



Optimizing Your DAF Process

Process Management for
Dissolved Air Flotation Systems



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A photograph of a Dissolved Air Flotation (DAF) system in a wastewater treatment plant. The machine has a large horizontal roller and a conveyor belt. A thick layer of brown, frothy foam is being discharged from the side of the machine onto the floor. The background shows the industrial structure of the facility.

**Maintaining your DAF
system is priority #1, right?
Wrong.**



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DAF Elements that Require Attention & Potential Problems:

1. Solids loading rate
2. Hydraulic loading rate
3. Regular testing
4. Probe/Analyzer maintenance
5. Chemical usage



Specific Operational Challenges

Influent
Variability

pH Control

Temperature
Fluctuations

Accuracy of
Online
Measurements



Specific Operational Questions

- What to measure – and why?
 - Where to measure it?
 - Is a shift or daily grab sample good enough?
- Hint: It is not**
- Is my system running as designed?
 - Is my instrument giving me correct readings?
 - What do I do with the data?
 - Do chemical and/or power savings matter?

Hint: Absolutely



Typical DAF System Process Operation

Overloaded system

Lack of true understanding of DAF
process conditions

Ongoing reliance on individual
operator knowledge/experience



Process
Operation
is Not
Process
Optimization

Determining DAF Efficiency – The Manual Approach



Decreasing
effluent
turbidity



Sludge cake
accumulating in
back 1/3 of DAF



HEALTHY



Thick Sludge Cake

Low turbidity

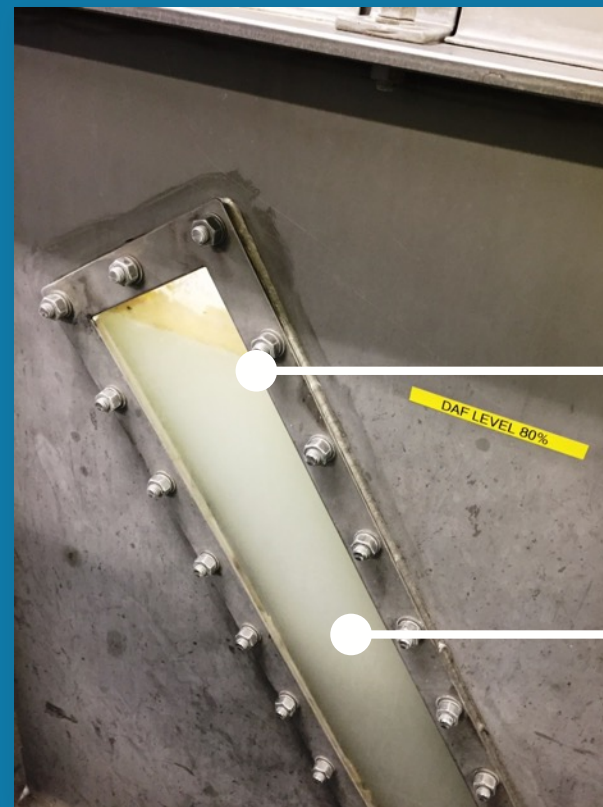
Determining DAF Efficiency – The Manual Approach



Minimal change in
effluent turbidity

No sludge cake

High turbidity



UNHEALTHY

Thin
Sludge Cake

High turbidity



We Can Help



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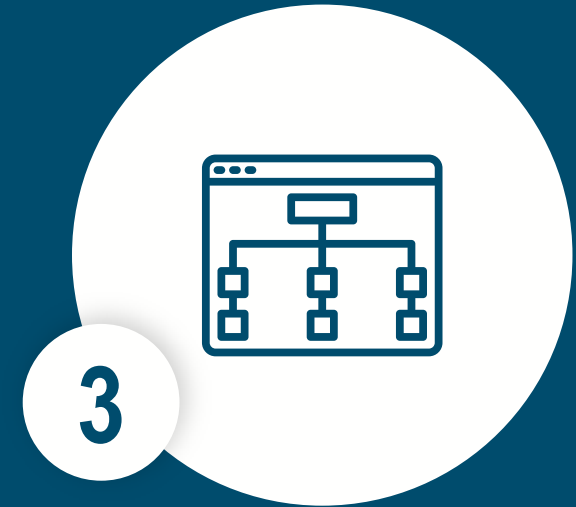
How Can We Help?



**Rugged online instrumentation
for industrial processes**



**Real-time
monitoring**



**Automated
process control**

A close-up photograph of a blue plastic bottle being filled by a machine. The machine has a red nozzle and a silver metal body. The bottle is partially filled with blue liquid. In the background, several other similar bottles are visible, some with red caps. The image is overlaid with a blue diagonal band containing text and a logo.

