Monitoring & Control of Feedwater Corrosivity Using 3D TRASAR Boiler Technology
Topics

• Why monitor and control feedwater corrosivity?
• Is control possible?
• What control achieves
• What control delivers
Why monitor or control feedwater corrosivity?

Iron Deposits
- Reduced heat transfer
- Reduced tube life
- Excessive or unplanned cleaning costs
- Slow ramping

Flow Accelerated Corrosion (FAC)
- Safety concerns
- Premature system failure
- Unscheduled downtime

Slow Ramping
- Lower availability
- Increased costs
- Decreased revenues
Current state of feedwater monitoring and control

- Routine (and frequent) wet chemistry monitoring in accordance with ASME or other guidelines.
- Online monitoring of conductivity, temperature, pH, maybe dissolved O\(_2\) and/or room temperature ORP.
- Adjustments to chemical treatments in a reactive fashion, based on test results.
- The assumption: if feedwater chemistry is maintained in accordance with the guidelines, failures will not occur.
Current State

• Consistency and diligence have been rewarded with good results.
  – Most plants have operated for long periods of time without significant problems.

• Better results are possible.
  – Wet chemistry misses upsets and operational changes.
  – Reaction times can be slow.
  – Key parameters are still missed.
  – Current practices are time consuming.

• Better results are worth the effort.
  – Gaining control delivers better results and helps power plants meet their goals.
Better control is possible

The NCSM can control ORP … but what difference does that make? What does control deliver?

NCSM Monitoring
Mean = -272.1 mV
Std. Dev. = 64.1 mV
n = 2,160

NCSM Controlling
Mean = -469.4 mV
Std. Dev. = 5.3 mV
n = 2,160
Correlation between control and iron generation

Before NCSM

After NCSM

ORP measurements made with the NCSM correlate tightly with measurements made with a particle counter.

NCSM-based control of scavenger feed delivers less variability and less corrosion product generation.
The value of reducing iron generation

We can control ORP…and control of ORP delivers less corrosion product … and so what…?

- Arizona Electric Power Cooperative, Apache Station, Cochise, AZ
  - 557 MW, coal-fired plant

- Reduced routine start-up time by up to 75%

- The customer has reduced his operating costs by up to $1 million per outage event
Is the situation at AEPCO unique?

• AEPCO cycles more than most coal plants
  – …but coal plants – and gas plants – are cycling more today than in the past.

• AEPCO had longer silica holds than a lot of plants
  – …but a lot of plants have chemistry holds of some kind.

• AEPCO is not unique in the economic value 3D TRASAR Boiler Technology delivered.
  – Every plant wants higher availability
  – Every plant wants to avoid chemical cleaning
  – Every plant wants to minimize boiler deposition
  – Every plant wants to meet their generating goals, consistently and at the lowest possible cost.
What about combined cycle plants?

Shutdown at about 11:00 PM every night.

Start-up at about 5:30 AM every morning.
Material Condition Matters

• Combined cycle plants are bought and sold frequently.
• Prior to sale, material condition is assessed as part of the due diligence.
  – A well-maintained plant sells for more than a poorly-maintained one.
  – Documentation is often key to this determination.
• Operating companies provide their services to the owners and the price they charge is impacted by material condition.
  – A well-maintained plant requires fewer people (lower costs), which improves financial performance.