

**CONTINUOUS REAL-TIME  
MONITORING OF FACTORY  
WATER SYSTEMS IDENTIFIES  
OPPORTUNITIES FOR PROCESS  
AND OPERATING COST  
IMPROVEMENTS**



People you trust, delivering results.

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1601 West Diehl Road,  
Naperville, IL 60563



People you trust, delivering results.

## **Continuous Real-time Monitoring of Factory Water Systems Identifies Opportunities for Process and Operating Cost Improvements**

**2009 ASSBT Biennial Meeting**

**February 25 - 28, 2009**

Orlando, Florida, USA

Wyndham Orlando Resort

# 3D TRASAR® Technology

## Unique Process Monitoring Capability for Beet Sugar Processing

- Nalco Overview
- 3D TRASAR for Cooling
- 3D TRASAR for Boilers
- 3D TRASAR for Sugar



# Nalco Company Profile



People you trust, delivering results.



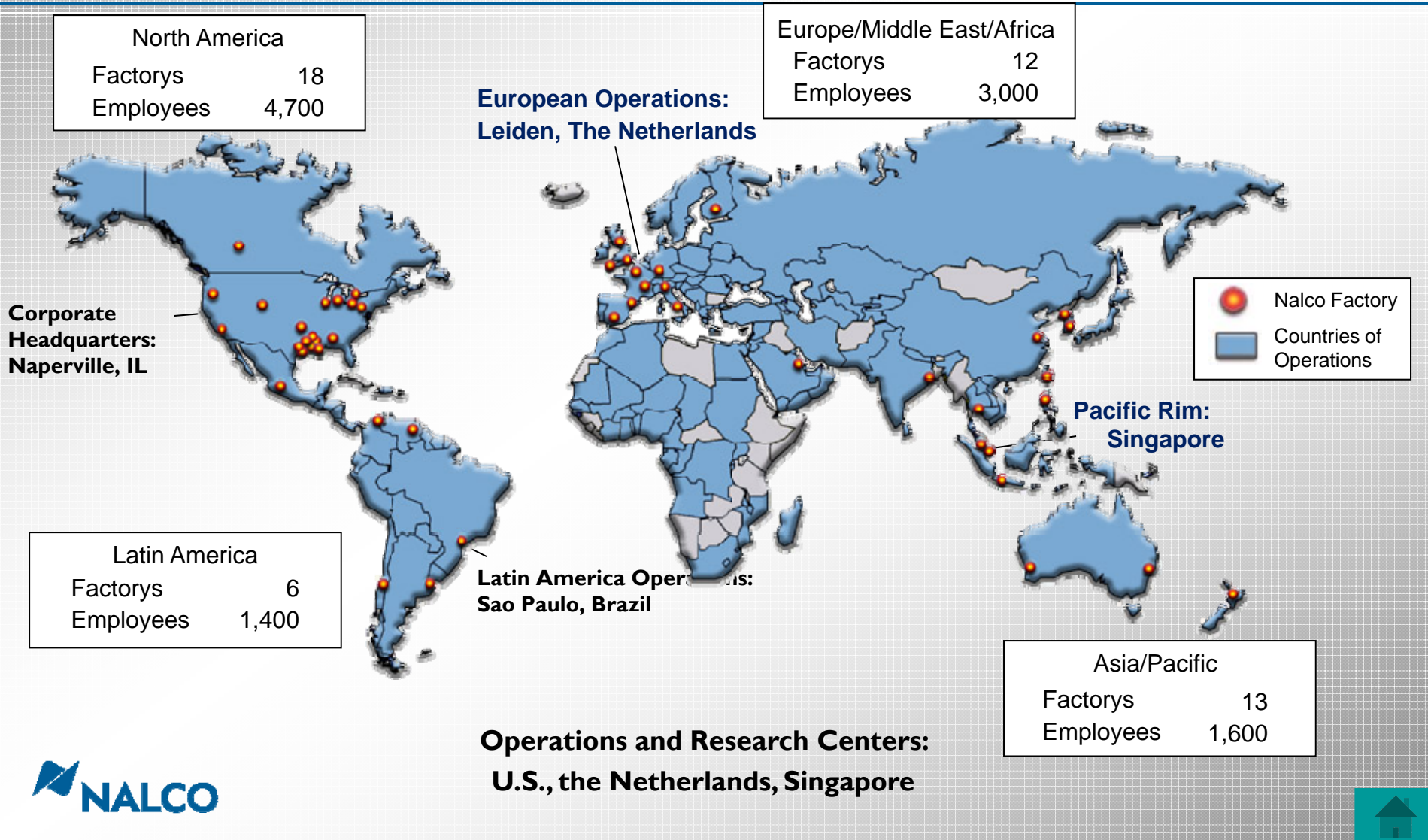
# Overview of Nalco

- SUSTAINABLE VALUE CREATION
- PEOPLE INVESTMENT
- INDUSTRY ALIGNMENT
- DIFFERENTIATING TECHNOLOGY



# Worldwide Leadership

“We are Where You Are”



# World-Class Support Team

- **Service Driven Business**
  - 11,600 degreed sales, research and marketing professionals world-wide
  - Key success factors: recruiting, development and retention
- **Local Experts**
  - Global knowledge management system links selling and service professionals
  - Share best practice expertise across the world
- **Customer Care Approach**
  - Selling reps generate new sales and expand share in existing accounts
  - Service reps provide maintenance services to existing accounts
  - Six Service Standards
- **Strong Training Investment**
  - One year for reps to reach productivity
  - 50% of 1<sup>st</sup> year spent on training
- **Deep Experience**
  - 45% of the North American sales force has greater than 10 years of service

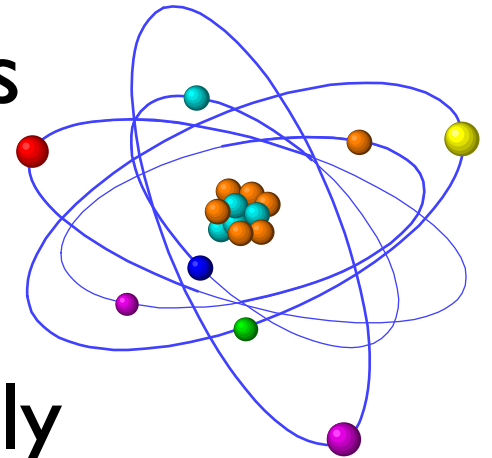


# Nalco commitment to Research & Development

165 Scientists (80 Doctorate Level)

>375 Patents in 35 Countries  
(50+ in Progress)

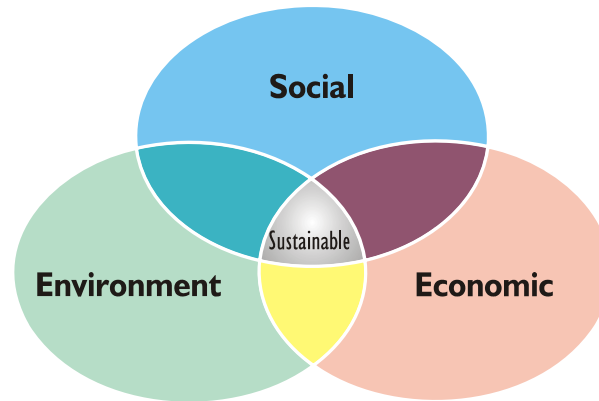
5% of Sales Reinvested Annually





# Sustainability

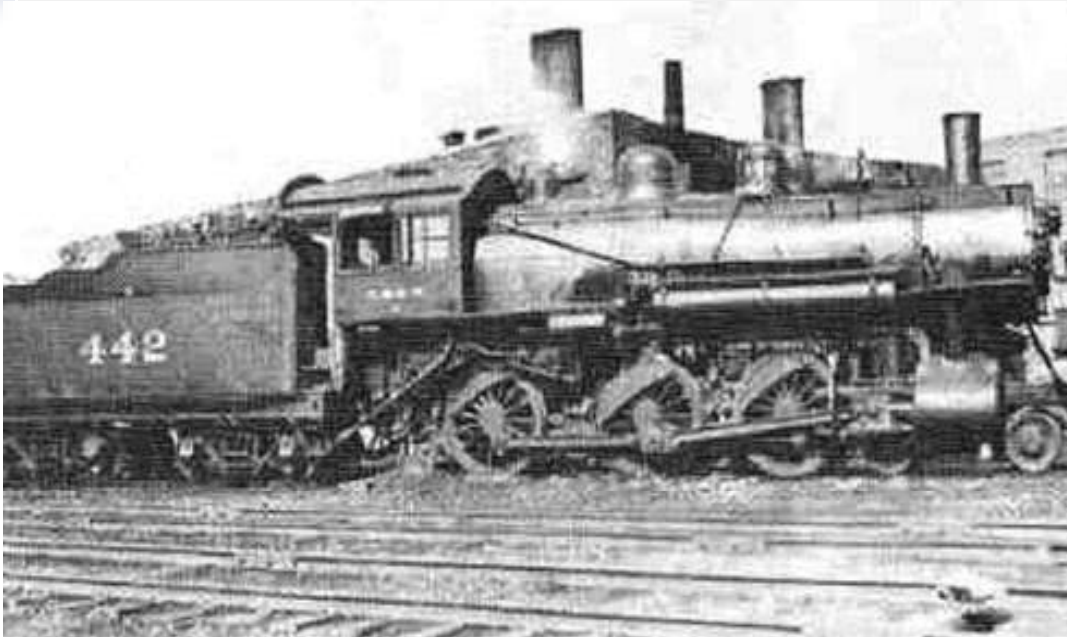
- **We are all stakeholders in the global future, charged with safeguarding the world for future generations....**
- **We recognize the need for the Sustainable Development**



- **This means working towards a time when there will be no net loss of non-renewable resources. This can be achieved through conservation, re-use and recycle activity, and alternate technology, while minimizing the environmental impacts caused by emissions**



# Nalco's History in Sustainability



For over 80 years, Nalco has focused on providing solutions to our customers that result in:

