



Chemistry change to address FAC-like corrosion in ACC tubes

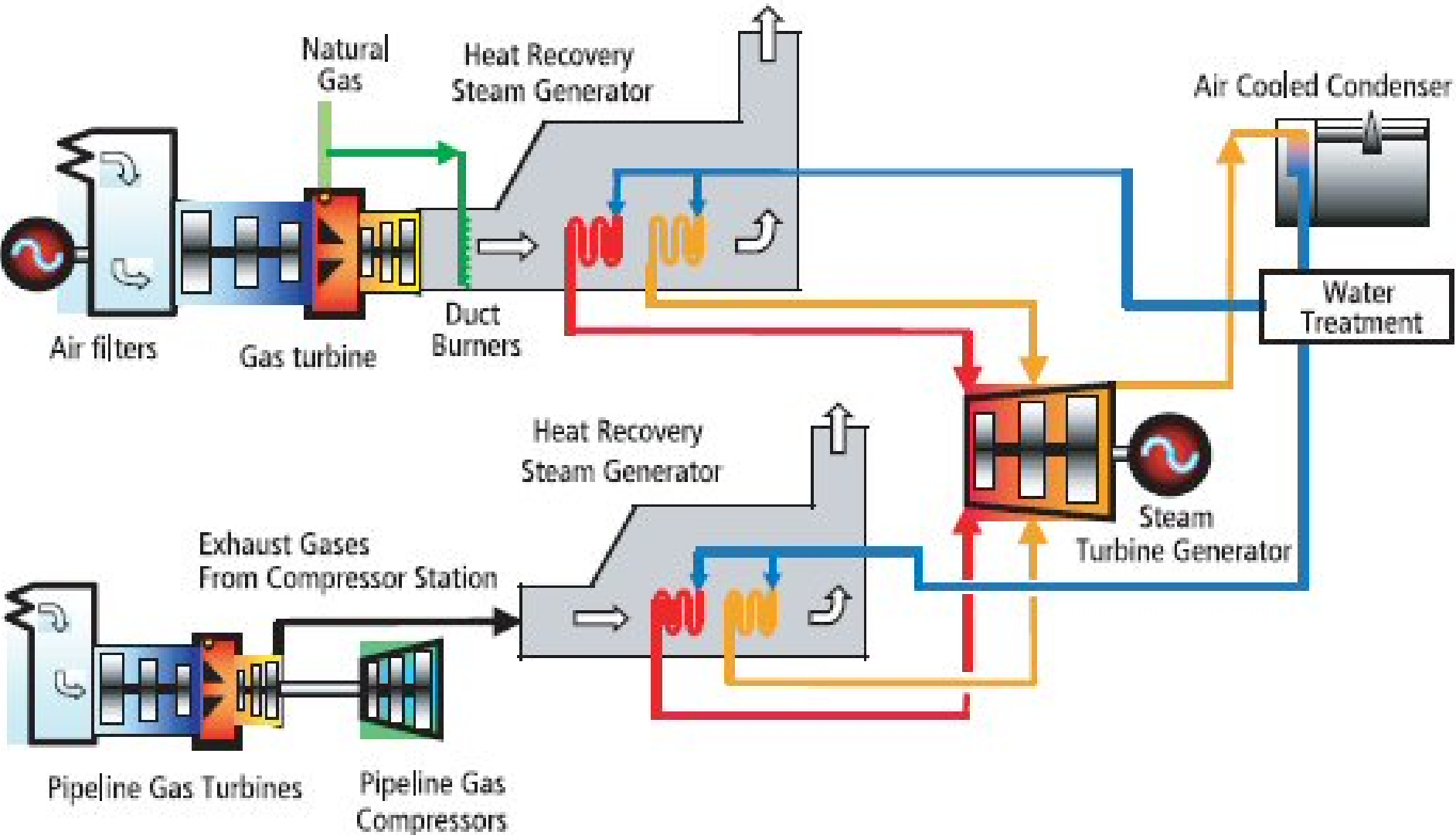
Bill Stroman, Operations Specialist Support