1

Rugged Instrumentation



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Rugged Instrumentation



Total Suspended Solids (TSS) / Turbidity Monitoring

Solitax sc Sensors

TSS sc Sensors



pH Monitoring

Digital Differential pH &
ORP Sensors



Organics (TOC) Monitoring

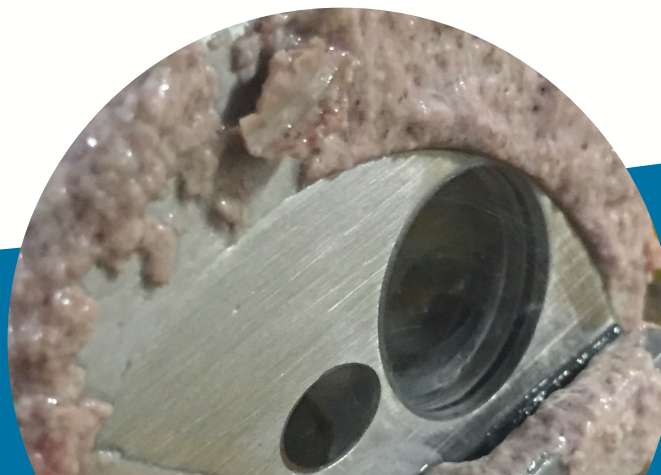
BioTector B7000i Online
TOC Analyzer



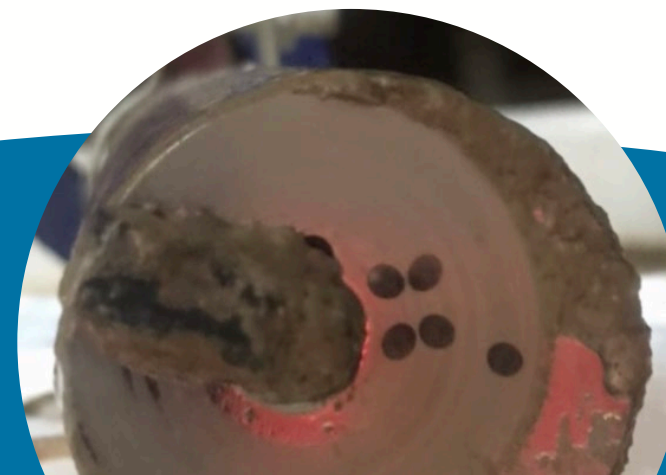
Getting the Job Done in the Dirtiest Environments



**Self-Cleaning
Wipers**



**Humidity
Sensors**



**Multiple
Detectors**



2

Real-Time Monitoring



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Real-Time Monitoring

24/7 Process Visibility

Instrument Health Monitoring

Resource Savings

- Chemicals
- Labor

Reduce downstream
treatment costs

Identify product loss

Universal Controller

sc1000



Standard Features

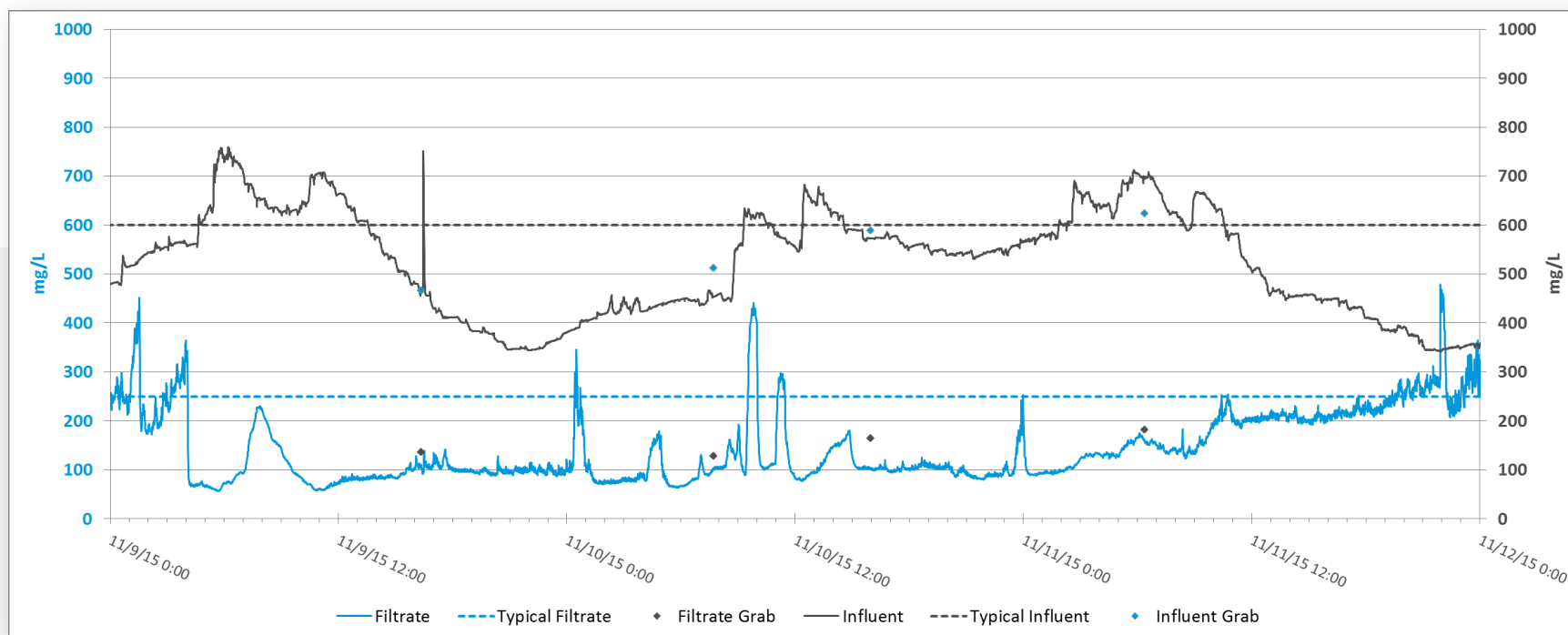
- Highly configurable
- Up To 8 Sensors
- Plug And Play Functionality
- C1D2 Certification
- NEMA 4x/Ip66
- 4 Relays
- Up To 12 mA Outputs
- Up To 12 mA Inputs
- SD Card For Data log And Configuration
- Networking
- Allows Up To 32 Devices Per Network