....water conservation

....energy savings

....asset protection

....a competitive advantage

**Sustainability is not new to Nalco.....**

**.....just a new term.**



# Nalco's Environmental Performance

## PORTA-FEED® Chemical Delivery

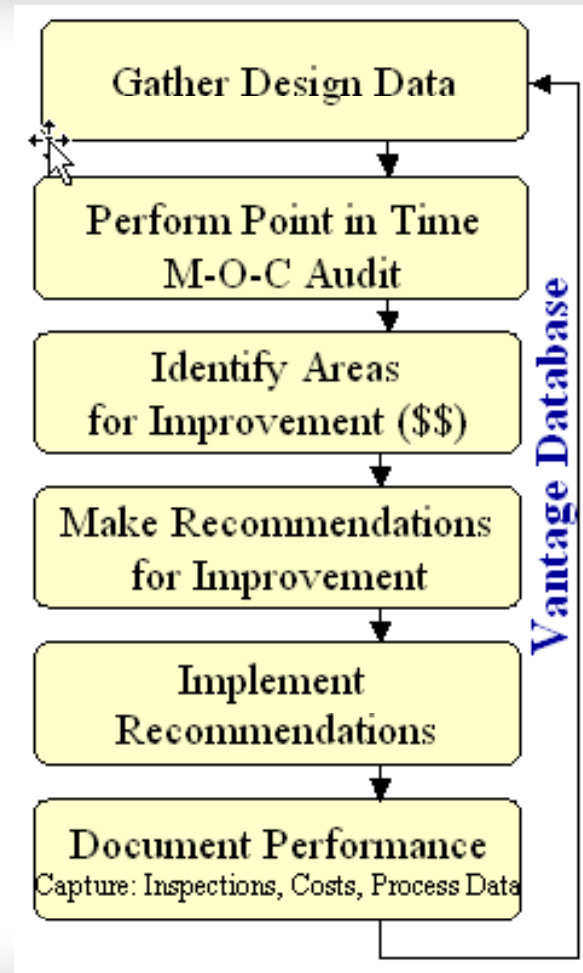
- Introduced 1985
- Nalco's largest asset - \$300 Million Plus
- Eliminated over 4 Million drums from land-fills



**Drum costs:** Manpower, Chemical Waste, Drum Disposal and Safety



# Engineering approach: process



A data-driven process



# 3D TRASAR® Technology

Winner of the 2008 Presidential Green Chemistry Award

*“3D TRASAR Systems saved 40.2 billion gallons of water for Nalco customers in 2007”*

## 3D TRASAR Automation Control

helps customers:

- Reduce water use
- Lower energy consumption
- Extend asset life



# 3D TRASAR® Technology

**3D  
TRASAR®**



 **NALCO**

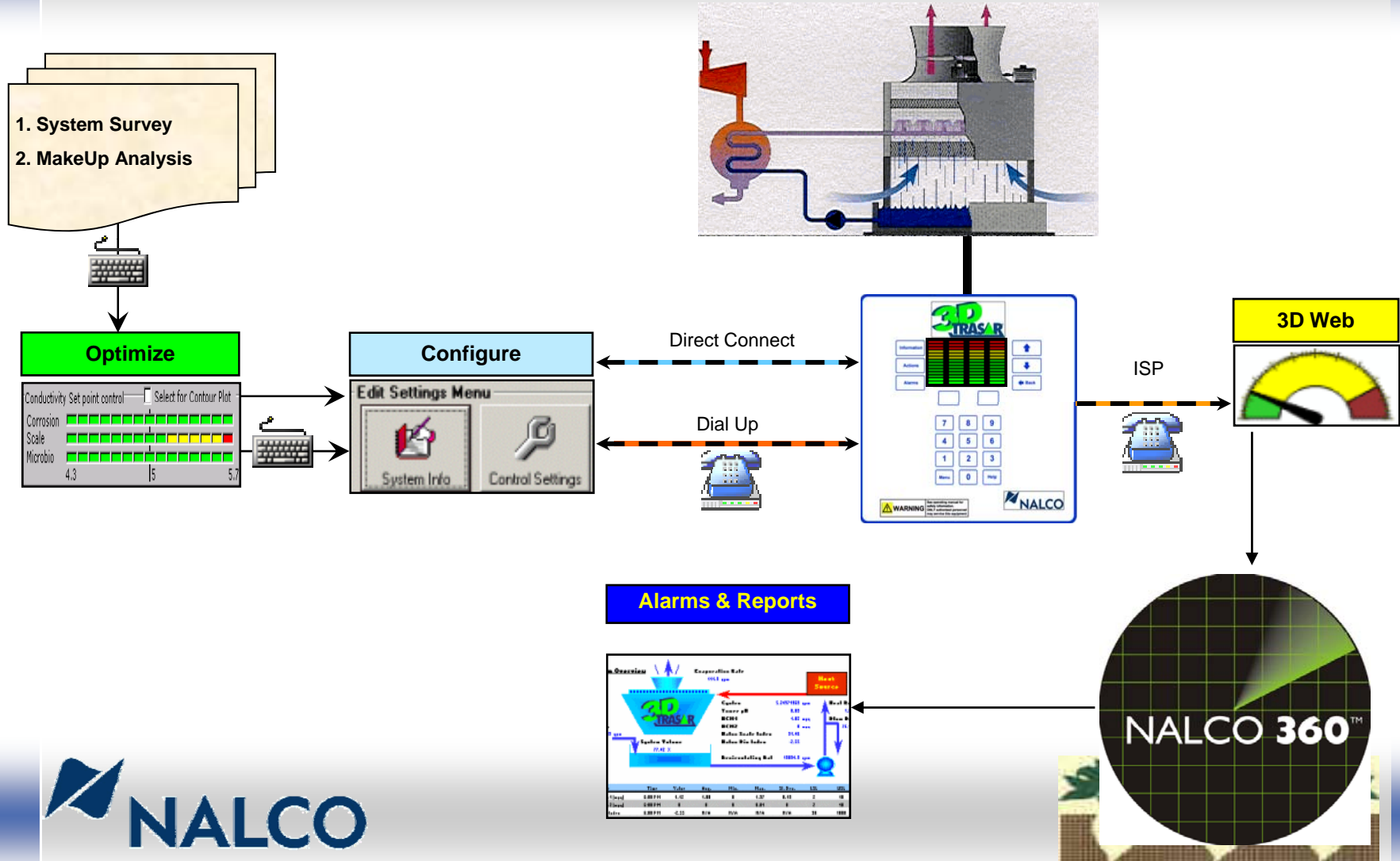


# 3D TRASAR® Technology

- Covered by 14 global patents
- Innovative chemistries – Tagged polymer & Bio-reporter
- Nalco proprietary fluorescence technology
- Nalco proprietary software – Optimizer & configurator
- Nalco proprietary hardware – Controller & fluorometer
- Online monitoring and reporting – 3D TRASAR® Web
- 24/7 Expert analysis and alarm coverage – Nalco 360 Service™



# 3D TRASAR<sup>®</sup> Technology for Cooling Water Overview





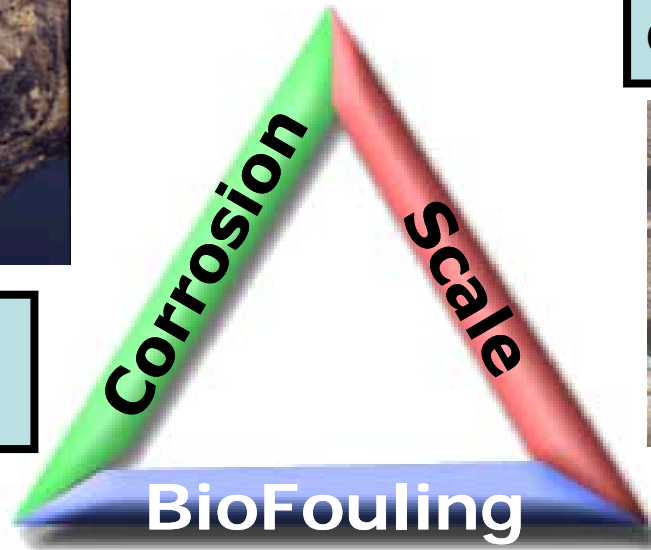
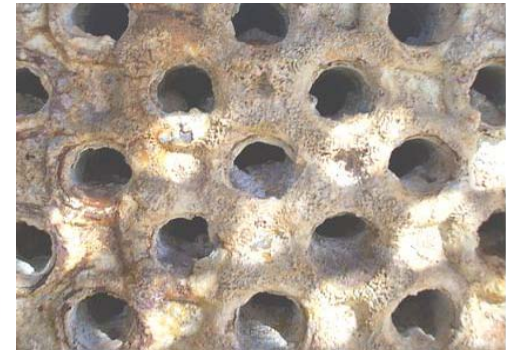
# 3D TRASAR® Technology for Cooling Water