Capital Power ACC Plants

- North Bay
- Tunis
- Kapuskasing
- Nipigon
- North Island-San Diego
- MCRD-San Diego
- Naval Station's San Diego the Navy has ACC with condensate return to our facility

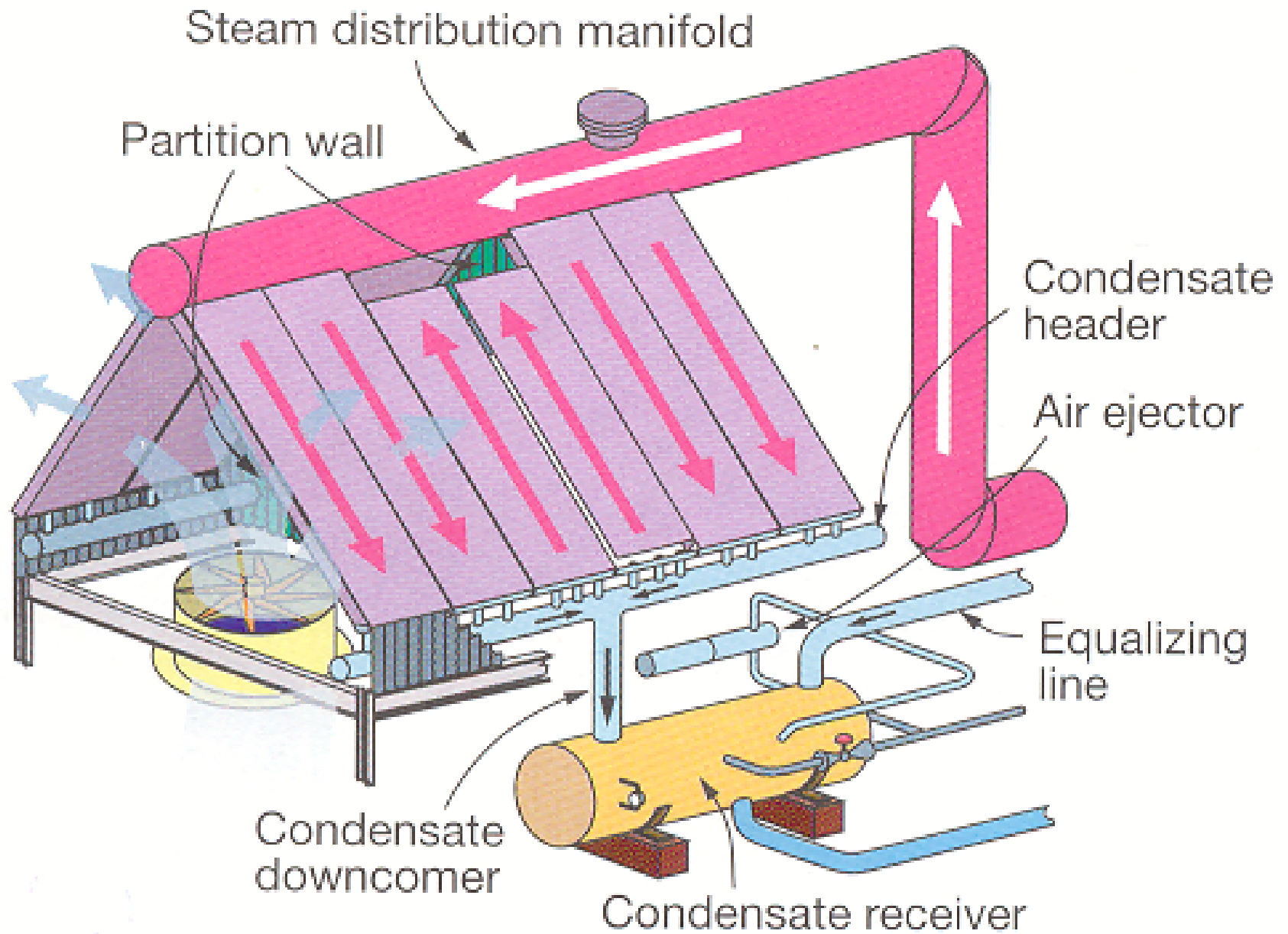


North Bay



Chemistry-North Bay

- Operating pressure 3,200-3,600 kPa (460-520 psi)
- Boiler make up: Well, softeners, RO and mix bed DI. Exhausted resin regenerated off site.
- Condensate polishers, resin replaced once every 50-60 days.
- On-line chemistry control <9.4 target 9.1-9.2
- Discharge wastewater pH 5.5-9.5, <10 ppm ammonia, <10 ppm iron