Communication Options

- Modbus Rs232/Rs485
- Modbus TCP/IP
- Profibus Dp
- Hart 7.2



Knowing the
Process is a
Good Start,
But...





3

Automated Process Management

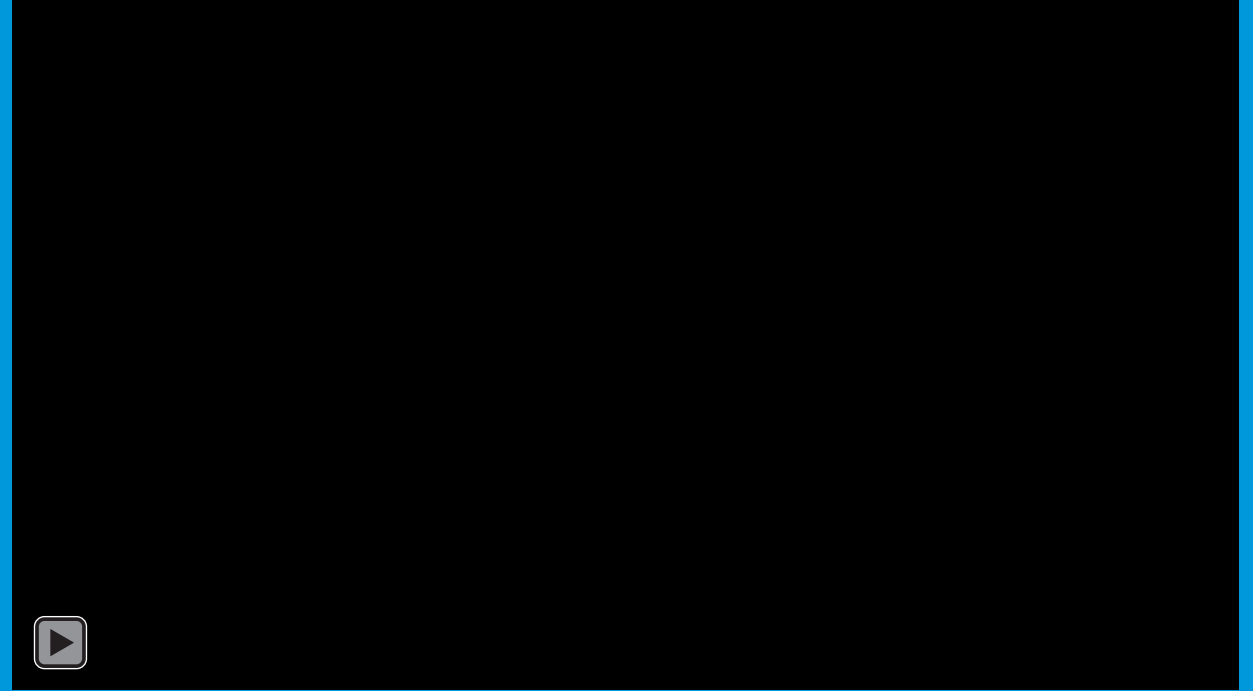


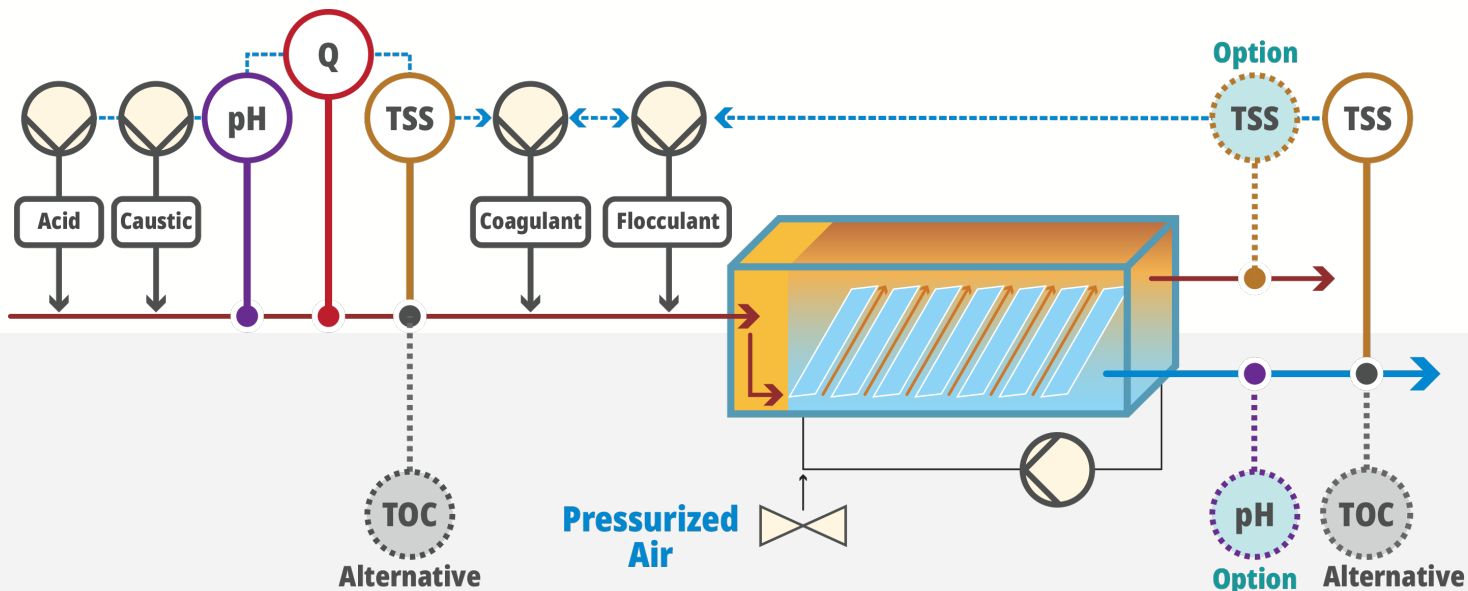
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Process Management

1. Collect real-time data
2. Calculate dynamic set points
3. Treatment adjusted – chemical feeds or aeration
4. Manual and automated modes available





RTC-DAF System Overview

RTC DAF Parameters=	Monitor	Manage
pH, Influent	Y	Y
pH, Effluent (optional)	Y	Y
NTU (TSS), Influent	Y	Y
NTU (TSS), Effluent	Y	Y
NTU (TSS), Float	Y	Y
Flow	Y	



RTC-DAF Input and Output Options

Inputs	
Influent Flow	Standard
Effluent Turbidity	Standard
Effluent pH	Standard
Influent pH	Optional
Influent Turbidity	Optional
Coagulant Flow Rate	Optional
Anionic Flocculant Flow Rate	Optional
Cationic Flocculant Flow Rate	Optional
Pre-DAF Acid Flow Rate	Optional
Pre-DAF Base Flow Rate	Optional
Post-DAF Acid Flow Rate	Optional