**THE** Total Solution

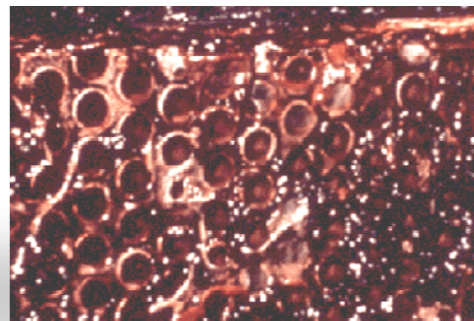


Corrosion failure =  
Maintenance costs

Scaled exchangers =  
Operating costs

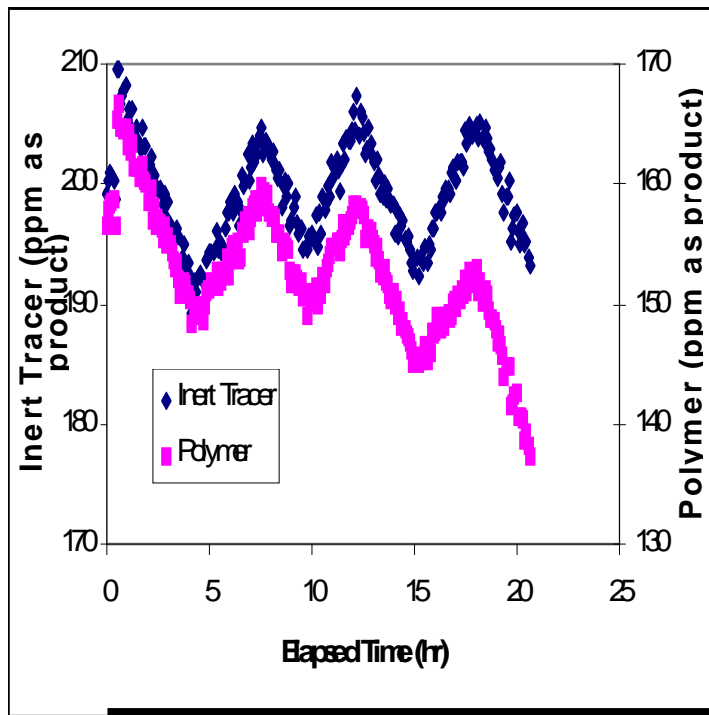


Bio-Film =  
Operating costs + Corrosion

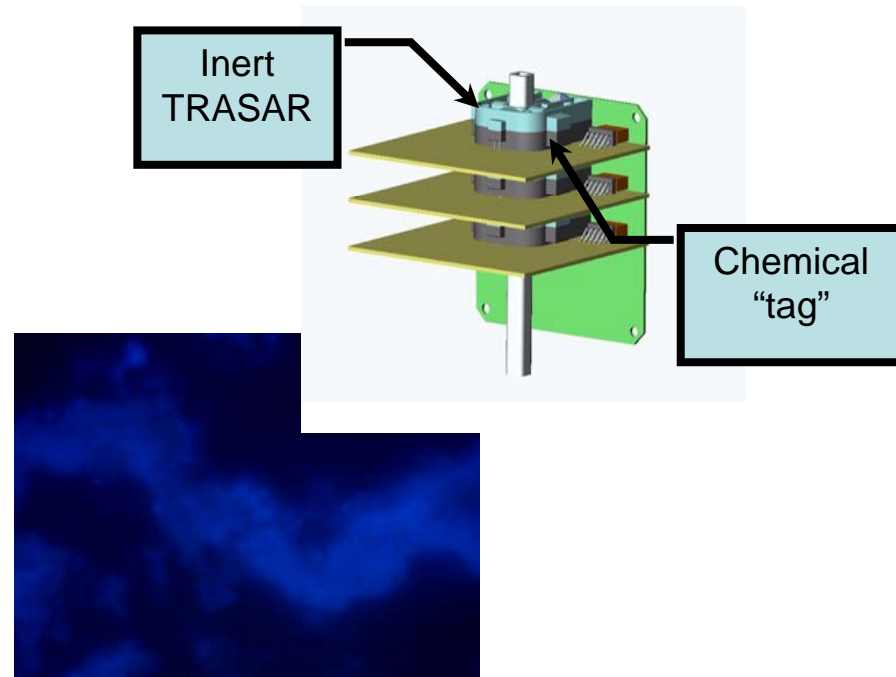


# 3D TRASAR<sup>®</sup> Scale Control

- Dispersant and “tag” incorporated into scale while inert TRASAR remains in bulk water



Controller detects instantaneous rate change between TRASAR and “tag.”

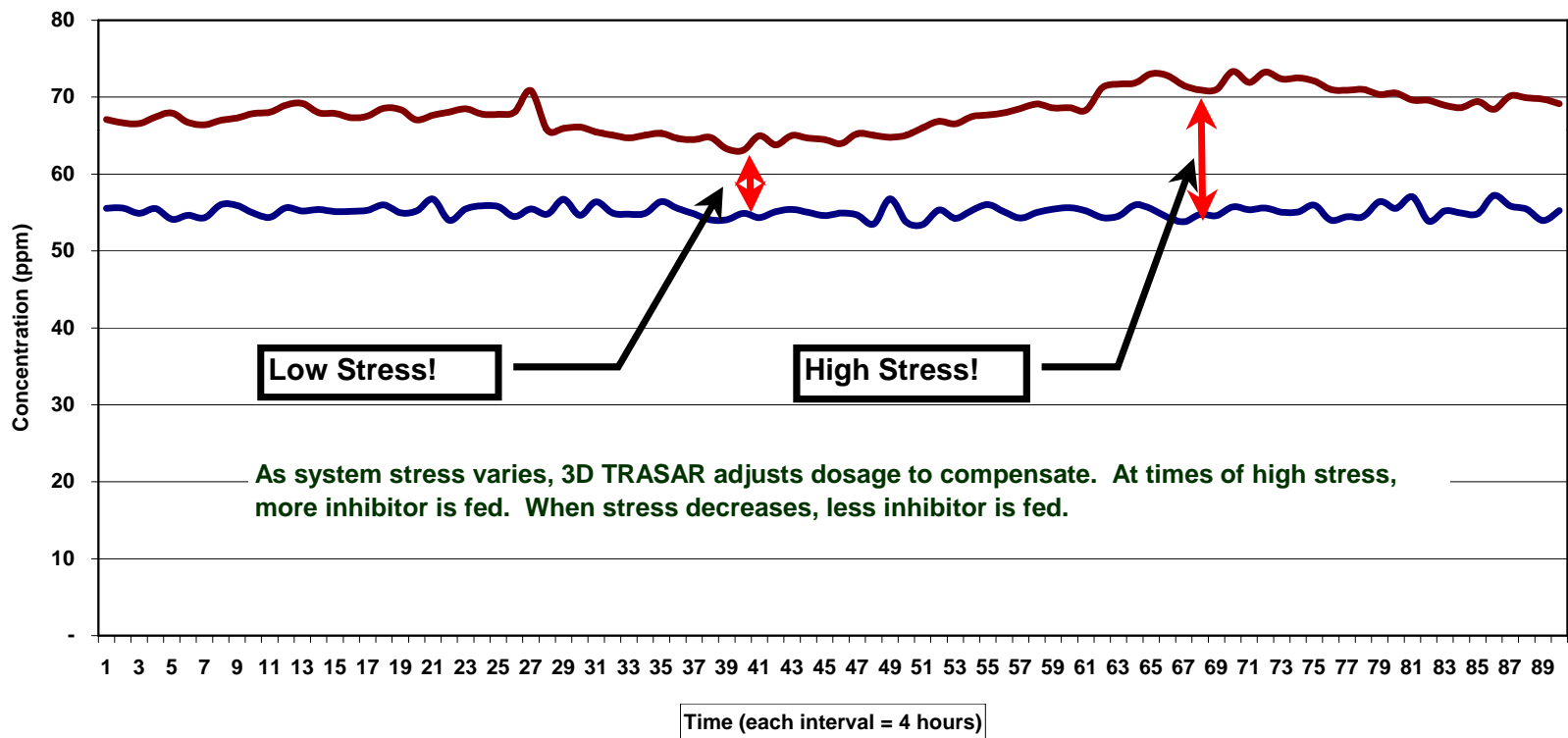


Electro-micrographic image of “tag” incorporated into mineral scale



# 3D TRASAR<sup>®</sup> Scale Control

Control Based on System Stress



— Active Concentration (ppm)  
— Treatment Concentration (ppm)



# 3D TRASAR<sup>®</sup> Bio-Control

3DT-5000

1. Fluorescent Bio-reporter reacts enzymatically with microbe.

2. Reacted bio-reporter fluoresces at a different wavelength.

3. 3D TRASAR<sup>®</sup> Fluorometer measures both un-reacted and reacted bio-reporter.

