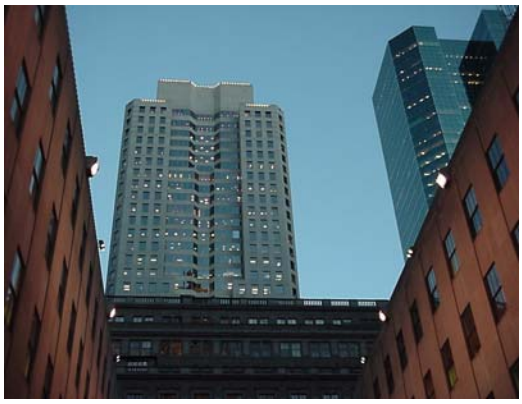
JAMESTOWN TECHNOLOGIES
Water Resource Specialists

MOLYGARD®-600 and ON-LINE-CLEANER

COOLING WATER TREATMENT CASE HISTORY
New York City Office Building with Package Air Conditioning Units

Facts:



A large New York City commercial building operates a 1,200 ton cooling tower in conjunction with 70 direct expansion package units to regulate temperature levels within the office space and computer areas. Prior to the Jamestown program, the system was being treated with an organic-based inhibitor and an iron dispersant to control corrosion and fouling problems. Despite the use of the treatment program, the system was plagued by severe turburculation and deposition problems in the 3/4 to 2.0 inch pipes leading to the package units. These blockages resulted poor system performance, frequent downtime, and excessive pipe replacement costs.

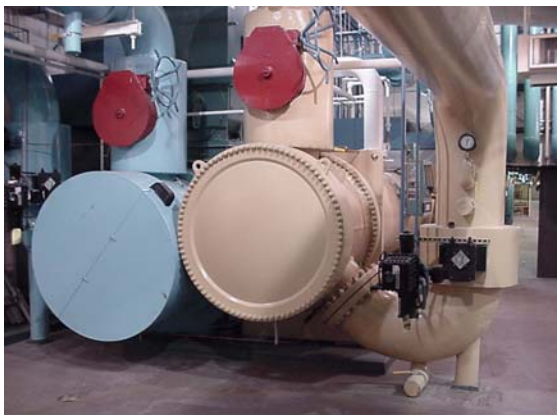
To eliminate these problems, the building then implemented a program based upon Jamestown's MOLYGARD-600, a molybdate-based corrosion inhibitor, and ON-LINE-CLEANER, a concentrated blend of dispersants and surfactants. Once established, the new program not only consistently provided mild steel and copper corrosion rates below 1.0 mpy and 0.2 mpy, respectively, but also gradually removed iron deposits from the piping and greatly improved the operation of the package air-conditioning units.

Background:

The 1.4 million square foot, 31 story office building uses a 15,000 gallon open recirculating cooling system to supply chilled water for 70 individual package units of 10 - 50 ton capacity. The building uses city water with the following characteristics to satisfy the system's approximate 70,000 gallon per day make-up requirement:

TYPICAL MAKEUP WATER CHARACTERISTICS	
PARAMETER	VALUE
pH:	7.0
Total Alkalinity, (ppm as $CaCO_3$):	30
Total Hardness, (ppm as $CaCO_3$):	10
Conductivity, (mmhos/cm):	80
Chlorides, (ppm as Cl):	10
Iron, (ppm as Fe):	0.1

With such a high quality makeup water, the system typically operated at 10 cycles of concentration, which when combined with the poor air quality of the city environment, meant that suspended solids levels in the system were quite high. In addition, the package units all lacked 3-way modulating valves for temperature control, so the entire system was very prone to low flow/no flow conditions, and subsequent suspended solids precipitation and underdeposit corrosion problems. Within a short period of time, corrosion had become so severe in the system that turburculation had completely plugged many of the 3/4 to 2.0 inch black iron pipes that fed the package units. In fact, during the peak summer cooling season, an average of one package unit per week was failing, resulting in a manpower output of six hours per repair.



Jamestown Program:

The new program consisted of Jamestown's MOLYGARD-600 molybdate-based corrosion and scale inhibitor, our ON-LINE-CLEANER dispersant, and two proprietary microbiocides. The MOLYGARD-600 was continuously fed to the system to provide a molybdate residual of 10 - 20 ppm (as MoO_4) in the recirculating water. Likewise, the ON-LINE-CLEANER was also continuously fed to the system at a rate of 75 ppm (as product). The biocides were each slug fed to the system once per week via an electronic timer and metering pump. A 50 micron in-line strainer was also added to the system to remove large particulate matter from the recirculating water.

Program Results:

Based upon guidelines established by the National Association of Corrosion Engineers (NACE), the industry accepted standards for mild steel corrosion rates (expressed in mpy) in cooling water applications are as follows:

NACE Guidelines	
Corrosion Rate	Evaluation
0 - 2 mpy	Excellent Control
3 - 5 mpy	Good Control
Greater than 5 mpy	Poor Control

In addition, corrosion rates for copper and copper-based alloys should also be maintained below 0.3 mpy.

Throughout the cooling season, corrosion rates were measured by a Corrater®, an electronic device that uses Linear Polarization Resistance (LPR) techniques to provide instantaneous general and pitting corrosion rates in the system. As measured by the Corrater, mild steel corrosion rates never exceeded 1.0 mpy, while copper corrosion rates were always maintained below 0.2 mpy. Pitting corrosion rates for mild steel were also very low; an encouraging indication that this often highly destructive form of corrosion was also being properly controlled.

From an operations standpoint, building personnel noticed a pronounced improvement in system performance during the course of the year, as the failure rate for the package units decreased significantly. In addition, a visual inspection of spool samples taken from various sections of the system throughout the year showed a gradual decrease and eventual removal of iron deposits from the distribution piping. Such observations were also supported by system performance, as the building has operated for over two years now without a single failure in a package air-conditioning unit.

Conclusion:

The selection of a proper chemical treatment program, carefully applied and monitored under the guidelines of an integrated technical support program, is a strategy that must be routinely followed to establish a successful cooling water treatment program. By carefully evaluating the situation and recognizing the important role that deposit control plays in systems using package air-conditioning units, Jamestown was able to recommend a comprehensive program based upon MOLYGARD-600 and ON-LINE-CLEANER to help the building improve performance and eliminate downtime in this demanding cooling water application.

Bibliography:

1) "Of Cooling Water Treatment Effectiveness", Water Treatment Committee of the Cooling Tower Institute, CTI Bulletin Number WTP-130, October, 1981.

Contact Information:

Jamestown Technologies
A Division of Azure Water Services, LLC
280 Callegari Drive
West Haven, CT 06516

Phone: **203-932-3655**
Fax: **203-933-1751**
Web: **jamestowntech.com**
Email: **info@jamestowntech.com**