

## WORLD CLASS EXPERTISE AND RESOURCES

You know Nalco Water has been an expert in scale and deposit control in water treatment applications for over 80 years. We apply that same expertise to understanding your process side applications such as evaporator management. Your on-site Nalco Water engineer will utilize our world-class resources including analytical laboratories, monitoring & control systems, and research & development capabilities. Combined, these resources can provide the optimal solution for your system.

## QUESTIONS EVERY CORN PROCESSOR SHOULD ASK

- Am I feeding the optimal deposit inhibitor for my system?
- How do I know which evaporator to clean?
- How much downtime is required for cleaning?
- How can I measure the effectiveness of my cleanings?
- How frequently is the system shut down for hydro-blasting?

## HOW DO I GET MORE INFORMATION ABOUT NALCO WATER'S DEPOSIT CONTROL PROGRAM?

Contact your local Nalco Water Sales Engineer, email us at [peastin@nalco.com](mailto:peastin@nalco.com), or call Phil at 636-448-7356.



# Evaporator Management Program

Another State-of-the Art Solution from Nalco Water

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## THE IMPORTANCE OF DEPOSIT CONTROL

Whether you operate a dry grind ethanol plant or a corn wet mill, constituents present in the corn process streams can cause fouling and scale build-up in the evaporator and distillation systems. These deposits cause a myriad of problems including loss of efficiency, increased costs and lost production time.

## A COMPREHENSIVE APPROACH OPTIMIZES SYSTEM PERFORMANCE

Today, most plant managers understand that the high mineral and solids concentrations found in evaporator systems combined with a high temperature environment will lead to significant organic and inorganic fouling. Feeding chemistry alone is not the answer. In order to eliminate the evaporator system as a bottleneck in the plant, customized chemistry, performance monitoring, regular cleaning and ongoing inspection are required to ensure cleanliness.

Nalco Water's comprehensive approach to evaporator system optimization is multi-faceted and based on years of industry experience. This approach has delivered documented results in increased energy efficiency and plant production. And, now that we're part of Ecolab, our capabilities have expanded to include world class cleaning and sanitation expertise and programs. Ecolab's Food & Beverage division has been the leader in cleaning and sanitation for the food processing industry for over 60 years.

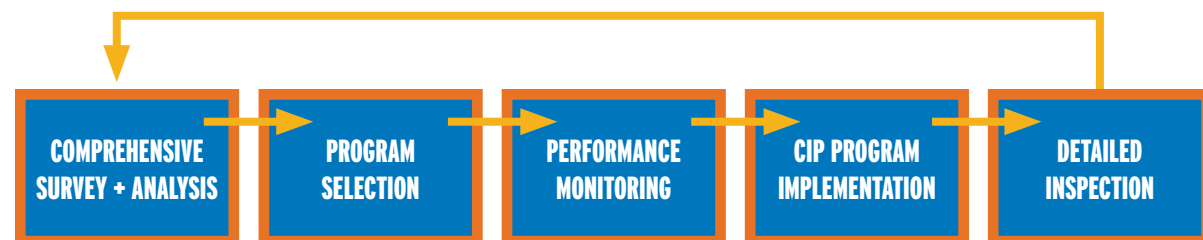
Our enhanced 5-step approach now delivers:

- A comprehensive survey along with sample collection and analysis in order to understand regulatory requirements as well as the nature of the deposit.
- Selection of the proper deposit control agent to both inhibit and minimize deposition and fouling.
- Comprehensive performance monitoring to identify which evaporators are fouling and which ones need to be cleaned.
- Implementation of a targeted, highly effective CIP program that effectively cleans those evaporators that need to be cleaned.
- A detailed inspection to monitor program effectiveness and identify areas of improvement.