Post-DAF Base Flow Rate	Optional
5 Open Parameters	Optional

Outputs	
Coagulant Flow Rate Setpoint	Standard
Anionic Flocculant Flow Rate Setpoint	Standard
Cationic Flocculant Flow Rate Setpoint	Optional
Pre-DAF Acid Flow Rate Setpoint	Optional
Pre-DAF Base Flow Rate Setpoint	Optional
Post-DAF Acid Flow Rate Setpoint	Optional
Post-DAF Base Flow Rate Setpoint	Optional



RTC-DAF User Defined / Adjustable Settings

- Effluent Turbidity or TSS Setpoint (NTU or mg/L)
- Coagulant PPM dose
- Anionic Flocculant PPM dose
- Cationic Flocculant PPM dose
- Effluent Turbidity or TSS PID values
- Coagulant Specific Gravity
- Anionic Flocculant Specific Gravity
- Cationic Flocculant Specific Gravity

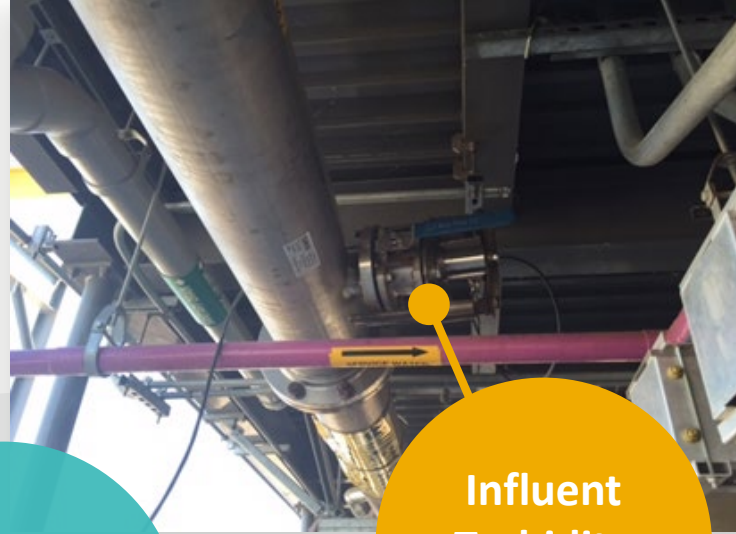
- Pre-DAF pH target value and range
- Pre-DAF pH PID values
- Post-DAF pH target value and range
- Post-DAF pH target value and range
- Minimum and Maximum Limits (flow setpoints, pump ranges, PPM or lb/ton, etc)
- Warning and Alarm limits for all measurements



