AGENDA

• Who is Solenis and who is Norris Johnston?
• Why Boiler System Treatment, Monitoring, and Control
• Evolution of Treatment, Monitoring, and Control
• Monitoring and Control: Where, What, How
• Decision Making and Data Management
• Summary
INTRODUCTION

WHO IS SOLENISS? WHO IS NORRIS JOHNSTON?
WHO IS SOLENIS?

A HISTORY OF TRUSTED PARTNERS

Drew Industrial founded 1907
Hercules founded 1912
Betz Laboratories founded 1925

1907 – 1925

PULP & PAPER

Betz Laboratories acquires Dearborn division of W.R. Grace

1996

WATER

1981

1996

1998

Hercules acquires Houghton

2000

Ashland acquires Hercules

2007

Ashland acquires Drew Industrial Division

Stockhausen Utility Water and Wastewater Polymer acquired

2008

Solenis is launched

2015

Solenis acquires Clearwater Specialties

3500+ Employees
118 Countries
30 Manufacturing sites

2014

Solenis is launched

3500+ Employees
118 Countries
30 Manufacturing sites
WHO IS NORRIS JOHNSTON?

- Director: Applications, Platform Launch and Equipment
- BSChE: University of Arkansas 1972
- 42+ years in Water Treatment, 37+ years with same company
- Past Chairman, TAPPI Steam & Power / Energy Management
- Founding Member, BLRBAC Water Treatment Subcommittee
- Author: 9th edition, Betz Handbook
- Author/Co-Author: 8 TAPPI Technical Information Papers
- Author: Various Technical Publications/Presentations
BOILER WATER TREATMENT, MONITORING, CONTROL: WHY?
CRITICAL SUCCESS METRICS

• Compliance
• Sustainability
• Resources
• System Assurance
WHY BOILER WATER TREATMENT?

Safe, Reliable, and Economic Operation

NO SURPRISES!
WHY MONITORING AND CONTROL?

Good Chemistry is Not Enough

- Trust
- Comfort
- Confirmation

Action is Required

- Key Operating Indicators
- Key Performance Indicators
- Measure/React/Measure/React/……

“Assure, Verify, Protect”
EVOLUTION OF TREATMENT, MONITORING, CONTROL
EVOLUTION OF TREATMENT, MONITORING, CONTROL
WHERE WE STARTED

- Basic Treatment
  - Phosphate
  - Chelant
  - Sulfite
- Crude Manual Tests
  - Soap Test
  - Color Comparator – pH +
  - Grab samples
- Elementary Control Methods
  - Gross adjustments
  - Shot feed
  - Reactive
WHERE WE ARE HEADED

- Advanced Treatment
  - High Purity Boiler Feedwater
  - AVT, AP, Phosphate
  - Dispersants
  - Volatile Scavengers and Passivators

- Advanced Analytical Techniques
  - Continuous automated analysis
  - Precision titration methods
  - Ultra low detection limits in the field

- Advanced Control Methods
  - Smart Pumps
  - PLC and DCS systems
  - Artificial Intelligence
Performance, Reliability, Cost Efficiency
MONITORING AND CONTROL
WHERE? WHAT? HOW?
MONITORING: WHAT?

Key Operating Indicators (KOI)

- Specific ions or water characteristics
- Specific flows

Key Performance Indicators (KPI)

- Corrosion
- Deposition
- Carryover
MONITORING: HOW?

Boiler System Monitoring

[Diagram of boiler system monitoring, with labeled components such as condensate receiver, deaerator, feedwater storage, oxygen scavengers, and boiler system components.]

From External Treatment

Boiler Blowdown

Magnetic Filter

Vent

Amine Regenerant

Oxygen Scavenger 1

Neutralizing Amine

Oxygen Scavenger 2

Feedwater Storage

Deaerator

Resin Polisher

MUI/BD HEX

SP

From External Treatment

TAPPI
TIP 0416-03
TIP 0416-14

Solenis
Strong bonds. Trusted solutions.

Norma N. Johnson
August 2000

Boiler System Monitoring
WHAT NOW?

DECISION MAKING AND DATA MANAGEMENT
DECISION MAKING

Monitoring Results
- Grab Test Data
- Continuous Test Data

Control Results
- Process Variable Data
- Event Data
- Trends
DATA MANAGEMENT

Real Time
- KOI and/or KPI tracking
- Trending

Historian
- KOI / KPI history
- Trend history
- Manual entry trends
- Continuous variable trends
SUMMARY
ONGUARD™ ONLINE PLATFORM ARCHITECTURE

OnGuard™ Analyzers and Sensors

Controllers

Tank Levels

DCS / Pi Interface

Customer Access

Solenis Applications Support

Alarms

Reporting

Performance, Reliability, Cost Efficiency

Solenis Representative
ONGUARD™ ONLINE PLATFORM ARCHITECTURE

OnGuard™ Analyzers and Sensors

- Carryover
- Safe, Efficient, and Economic Operation
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