 NALCO



# 3D TRASAR<sup>®</sup> Technology for Corrosion Control

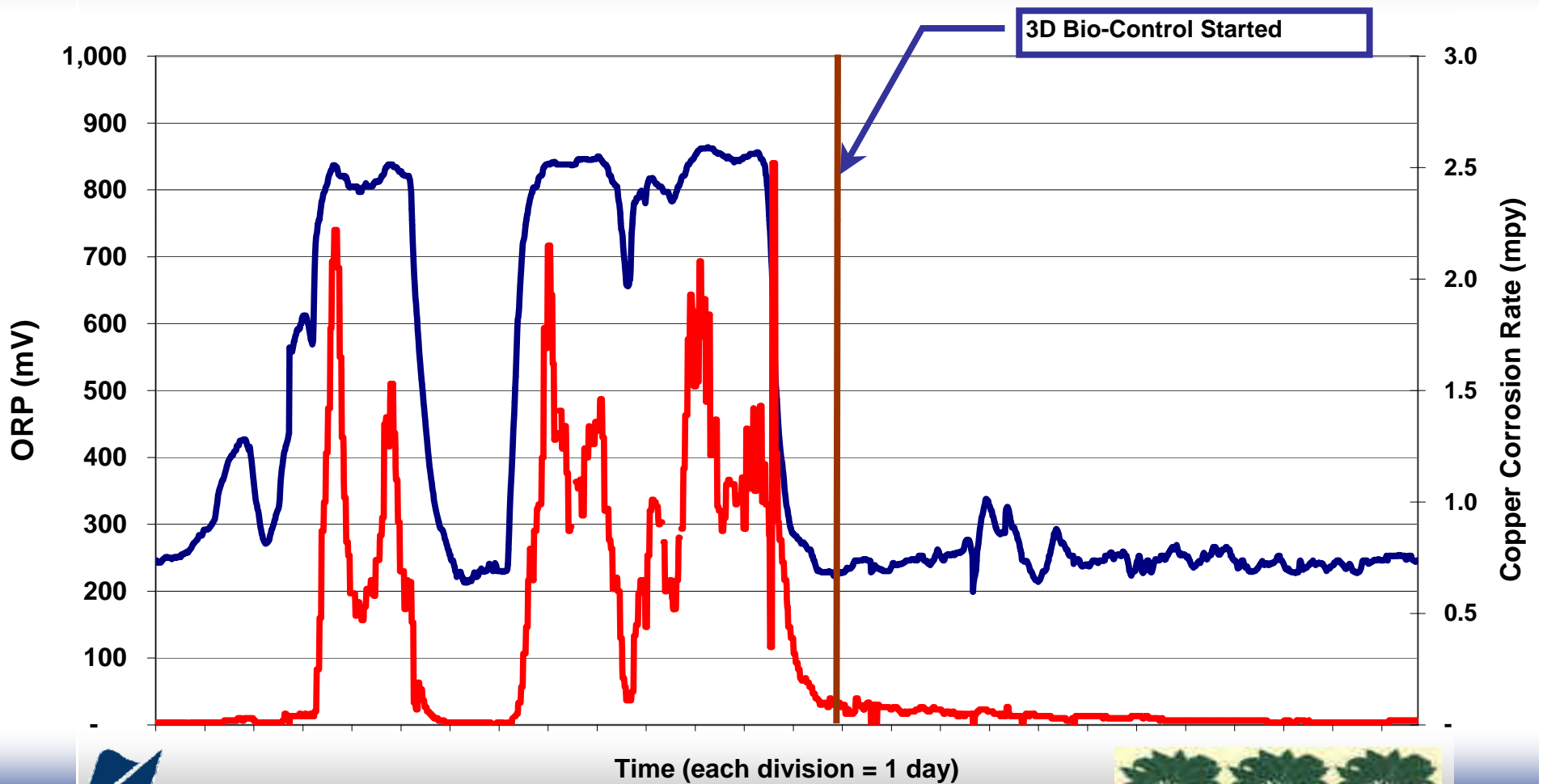


Two integrated corrosion probes using Linear Polarization Resistance (LPR)

