BOILER GENERATING BANK INSPECTIONS
POSSIBLE INSPECTION TECHNOLOGIES

• STANDARD ULTRASONIC THICKNESS TESTING
• MAGNETIC PARTICLE INSPECTION OF SEAM WELDS
• RADIOGRAPHY
• REMOTE FIELD ELECTROMAGNETIC TECHNIQUE (RFET)
• IRIS
Remote Field Electromagnetic Technique (RFET)

The electromagnetic field generated by the Exciter coil travels through the tube material and is sensed by the Receiver coil placed at a distance 3 times the diameter. Any change in the tube wall thickness will cause a change in the field which in turn changes the phase and amplitude. This change in phase & amplitude can be used to quantify the wall loss.

short flaw  
Long flaw
Carbon Steel Tube Inspection Using Remote Field Electromagnetic Technique

**Eagle 2000 Plus System**

- **Single/ Multi-channel System:** Up to 8 Channels for tube inspection
- **300 to 350 tubes can be inspected in a 10 hour shift**
- **Special Flexible Probes for boiler drum to drum tubes inspection**
- **Flexible probe sizes can be built to inspect generating bank tubes ranging in size from 1” OD to 3.5” OD.**
Remote Field Electromagnetic Technique (RFET)

- Inspects Ferrous Tubes such as Carbon Steel
- Highly sensitive to volumetric defects
- Equally sensitive to ID and OD defects however they cannot be differentiated.
- 60-75% Fill Factor probes can be used for inspection
- Minimal Preparation is required
- Defects under Tube-sheet cannot be detected
- Need access to the ID of the tubes through the steam drum and mud drum
- Can employ 2 teams at the same time to double productivity
COMMON DEFECTS FOUND IN GENERATING BANK TUBES

- GENERAL WALL LOSSES
- SOOT BLOWER EROSION
- FLUE GAS EROSION
- PITTING
- CRACKING
Bank Boiler Tube Inspection Using Remote Field Electromagnetic Technique

Tube Sheet showing color coded wall losses.

North - Hot Side
Viewed as Looking Down on Mud Drum Generating Bank
Nominal: 2.5" O.D., 0.109" Wall
Not Drawn to Scale.

W-1
1-1 5 10 15 20 1-20

5-1 5-20

West Side Wall Tubes

W-12
10-1 5 10 15 20 10-20

Soot Blower Lane Between Rows 5 and 6.

○ > .093" Wall
○ .087-.093" Wall
○ .082-.087" Wall
○ .076-.082" Wall
○ .071-.076" Wall
○ .065-.071" Wall
○ .060-.065" Wall
○ .055-.060" Wall
● .049-.055" Wall
● Plugged Tube
● Every 5th Row
Color Coded Side Elevation Diagram showing the location of the thinning.
Boiler Tube Inspection Using Remote Field Electromagnetic Technique

Single Channel and Multichannel Data showing 65-70% localized wall loss.
Example of ID pit found with Multichannel RFET Probe found between the mud drum and the mud drum bend. Carbon Steel 2.5” O.D., 0.165” tube swaged to 2” O.D.
Details Needed for Successful Inspection

- Tube Dimensions
- Any Available Drawings
- Failure History
- Repair History
- Scaffolding Plans
- Available Time for Inspection
GENERATING BANK INSPECTION

CONCLUSIONS

• CAN INSPECT APPROXIMATELY 350 TUBES PER TEAM PER SHIFT
• ABLE TO DETERMINE CONDITION OF TUBE WITHIN THE BANK
• LOCATIONS AND SEVERITY OF DEFECTS REPORTED
• PRELIMINARY REPORT ISSUED HOURS AFTER COMPLETION OF INSPECTION
• ABLE TO REACT ON RESULTS TO PLUG TUBES AND/OR REPAIR THINNED AREAS
• ALLOWS PLANNING FOR FUTURE RETUBING FORECASTING