



High concentrations of iron around the cycle Boiler/HRSG deposits (including aluminum) Boiler/HRSG Tube Failures (overheating and TF) Steam Turbine Deposits (including aluminum) Need for Iron Removal Processes Condensate Polishing and/or Filters Limitations around the cycle Condensate polishing (may have to change mode) Overall an ACC "controls" the unit cycle chemistry

Corrosion/FAC in ACC and The Consequences

- International Guidelines didn't consider ACC or two-phase flow up to 2008 (IAPWS Volatile Guidance)

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DHACI

(<u>D</u>ooley, <u>H</u>owell, <u>A</u>ir-cooled Condenser, <u>C</u>orrosion <u>I</u>ndex)

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Summary from 2012 ACCUG

- Some aspects relate to (LT Two-phase) FAC
- Adjacent black and white areas in severe turbulent areas
 - Increasing pH reduces damage
- Some aspects don't (normal FAC scalloped appearance and white areas on cross members is probably LDI)
- Environment is known and has been measured (one plant)
 Two-phase mixture formed in PTZ of ST
 - Concentrating liquids (Higher in chloride/sulphate, organics)
 - Lower in pH
- Clearly more tubes need to be analyzed and we need to provide solutions which address the mechanism
- Latest results from a number of plants indicate
 increased AI levels in turbine and in drum deposits

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Questions for ACCUG Discussion

Monitoring Iron and Aluminum

- Any new experience on monitoring total iron?
- Has any user identified aluminum in boiler/HRSG deposits or on the steam turbine
- Does any user have aluminum monitoring experience and methods
 ACC Tube Inspections
- Any experience of selecting and removing an ACC tube for inspection (assume the removed tube ends are just capped?)
- Has any user conducted inspections using video probes down ACC tubes

 observation and interpretation? Given that high pH reduces FAC it is
 still occurring albeit at a reduced rate hence how to determine tube life
 and are there areas in a ACC tube where the damaged (under high pH)
 might be focussed.

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Are spare ACC tubes available from ACC suppliers?

Questions for ACCUG Discussion

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ACC Tube Inspections Continued

- Have any members inspected new ACC tubes before use particularly interested in the tubes with aluminized external coatings.
- Have members considered removing a complete ACC finned cooler tube to investigate tube condition with respect to chemistry and residual and on-going FAC damage after moving to a high pH regime. If a tube has been removed - what was the criteria for selection between a normal tube or a dephlegmator tube.



Questions for ACCUG Discussion

Condensate Polishing and Filters

- What types of condensate filters are used (average or absolute size?)
- What type of condensate polishers are used:
 - powdex deep bed mixed beds separate cation and anion beds
 hydrogen cycle polishers ammonia cycle polishing
- For ACC units with condensate polishers and condensate filters :
- what are the high temperature trip points for the filters and polishers how often do polishers and filters trip on high condensate temperatures.
- What has been the experience with polisher resin life cation and anion. Is organic carbon monitoring conducted ?

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