Mild steel and copper metallurgies standard in the 3DT-5000 controller



# 3D TRASAR® Corrosion Control

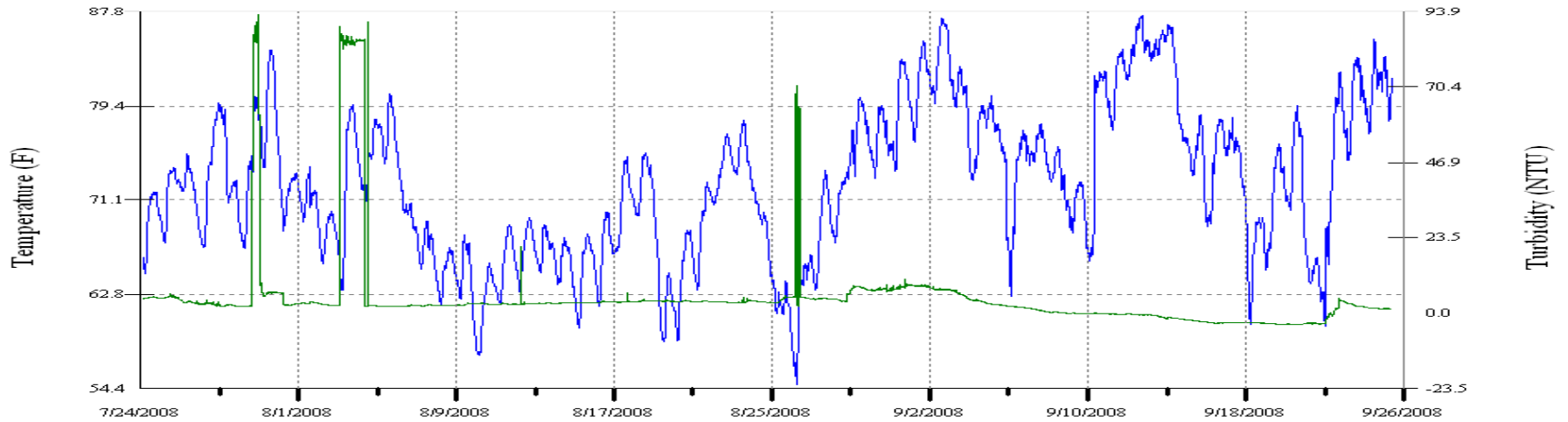


# 3D TRASAR<sup>®</sup> Technology for Cooling Water in Beet Sugar Processing

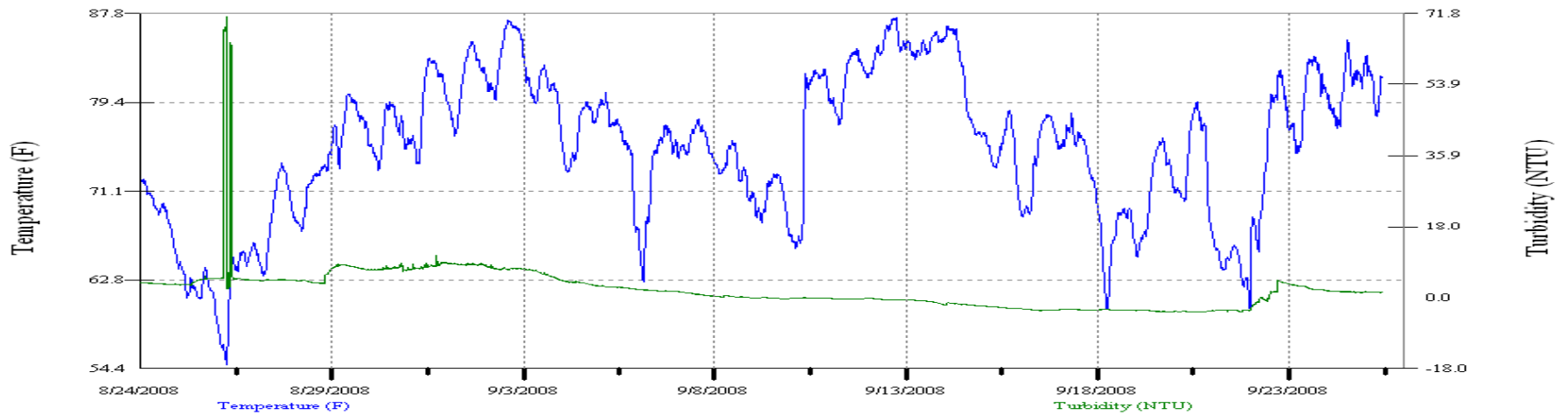


# TEMPERATURE & TURBIDITY

Vantage<sup>®</sup>v100



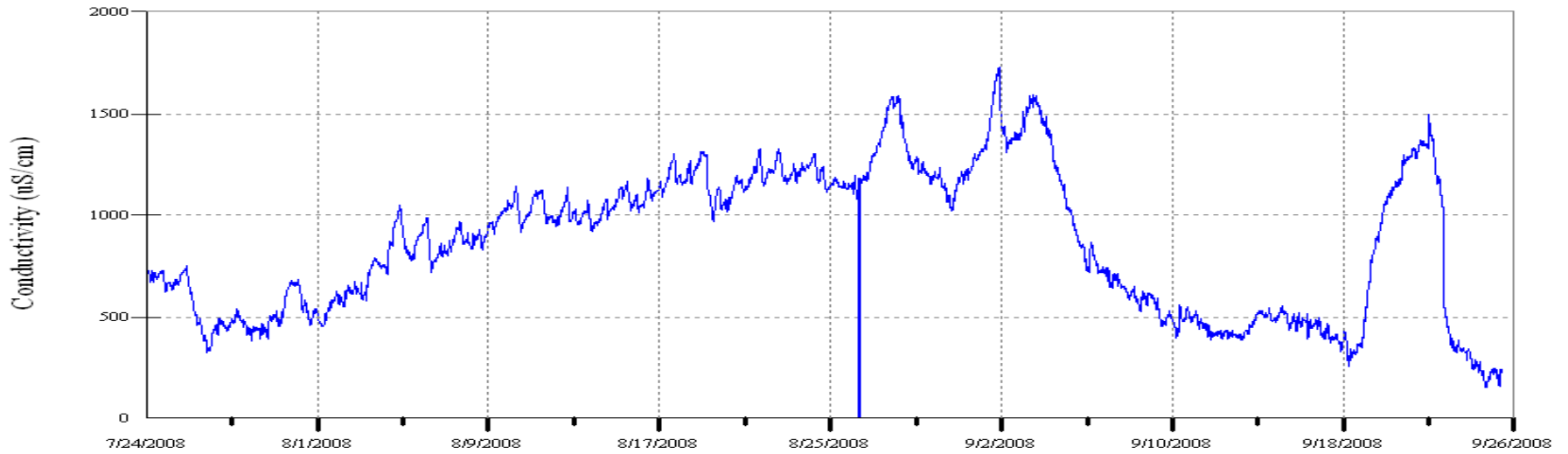
Vantage<sup>®</sup>v100



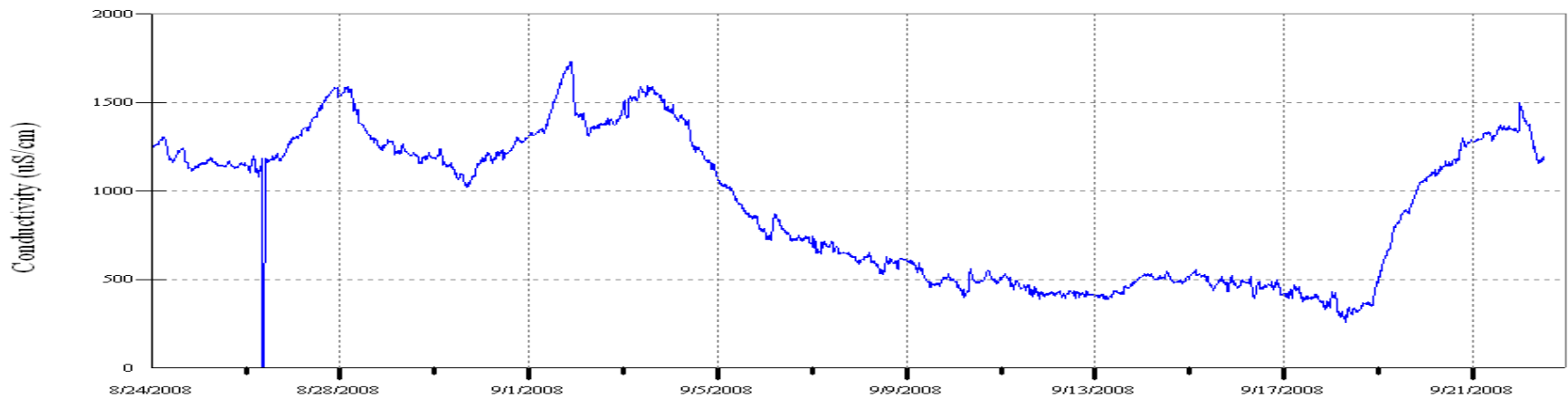


# CONDUCTIVITY

Vantage<sup>®</sup>v100

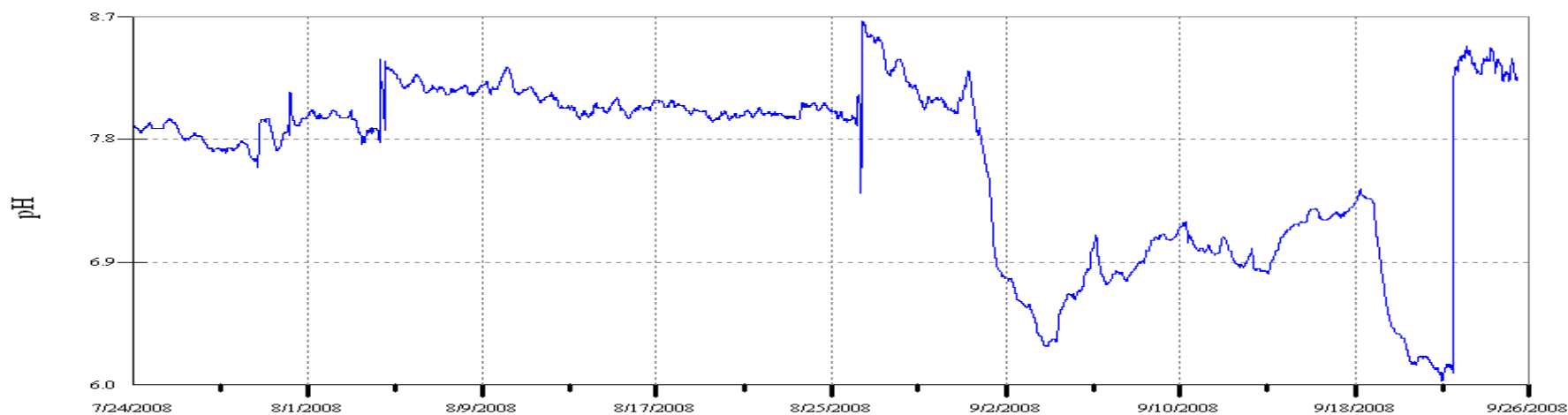


Vantage<sup>®</sup>v100

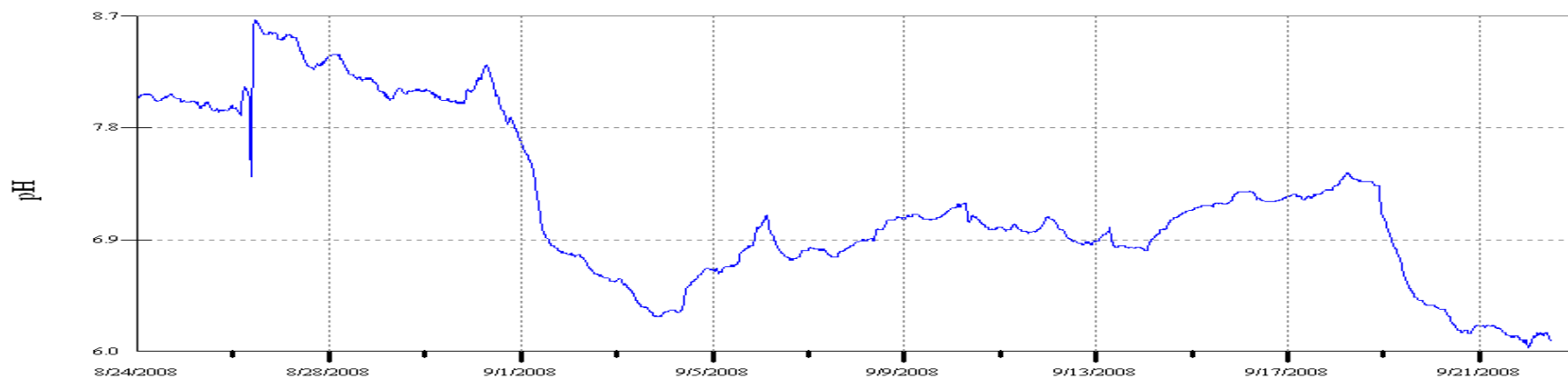


# Tower pH

Vantage<sup>®</sup>v100

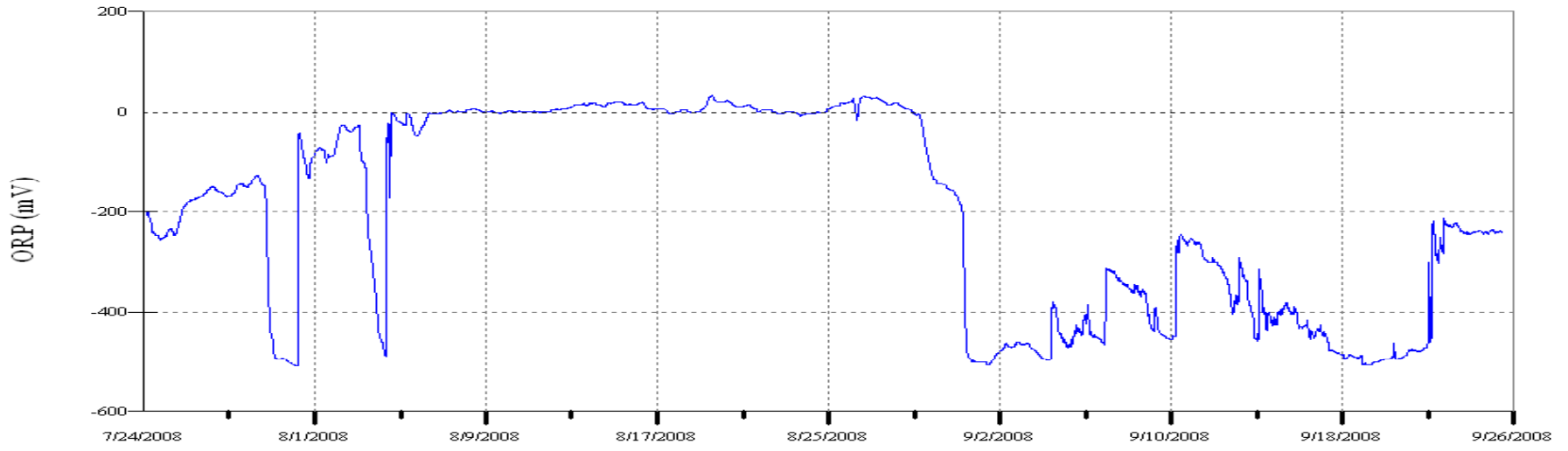


Vantage<sup>®</sup>v100

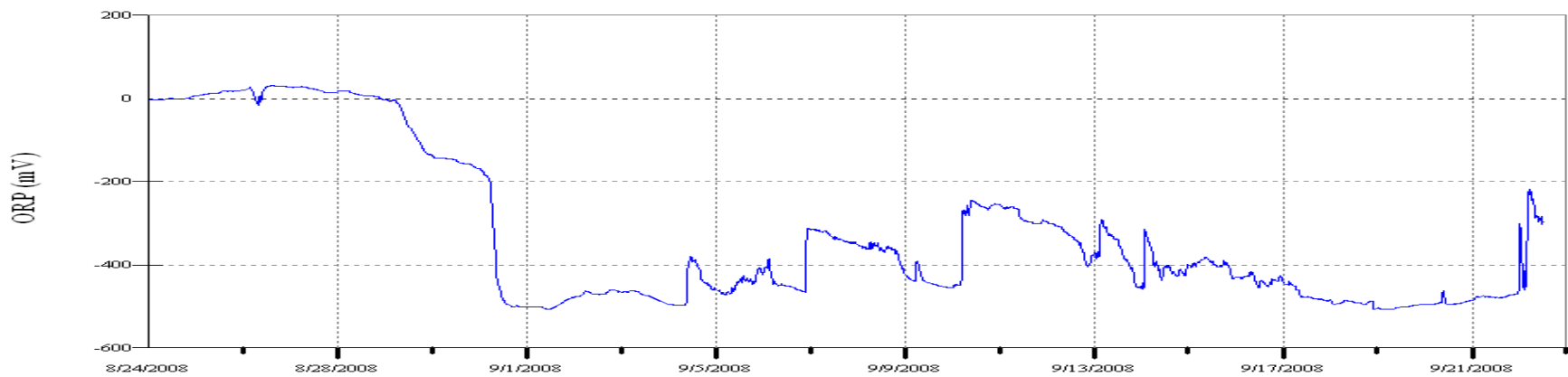


# Tower ORP

Vantage<sup>®</sup>v100



Vantage<sup>®</sup>v100



# Mild Steel Corrosion Rates

Vantage<sup>®</sup>v100



NCM1 (mpy)	
Start Date	8/24/2008
End Date	9/24/2008
Mean	29.426
Standard Deviation	9.378

Low Value	13.82
High Value	52
Period Total	83,393.64
Total Points	2834
LSL	NONE
USL	NONE
Points in Spec	2,834
% of Points In Spec	100.00%