Process pH
& Temperature



85% Solids
Reduction



Influent
Turbidity
Sensor

pHIN TEMP 7.6 ^{pH} 14:49:44 2018-11-15	pHIN TEMP 88.0 ^F 14:49:44 2018-11-15	INF179750 SOLID 3406 ^{ppm} TS 14:49:45 2018-11-15
pHD sc EFF1797776 SOLID 1460 ^{ppm} TS 14:49:41 2018-11-15	pHD sc 000000083487 INF000000083487 TS 7985.637 ^{PPM} Chan1 14:49:42 2018-11-15	TSS sc 000000083487 EFF000000083487 TS 528.793 ^{PPM} Chan2 14:49:42 2018-11-15



Effluent
Turbidity
Sensor



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The Benefits of Automated DAF Process Management



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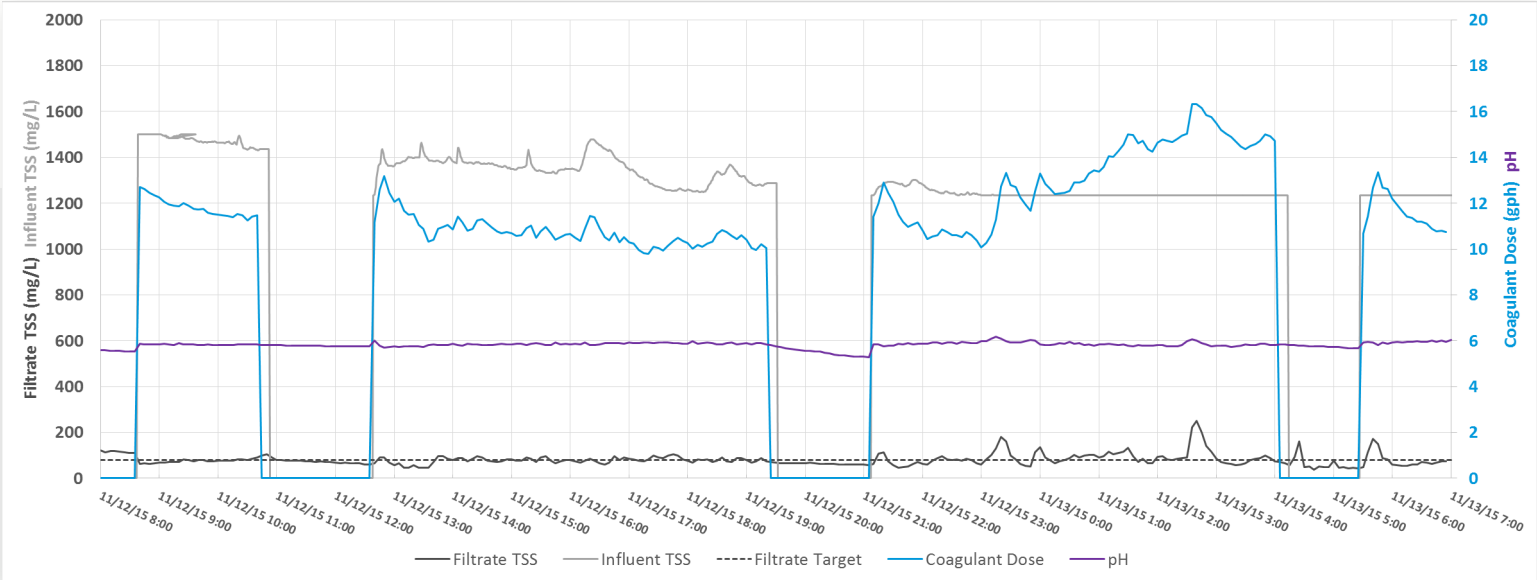
Benefits

- Automated chemical dosing
 - Eliminate manual adjustments
- Reduce operator interaction
- Optimize both solids and filtrate quality
- Consistent & cleaner effluent concentration
 - Reduced discharge costs
- Critical visibility into the process
- Chemical savings
- Save time
- Consistent compliance and reduced fees