## POTENTIAL BENEFITS INCLUDE:

- Fewer Unplanned Shutdowns
- Extended Run Length Between Cleanings
- Reduced Frequency of Hydro-blasting
- Increased Production Time

## NALCO WATER'S SCIENTIFIC APPROACH TO EVAPORATOR MANAGEMENT



## ANALYTICAL DISCOVERY

Our on-site experts use a comprehensive system survey to understand critical process parameters and regulatory requirements. Next, samples are collected and analyzed to confirm the nature of the deposit.



## DEPOSIT CONTROL PROGRAM SELECTION

The majority of evaporator deposits consist of organic material. So why feed a deposit control agent? Organics are much less likely to stick to clean tube surfaces. Inorganic deposits create a surface 'roughness' that often leads to organic fouling. By selecting the best inorganic dispersant for your system, organic fouling can be minimized. The photo below clearly shows the organic layer that can accumulate on top of an inorganic layer.

Your on-site Nalco Water engineer can recommend the right products to inhibit deposition and fouling based on the specific conditions in your system. Depending on pH, temperature and mineral concentration, the mineral deposition can be calcium or phosphate based precipitation. Deposits in systems above 185 °F tend to be magnesium phosphate salts, with calcium oxalate in the lower temperature systems, typically below 145 °F. (See figure 2)

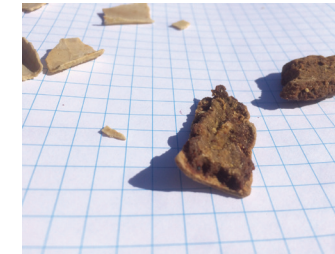


Figure 1: Organic materials can accumulate on a layer of inorganics.

## IN-SYSTEM EVALUATION

As a first step, we will develop a trial plan specifically for your system. The purpose is to define the criteria and measurements for success during the in-system evaluation/trial. This eliminates uncertainty and allows the program to be optimized according to actual system operation and performance.

## CONTINUOUS PERFORMANCE MONITORING AND EVALUATION

Nalco Water has developed a scientific method that monitors evaporator system performance. Today, the most common method of monitoring involves trending steam to the first effect and first and second effect header pressures. These can give an indication of a problem, but

don't identify where the problem is. Our detailed model can monitor overall system performance and efficiency, and identify which evaporator is becoming fouled so appropriate action can be taken. Time and resources are focused on those evaporators that need to be cleaned.

## CIP PROGRAM DESIGN

Organic and inorganic fouling have different requirements for successful cleaning. A customized cleaning approach, based on the constituents in your deposits, will yield optimal results. Ecolab has deep experience in cleaning and sanitation for the food processing industry. Proven technology from Ecolab experts is now being introduced to the corn processing industry with great success. The result is more effective cleanings that require less time, and result in increased efficiency and less downtime.

## DETAILED INSPECTION

In cooperation with the plant, we also leverage shutdowns to inspect the inside of the evaporator tubes with a boroscope. This instrument allows us to inspect the inside of the tubes, take videos to use for past and future comparisons, and collect samples for lab analysis to determine deposit makeup.

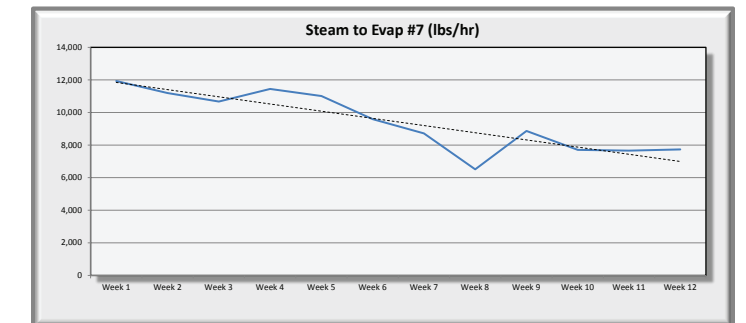


Figure 3: The model graphically depicts that evaporator #7 needs to be cleaned.

Figure 2: These two charts show that calcium oxalate, also known as beerstone, is more likely to form at lower temperatures, while magnesium phosphate is more likely to form at higher temperatures.