Vantage<sup>®</sup>v100



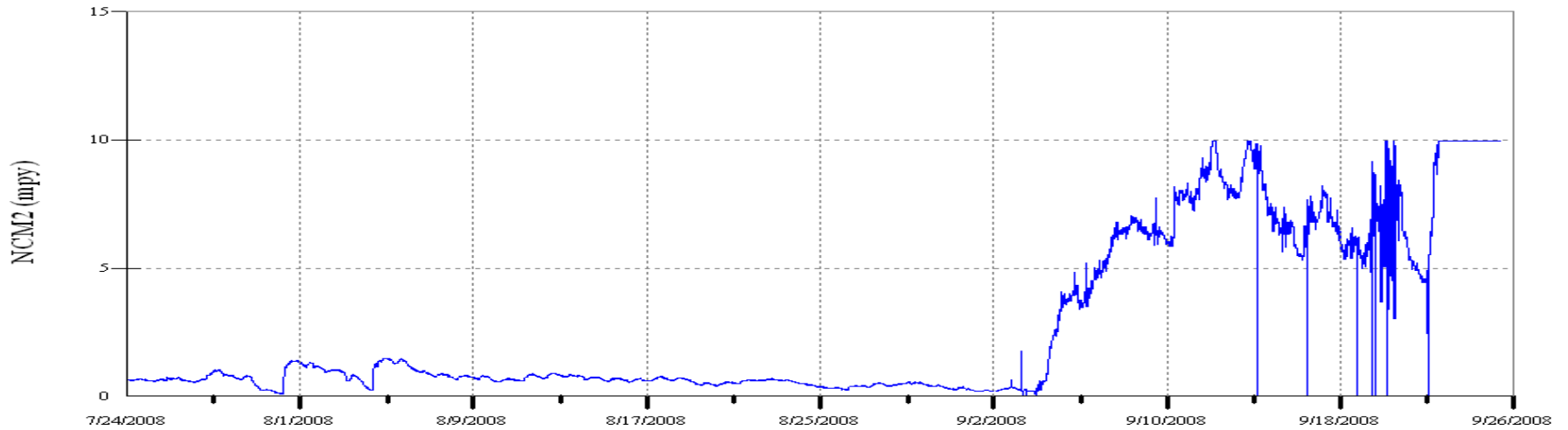
NCM1 (mpy)	
Start Date	7/1/2008
End Date	9/28/2008
Mean	23.904
Standard Deviation	10.117

Low Value	13.43
High Value	52
Period Total	#####
Total Points	6081
LSL	NONE
USL	NONE
Points in Spec	6,081
% of Points In Spec	100.00%

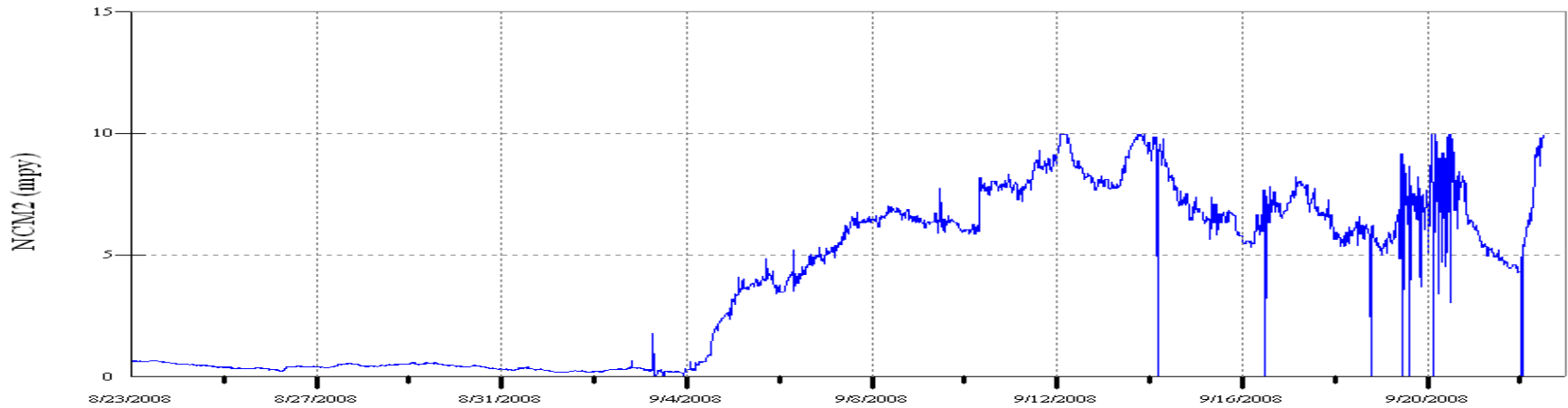


# Copper Corrosion Rates

Vantage<sup>®</sup>v10



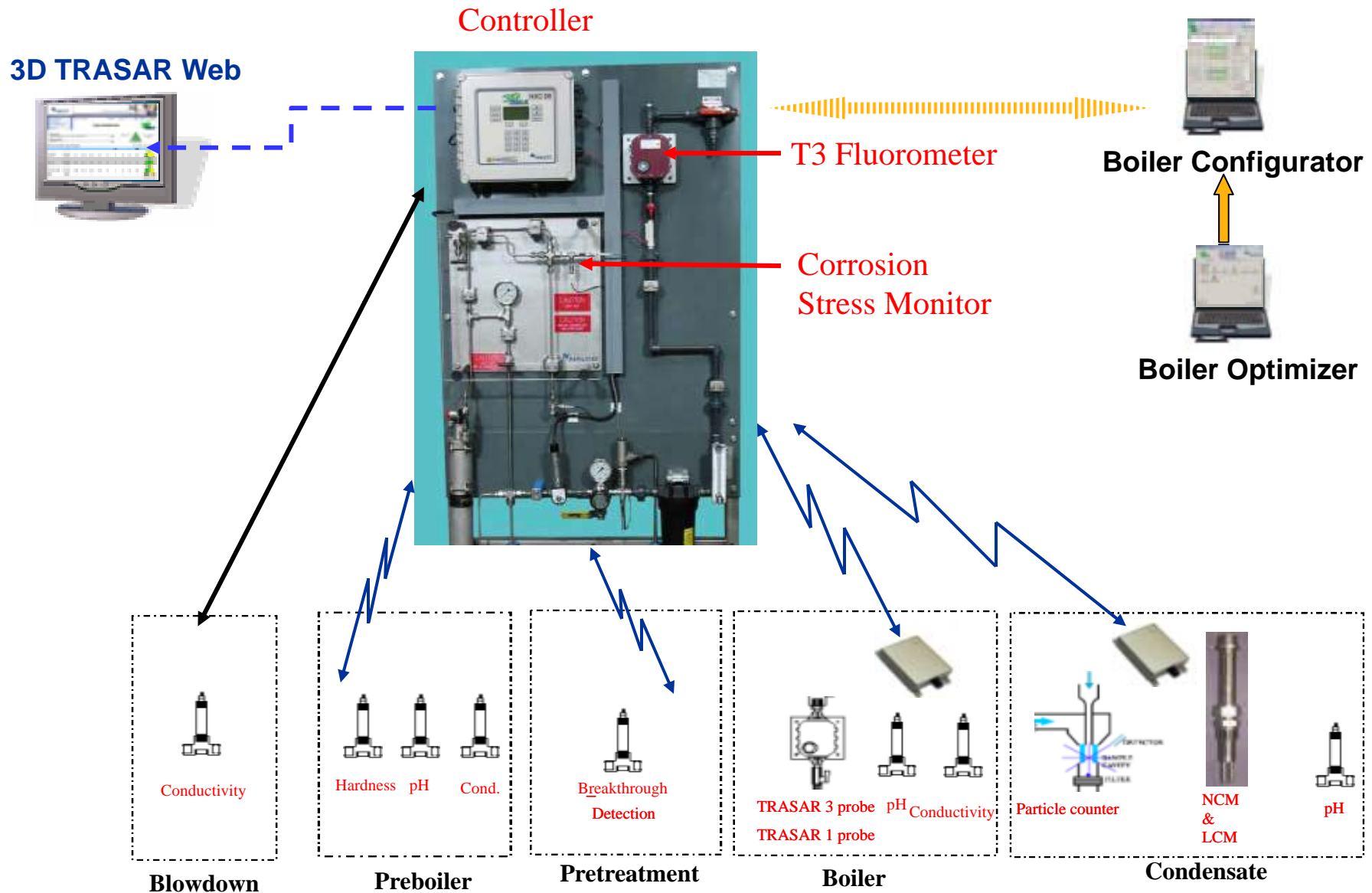
Vantage<sup>®</sup>v100



# 3D TRASAR<sup>®</sup> Boiler Technology



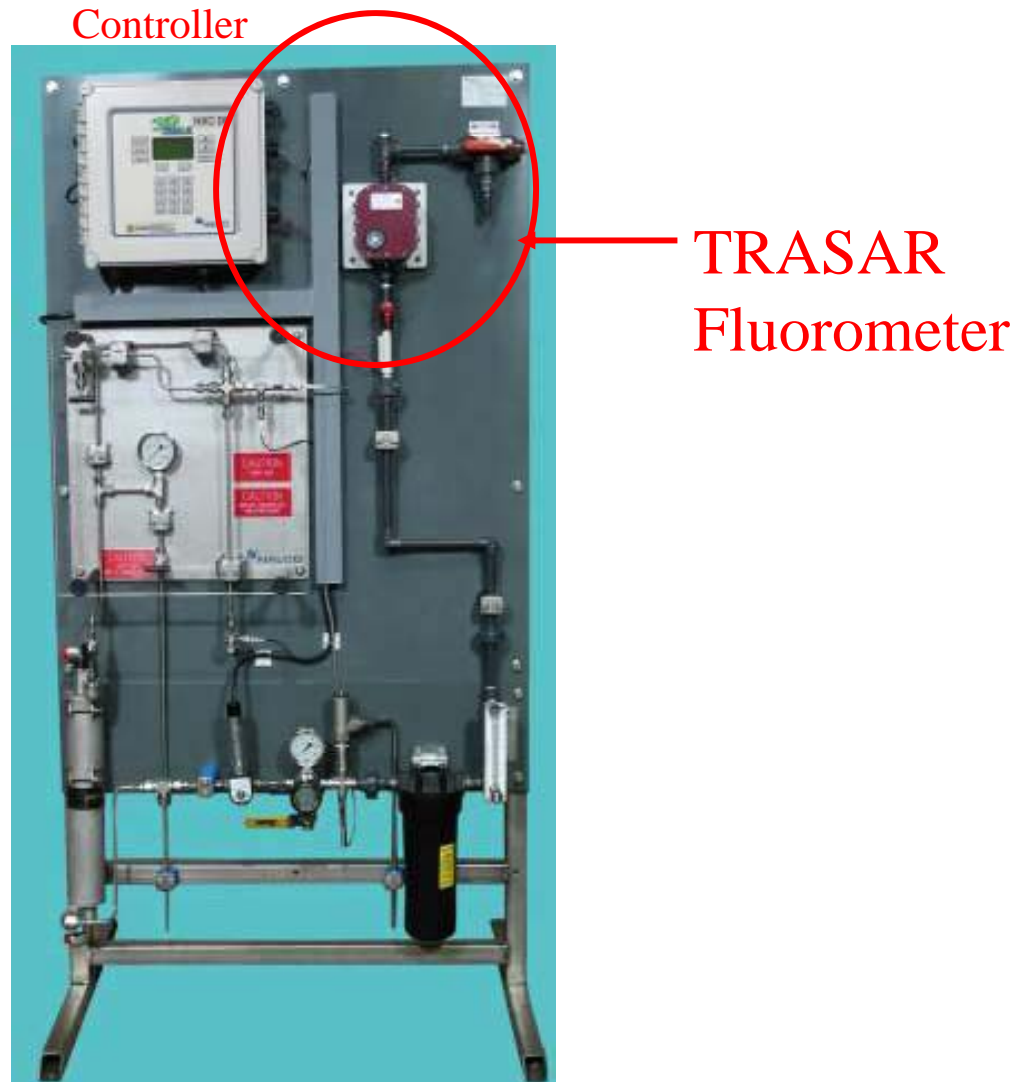
# What is 3D TRASAR<sup>®</sup> Boiler Technology?