For ~10 years the chemistry was hydrazine/morpholine then was changed during 2006 to ammonia treatment. Problem was not previously noted.

Inlet vanes



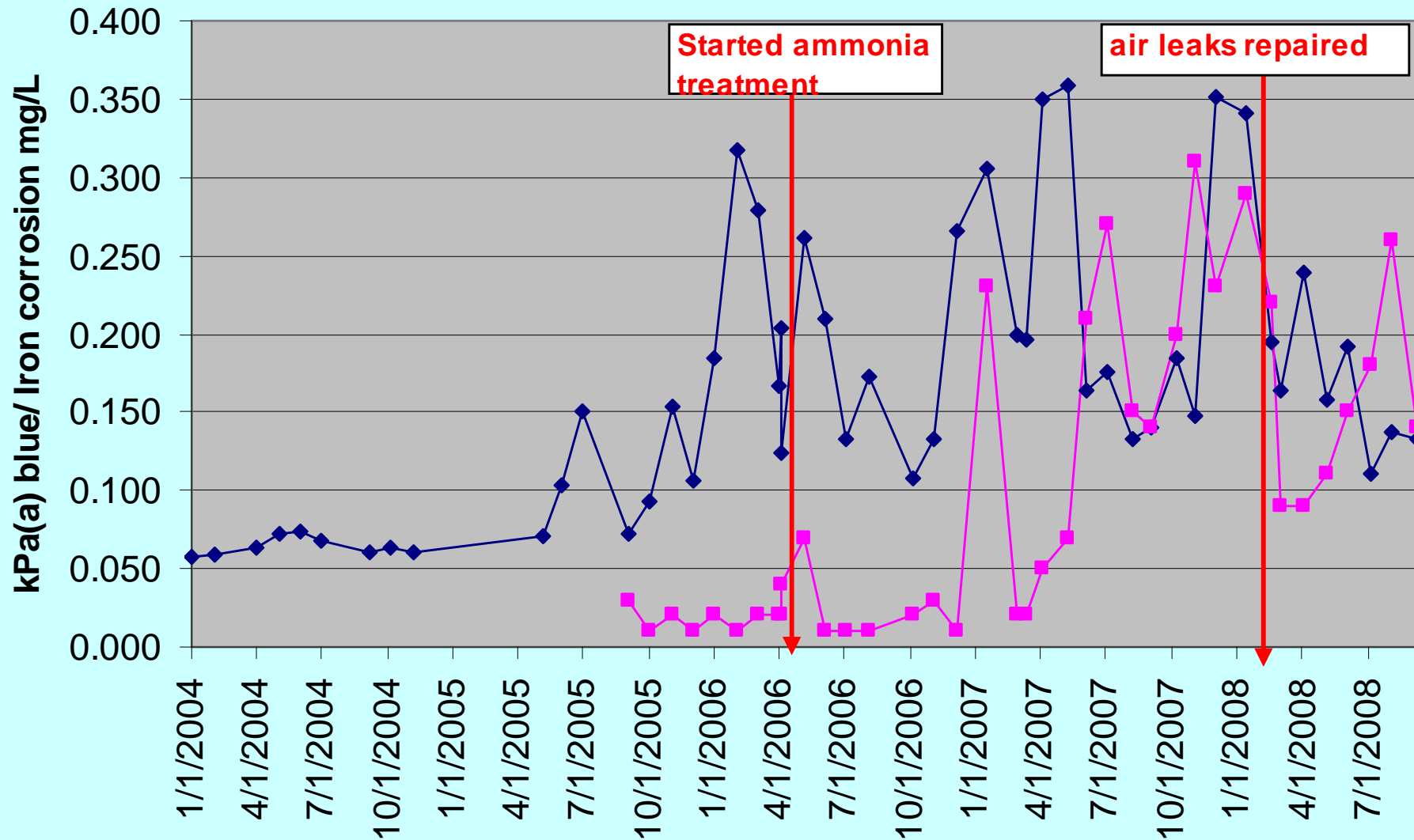
Foreign ACC unit with through wall corrosion



