat the water supply, the recirculating cooling water, and the bleedoff wastewater.
- A statement of local regulatory requirements for discharge of the bleedoff and any other wastewaters to the local sanitary sewer/POTW or receiving stream via an NPDES permit.
- Descriptions, feed and control methods, and pricing for all chemicals and chemical processes proposed to control microbiological growths, to inhibit corrosion of all system metallurgies, and to prevent deposition and fouling of heat transfer surfaces.
- The maximum corrosion rates that will be tolerated for each of the system metallurgies.
- The maximum microbiological concentrations that will be permitted based on planktonic counts for bacteria, yeast and fungi in the bulk water as measured by nutrient agar, ATP, and HMB testing methods. The method(s) and testing frequency to be used for measuring and monitoring system biofilm and anaerobic organisms including sulfate reducing bacteria.
- The water treatment service program to be provided including service call frequency, onsite testing to be conducted and reported. It needs to identify the water samples that will collected for laboratory analysis of system chemistry and the method(s) to be used for monitoring the presence and absence of Legionella bacteria.