# Taking a closer look ...

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## Boiler Scale and Deposit Control





# 24/7 TARGETED SCALE CONTROL

NORTH AMERICAN - CAMPUS UTILITY  
 NALCO 3D TRASAR BOILER AUTOMATION  
 NexGuard 22310 FW DOSAGE

MANUAL CONTROL

NALCO

<b>3D TRASAR CONTROL</b>		<b>MANUAL CONTROL</b>	
TARGET	4.00 ppm	TARGET	4.00 ppm
AVG	3.99 ppm	AVG	3.08 ppm
Std. Dev	0.24 ppm	Std. Dev	1.48 ppm
3 SIGMA	3.27 ppm	3 SIGMA	0.00 ppm
	4.71 ppm		7.53 ppm
OFFSET	-0.2%	OFFSET	- 23%
TIME	92 days	TIME	50 days

NALCO

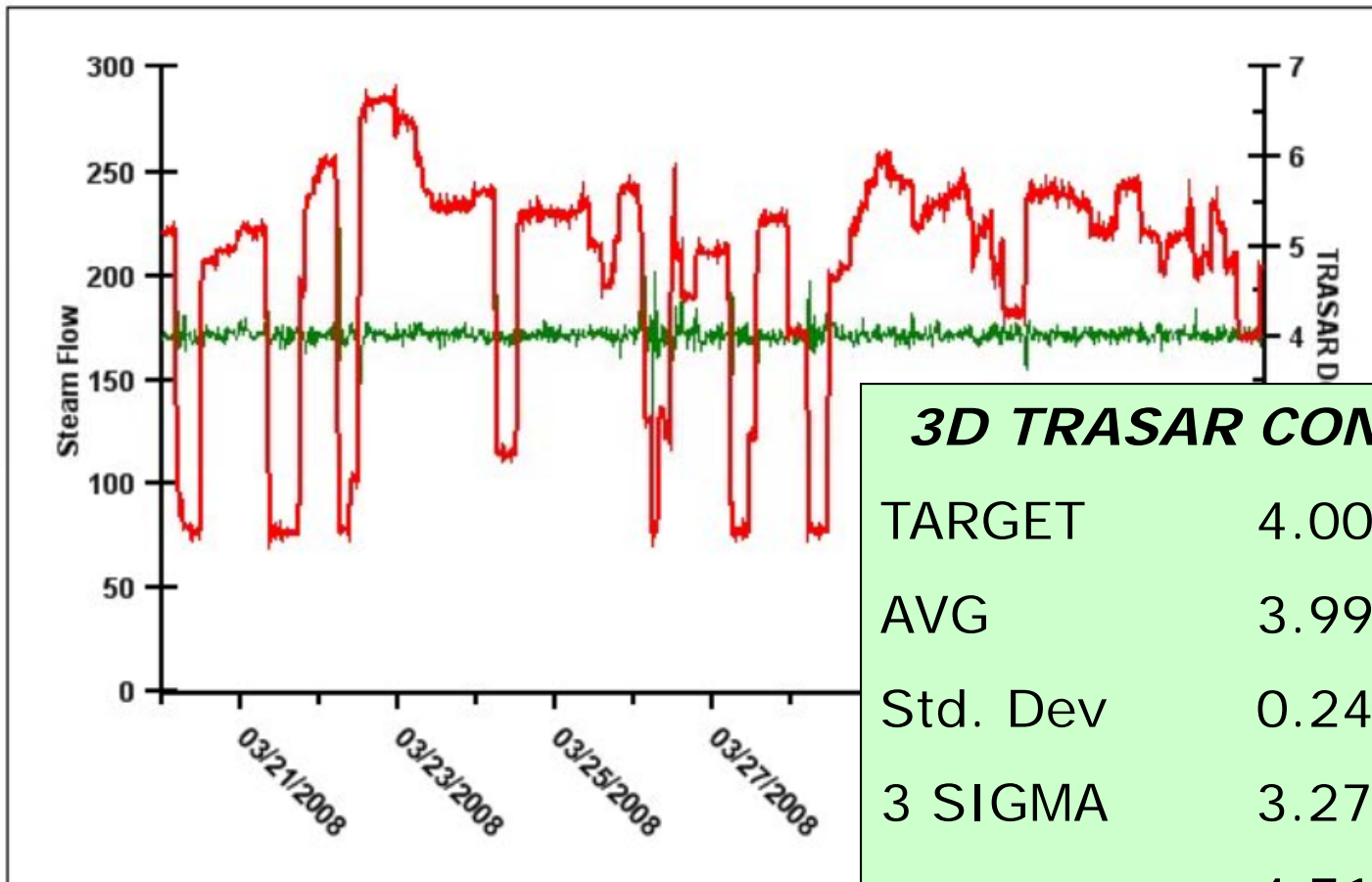
DATE

3D  
 TRASAR



# LARGE STEAM LOAD SWINGS

*540% STEAM LOAD SWINGS*



## ***3D TRASAR CONTROL***

TARGET	4.00 ppm
AVG	3.99 ppm
Std. Dev	0.24 ppm
3 SIGMA	3.27 ppm
	4.71 ppm



# Taking a closer look ...

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Pre-Boiler  
Corrosion  
Control

Controller



Nalco  
Corrosion  
Stress  
Monitor

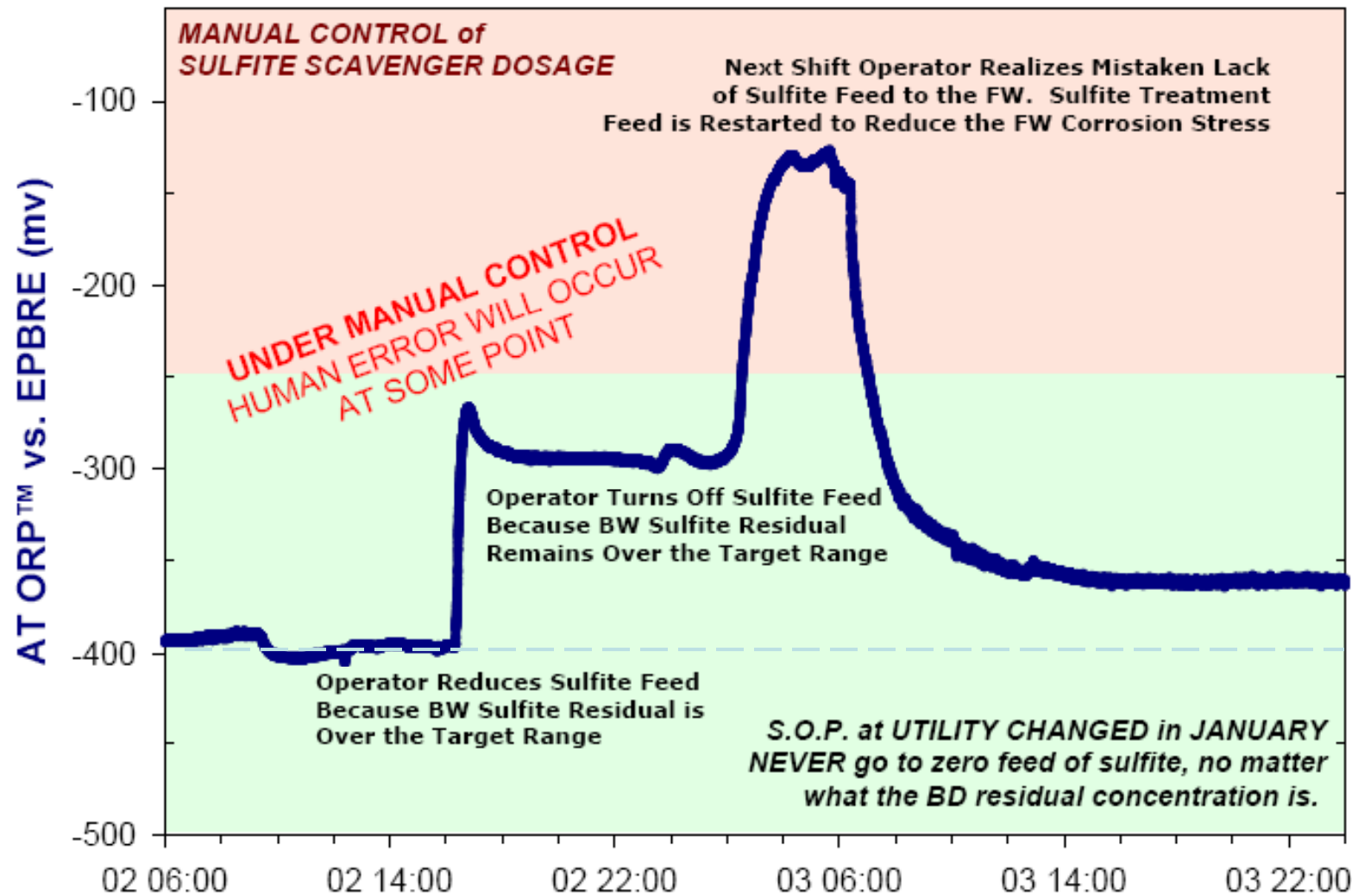
# Preboiler Corrosion Control NCSM Technology