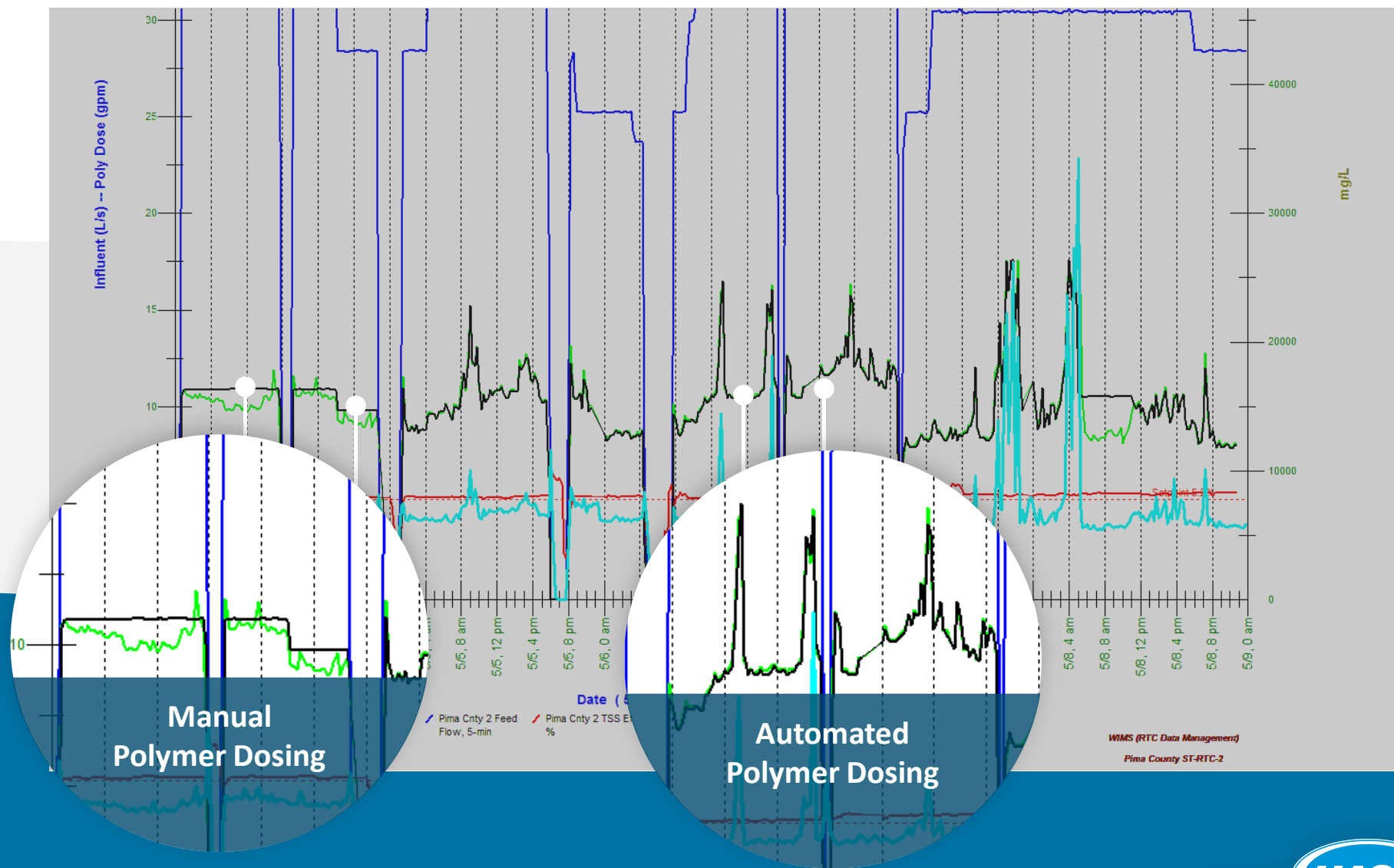




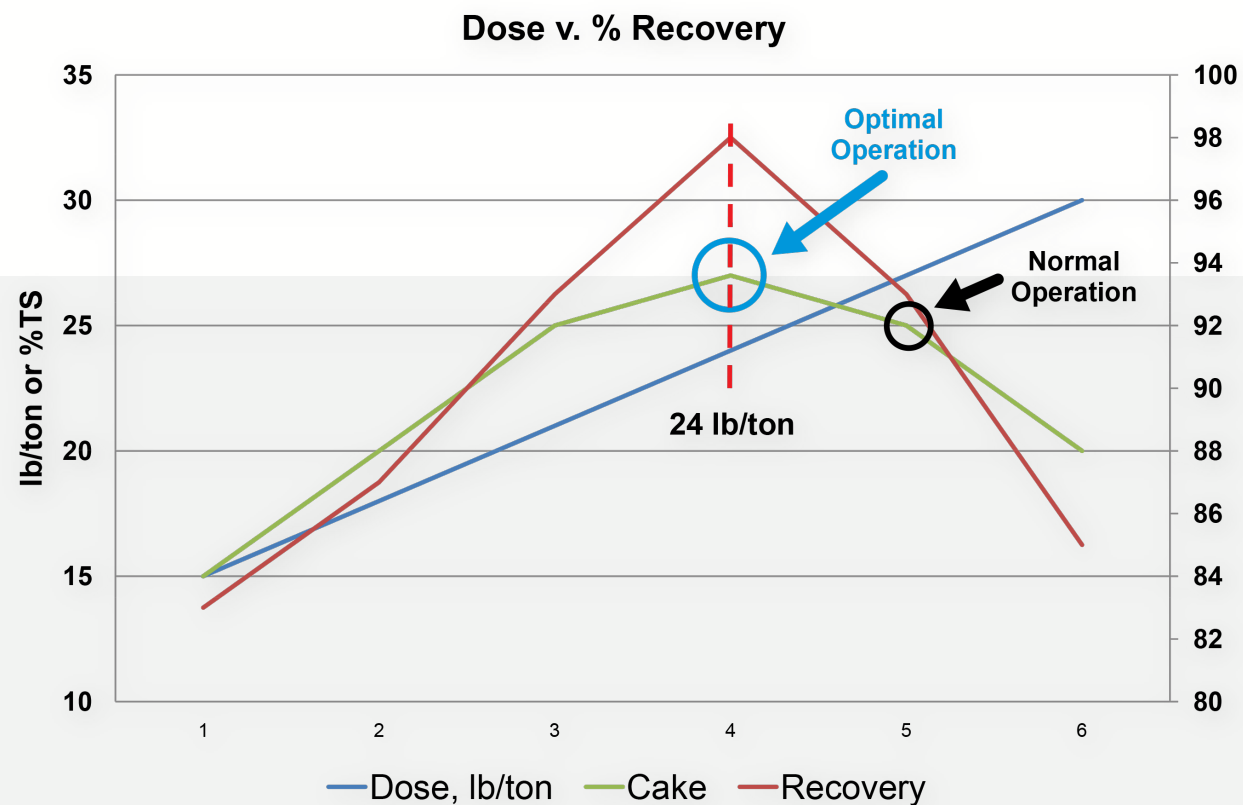
RTC-DAF in Action: Example of Real Benefits