Air Inleakage Control

- Monitoring air off take & Back pressure.
- Perform decay test.
 1. Implement investigation when air off take readings are out of specification
 2. Inspect for air ingress
 3. Helium leak test for areas of air ingress

Vacuum kPa(a) vs Iron Corrosion





Blue green deposition was present and has not been noted previously.

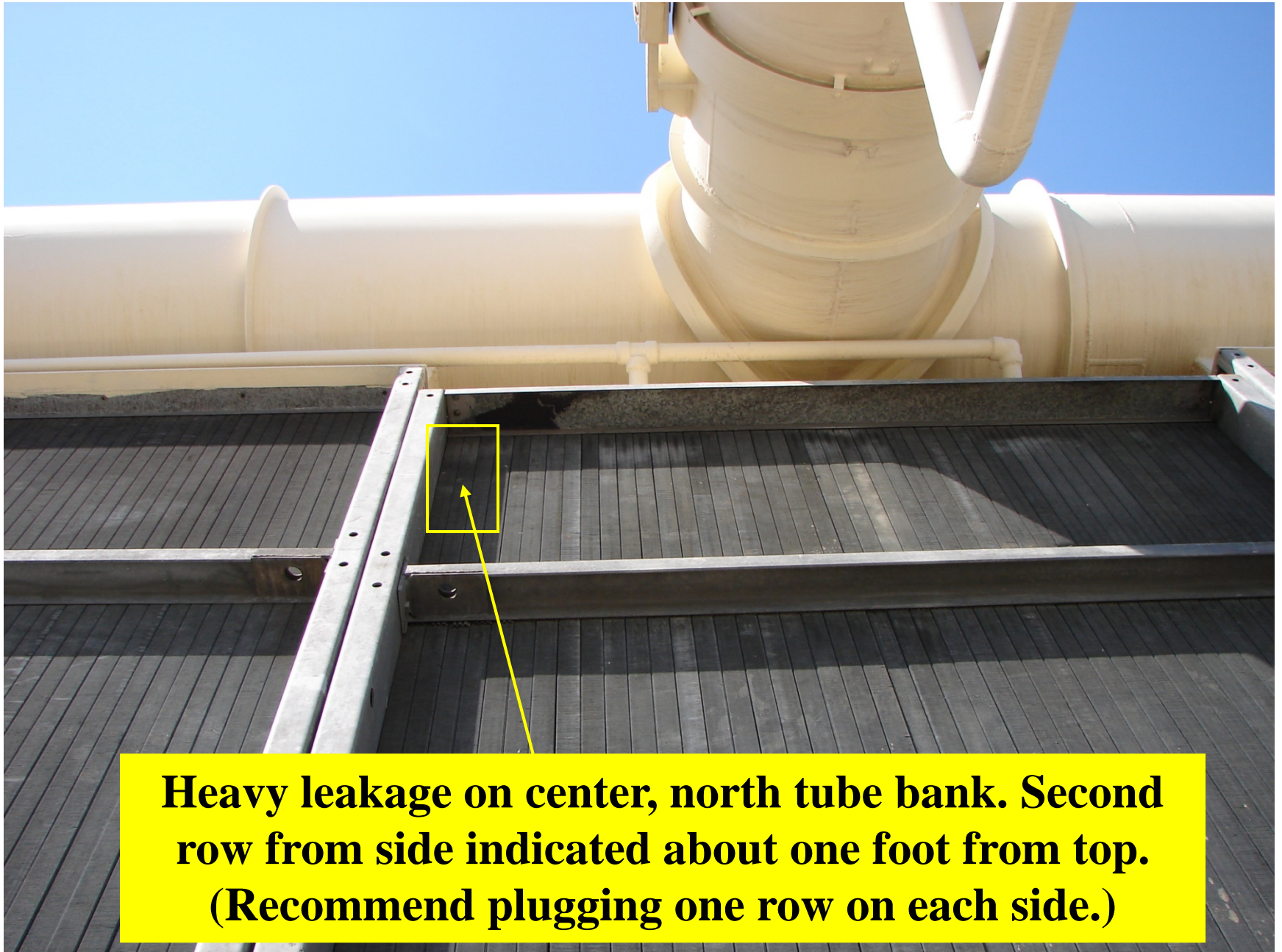
ZnO: 88%

SiO₂: 10%

ZnFe₂O₄: 1%

Zn₄Si₂O₇(OH)₂ H₂O: 1%





Heavy leakage on center, north tube bank. Second row from side indicated about one foot from top. (Recommend plugging one row on each side.)

Developing new methods for trouble shooting

- Dry cooling will have system specific challenges, will need creative solutions.
- Thermography (infrared) profiling for documenting & diagnosing various regions of the air cooled condenser for problems.
- For example: air binding, hot zones, channeling.

NTC: Vacuum Decay Test

Arrived onsite approx 0630 to run a vacuum decay test. Operator held load and fans steady and closed the SJAЕ suction valve. Start time of test 0716 BP 4.08" HgA. Stop time 0719 BP 6.57" HgA. Rate of decay 0.83" Hg/min, allowable rate of decay is 0.2" Hg/min.