- **Measures** REDOX stress
  - Includes simultaneous corrosion mechanisms
  - Includes all chemicals in the feed water that could undergo a REDOX reaction
- **Detects** variations from desired state
- **Responds** real-time
  - Varies oxygen scavenger feed
  - Maintains ideal reduced, low corrosion state
- **Communicates** via controller and web



# Feedwater Corrosion Stress Event

## NCSM Monitoring Data



UW

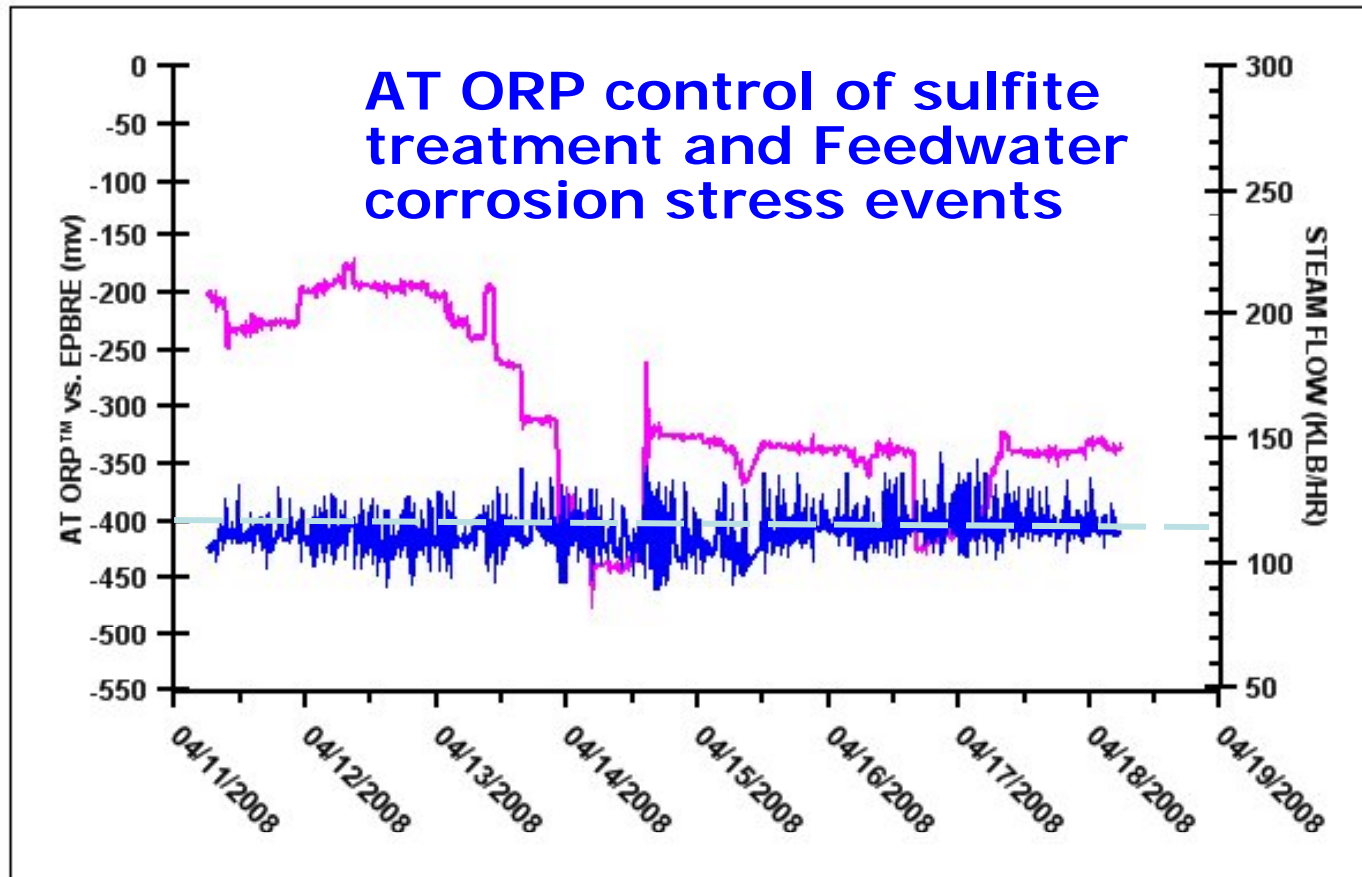


# Feedwater Corrosion Stress Event

## NCSM Control of Corrosion Stress

UW Walnut St. Graph - AT ORP™ & STEAM FLOW

— AT ORP™ — STEAM FLOW



UW

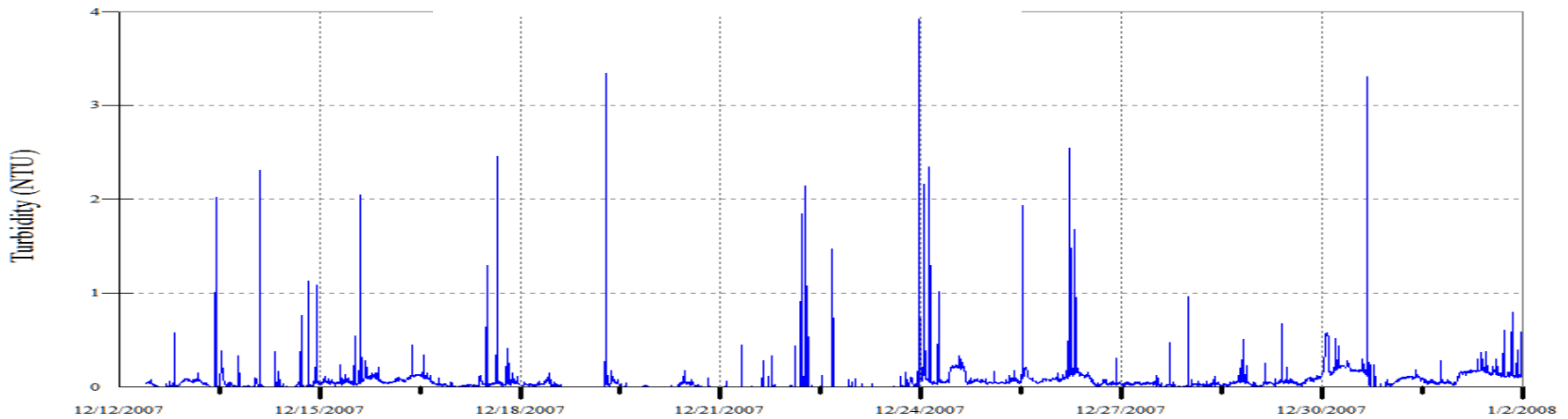


# 3D TRASAR® Technology for Sugar

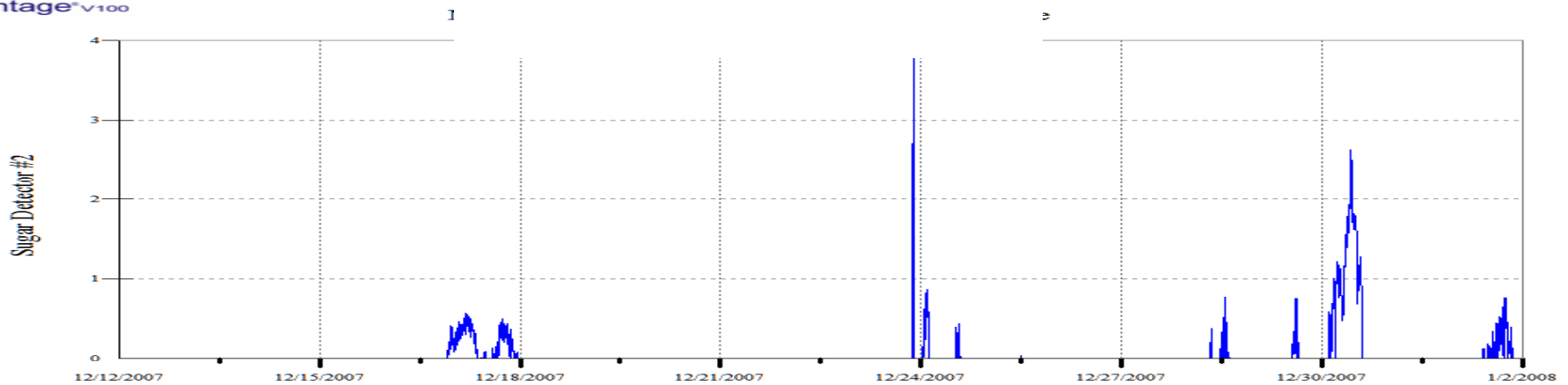


# 3D TRASAR<sup>®</sup> Technology for Sugar

Vantage<sup>®</sup>v100



Vantage<sup>®</sup>v100





# Nalco 360 Service



3D TRASAR

+



Web Connection

+



24/7 Expert Center

+



Nalco Sales Engineer

+



Advanced Reporting

=





People you trust, delivering results.™

## Profitable Performance

with a smaller  
environmental  
footprint

A conceptual image of a globe with a grid of latitude and longitude lines. The globe is covered in water droplets of various sizes. A prominent feature is a large, dark footprint shape formed by several water droplets, located in the lower right quadrant of the globe, symbolizing the concept of a water footprint.

**Delivering Sustainable Development**