Your process might still be highly variable, but the desired outcome is consistently met regardless of variation.



Performance Curve



Polymer Performance

There is an **OPTIMAL** dose ratio.

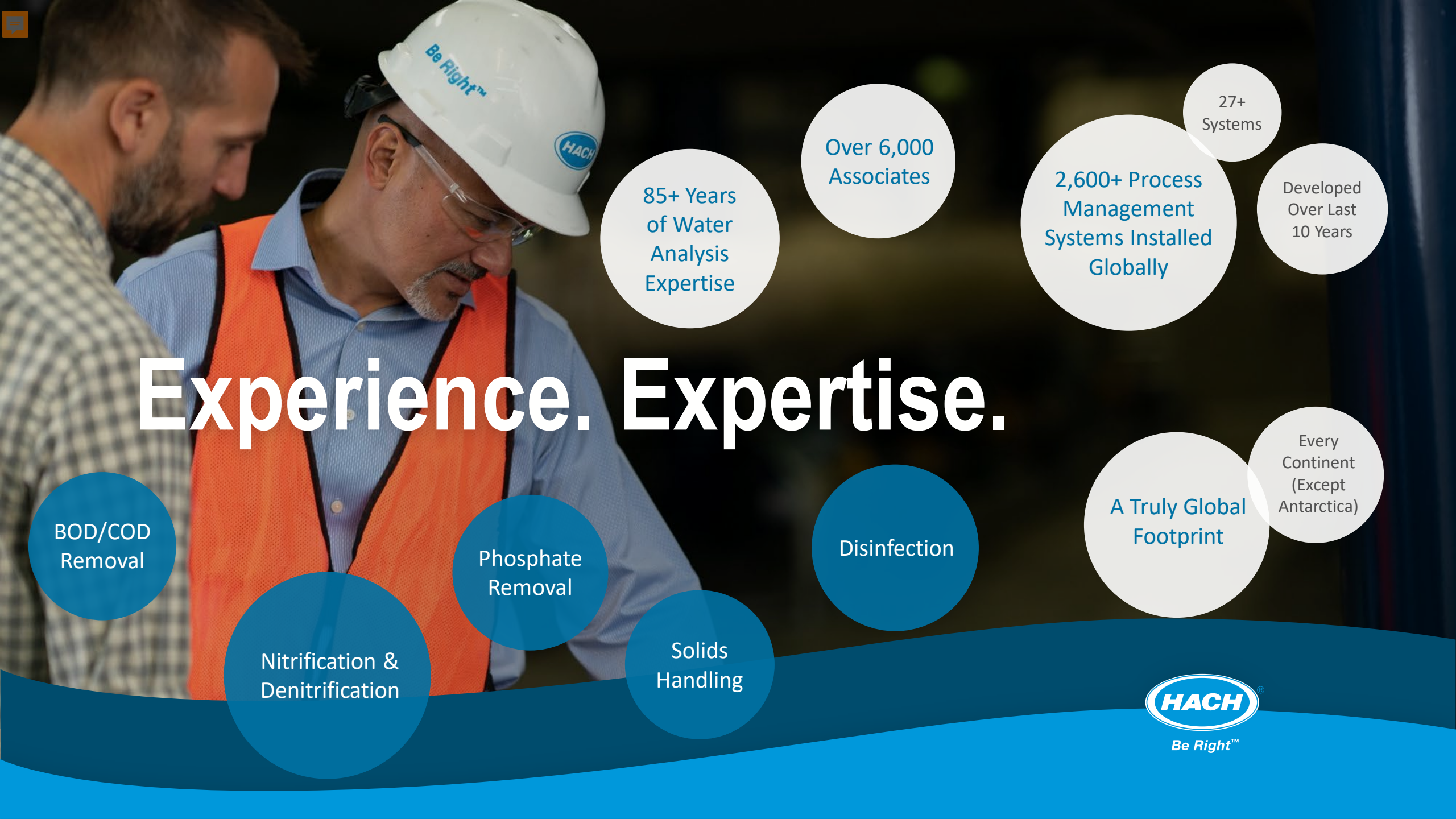
Adding chemical beyond the optimal point is wasting both chemical and budget.