North Bay PP
North Bay, Ontario, Canada
20 MW steam turbine







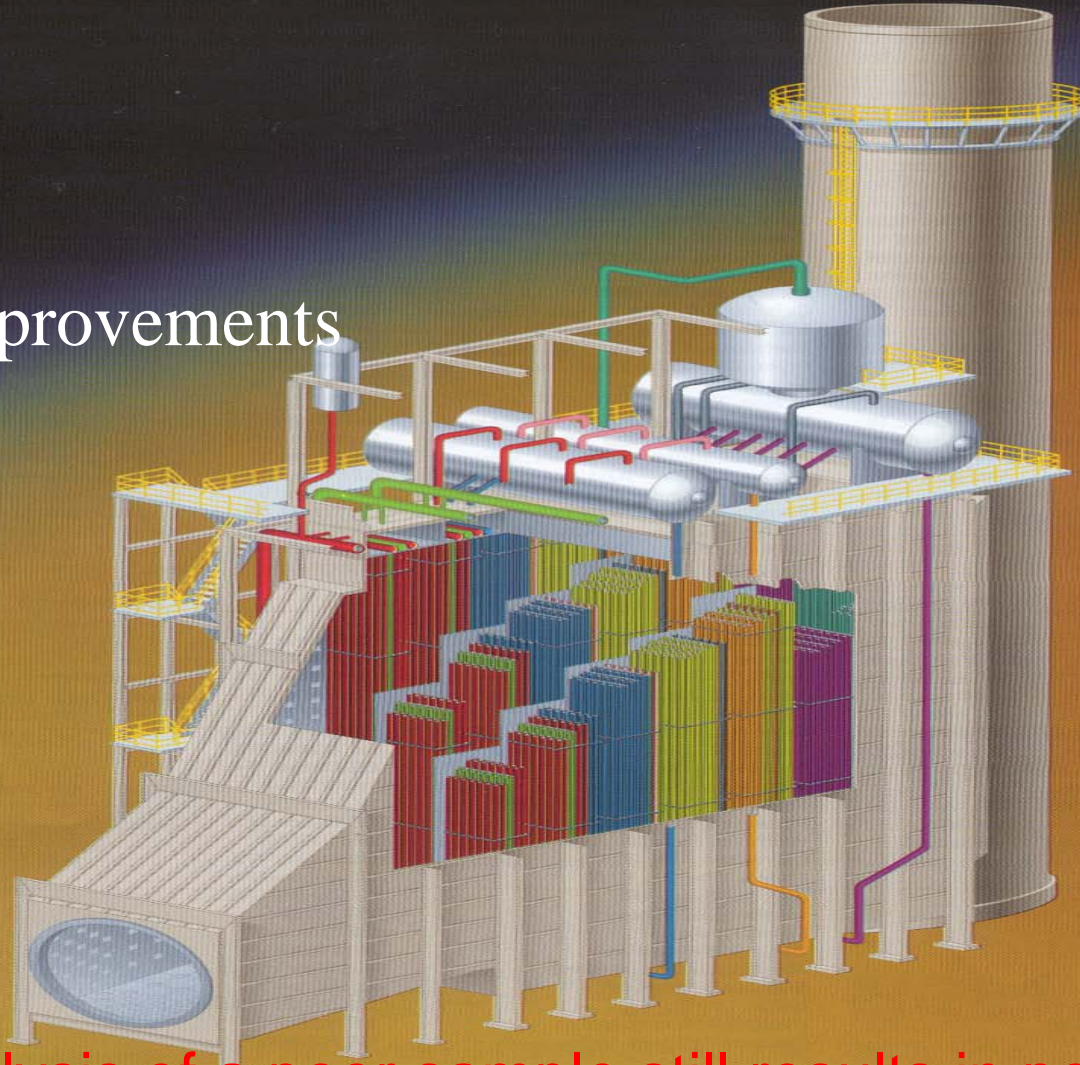






Chemistry Monitoring Requires Representative Sample In Order To:

- Measure
- Maintain
- Manage
- Make Improvements



Good analysis of a poor sample still results in poor results!

Monitoring

- B&W filter test
- Dissolved iron
- Physical inspection
- Not all monitor the air removal rate
- Backpressure

Chemistry Change

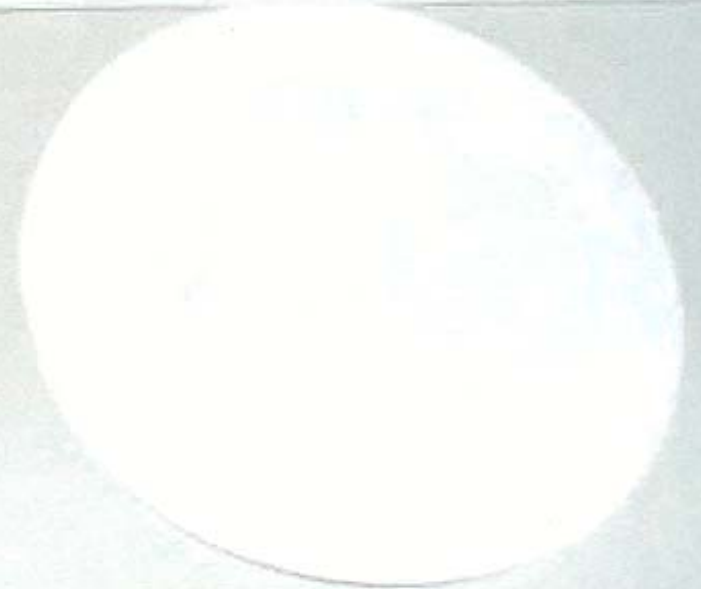
- Specific conductivity needs to be lowered and more elevated pH adjustment is desired; monoethanolamine (MEA) with a carbon/nitrogen ratio of 2:1 to lower organic byproduct formation versus morpholine @4:1 and cyclohexylamine @6:1.
- MEA blended with ammonia promotes steam and condensate passivation and less impact to the condensate service run length.
- Steamate NA1324:
 - MEA 3-7% + ammonia hydroxide 30-60%

B&W filter iron test

Feed

Filtrate

MEA & Ammonia Blend





CHEMTRAC[®]

SYSTEMS, INC.