MORE POLYMER \neq BETTER RECOVERY

A modern industrial building with large glass windows and a blue sky background. The building has a multi-story design with a prominent glass facade on the right side. The sky is a deep blue with some light clouds. A large blue diagonal shape is overlaid on the left side of the image, containing the text.

A Proven Approach from the Industry Leader





Experience. Expertise.

BOD/COD
Removal

Nitrification &
Denitrification

Phosphate
Removal

Solids
Handling

Disinfection

85+ Years
of Water
Analysis
Expertise

Over 6,000
Associates

2,600+ Process
Management
Systems Installed
Globally

27+
Systems

Developed
Over Last
10 Years

A Truly Global
Footprint

Every
Continent
(Except
Antarctica)



Be Right™



Dissolved Oxygen Control
Ammonia Removal
Total Nitrogen Removal
Chemical Phosphorus Removal
Sludge Retention Time
RAS Control
Sludge Thickening
Sludge Dewatering
DAF Coagulant/Polymer Control
Chlorination / Dechlorination



Instrumentation + Software
**= Less Uncertainty
& More Efficiency**



A silhouette of two industrial workers wearing hard hats and safety gear, shaking hands on a metal walkway of an industrial facility. The background is a vibrant sunset with a bright sun low on the horizon, casting a warm orange and yellow glow over the scene. The sky is filled with soft, wispy clouds. In the foreground, there are large, dark, cylindrical structures, possibly part of a water treatment plant. The overall mood is one of accomplishment and partnership.

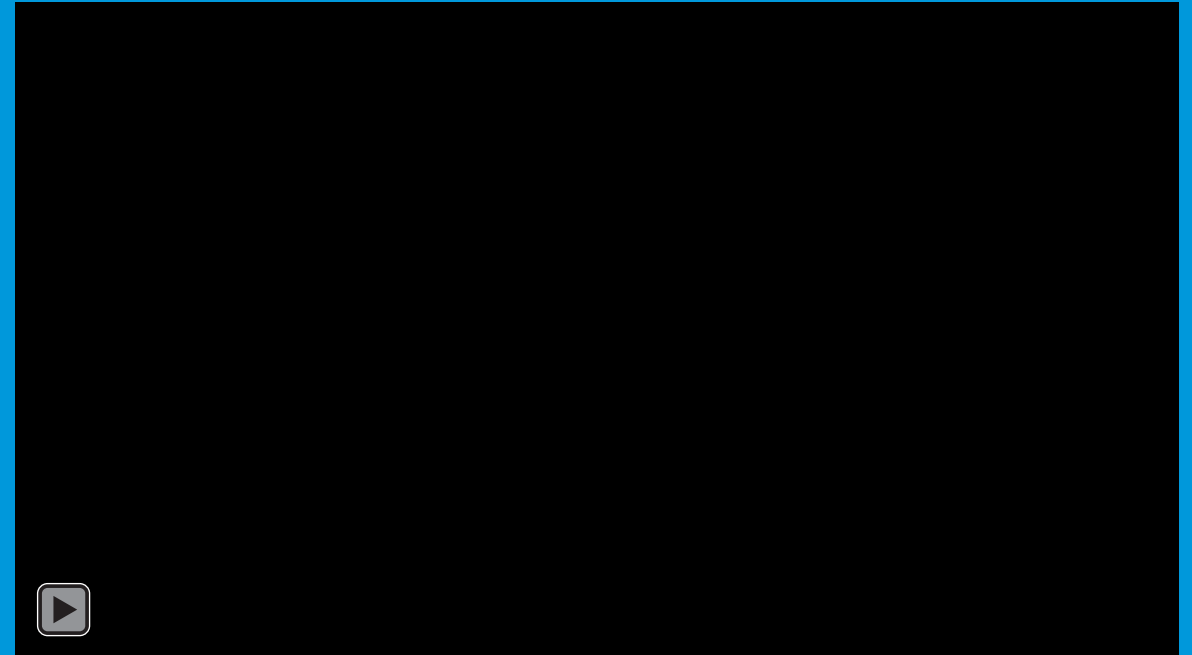
One More Benefit? Hach Support





Yearly Service Partnership

1. A dedicated Hach® support team available to consult
2. Hach technicians providing guidance specific to your plant and application
3. Monthly reports to review your plant's performance
4. Reduced risk of unexpected downtime with service/maintenance recommendations





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How to Get Started

Typical Process Stages

Discuss needs
with Hach
Representative
& Process
Management
Specialist

**In-Depth
Project Planning**
Best practice
to include 3rd
party partners
(Engineers, Energy
Consultants, etc)

Proposal
Technical
Recommendations
Pricing

Proposal Approval

Installation

Commissioning

**Ongoing Support
& Optimization**



Let's Go.



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