1)Online Num: 12
Chan: 1 2 μ m-5 μ m
35.75 cts/mL
Cell: 92 % 100 mL/m

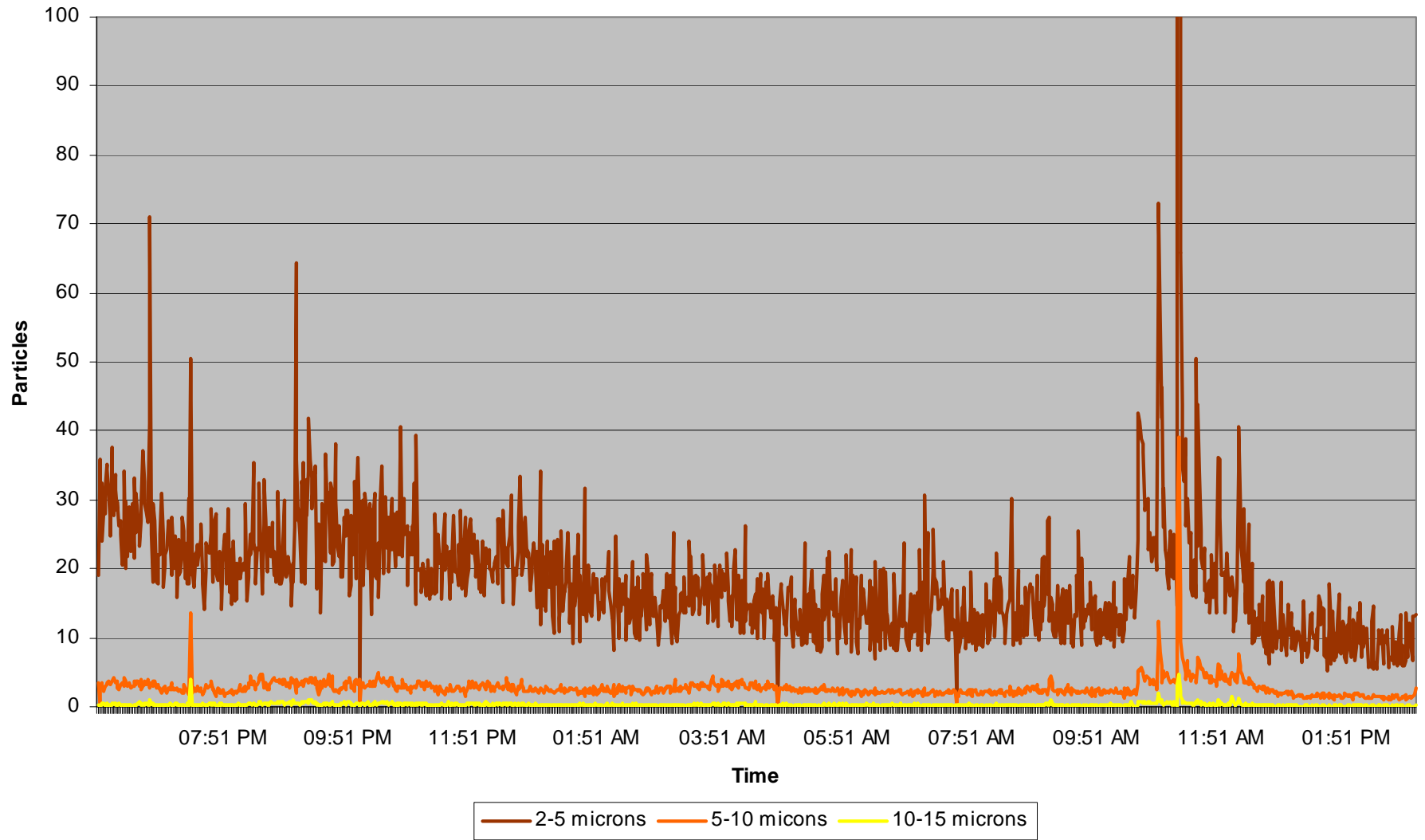

PWR

 
TX RX

Laser TracTM

**PARTICLE COUNTER
MODEL PC 2400 D**

Figure 2. Filtered Water (2-15 micron profiles)



Cycling

- What are the issues?

Typical Iron & Oxygen Content ACC Condensate during Start-Up

