

Water Side Inspection of Industrial Boilers

W.R.B.A. Meeting 3/11/09
Ed Baumgartner & Jim Robinson



imagination at work

Who are we?

- Jim Robinson Senior Boiler Consultant, Trevoise, PA
- Ed Baumgartner Senior Project Sales, Spokane, WA



GE
Water & Process Technologies

Ouch !!



A Boiler?



We Have Lift Off!



The Big Bang!



What will we cover?

What to look for and accomplish in the waterside inspection of your water tube industrial boiler

- Water Tube Configuration
- Generally softened and/or DeAlk MU



Three Areas of Discussion

Presentation includes

- Preparation for the inspection
- Conducting the inspection
- Best Practices follow-up



GE
Water & Process Technologies

Preparation for the Inspection

- Form a team for the inspection
 - Plant point of contact
 - Water treatment consultant
 - Insurance inspector if possible



Preparation for the Inspection

- Safety is paramount
 - LO&TO
 - DO testing
 - Man-Watch Always



Preparation for the Inspection

Before the inspection, research:

- Boiler Design (circulation issues, load issues)
 - Certain types of boilers have known issues
 - Loads higher than design can lead to carry-over and other issues such as level control
 - Low loads can worsen circulation issues
 - History of the boiler to be inspected



GE

Water & Process Technologies

Preparation for the Inspection

Before inspection, research:

- Past inspection results (review past reports the day of the inspection, if possible)
- View any TV camera tapes from prior outages
- Know the current treatment program type and how it works: Chelating, Precipitating, or Dispersing



GE
Water & Process Technologies

Preparation for the Inspection

- Preparation
 - Right gear
 - Clothing (not loose fitting, zippered pockets)
 - Tools (not too small, or tethered)
 - Digital camera
 - Plan for inspection discussed by the team before crawling in the boiler
 - TV camera
 - Other



Conducting the Inspection

- The Inspection
 - Make sure that LO&TO is done according to plant protocol
 - Man hole watch mandatory
 - DO testing



Conducting the Inspection

What to look for:

- Loose, plugged, or missing internals
- Level control indications in steam drum
- Indications of deposition concerns
- Indications of corrosion concerns
- Inspect all drums on boiler
- Inspect any headers if available



GE
Water & Process Technologies

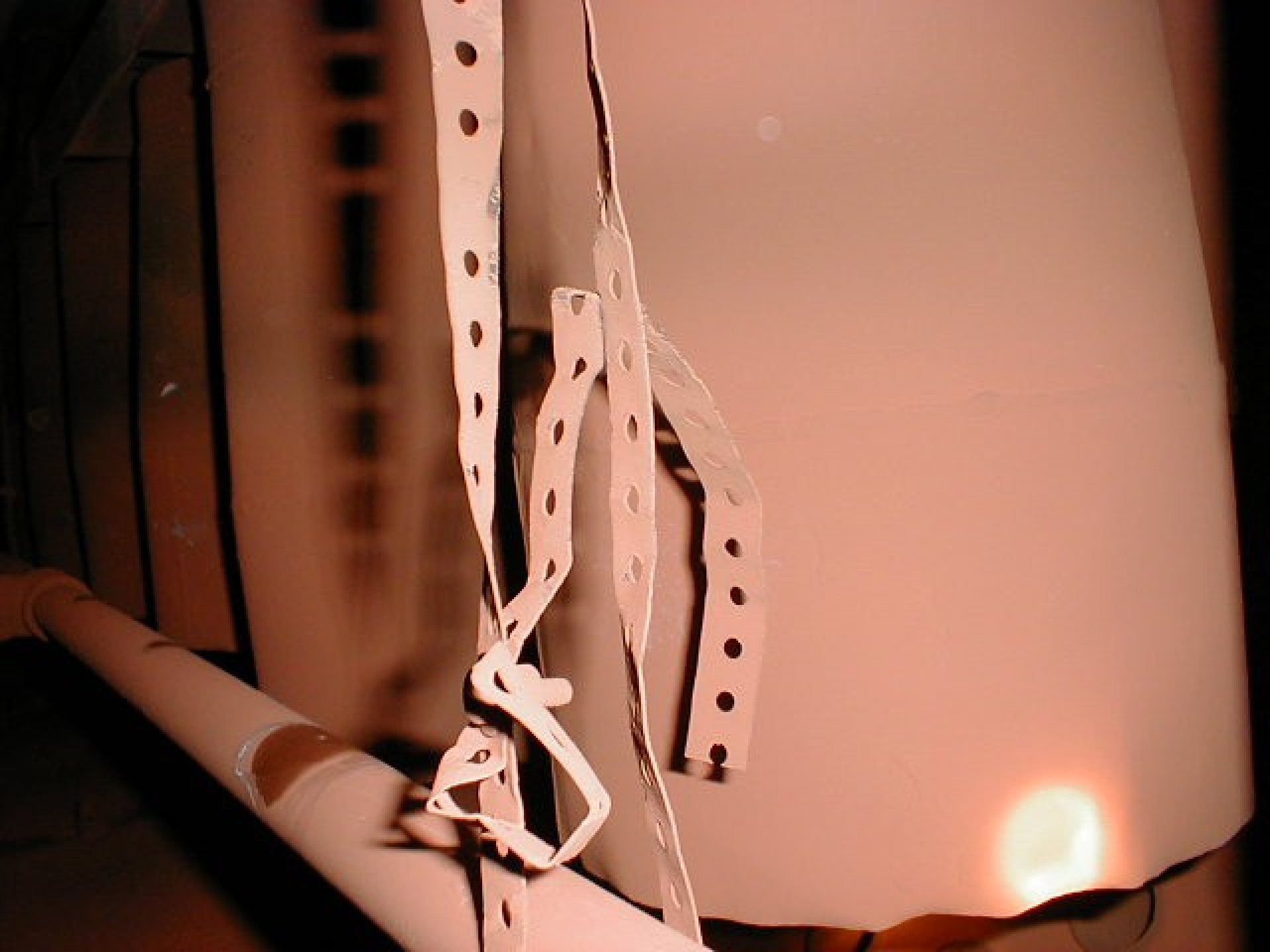
Conducting the Inspection

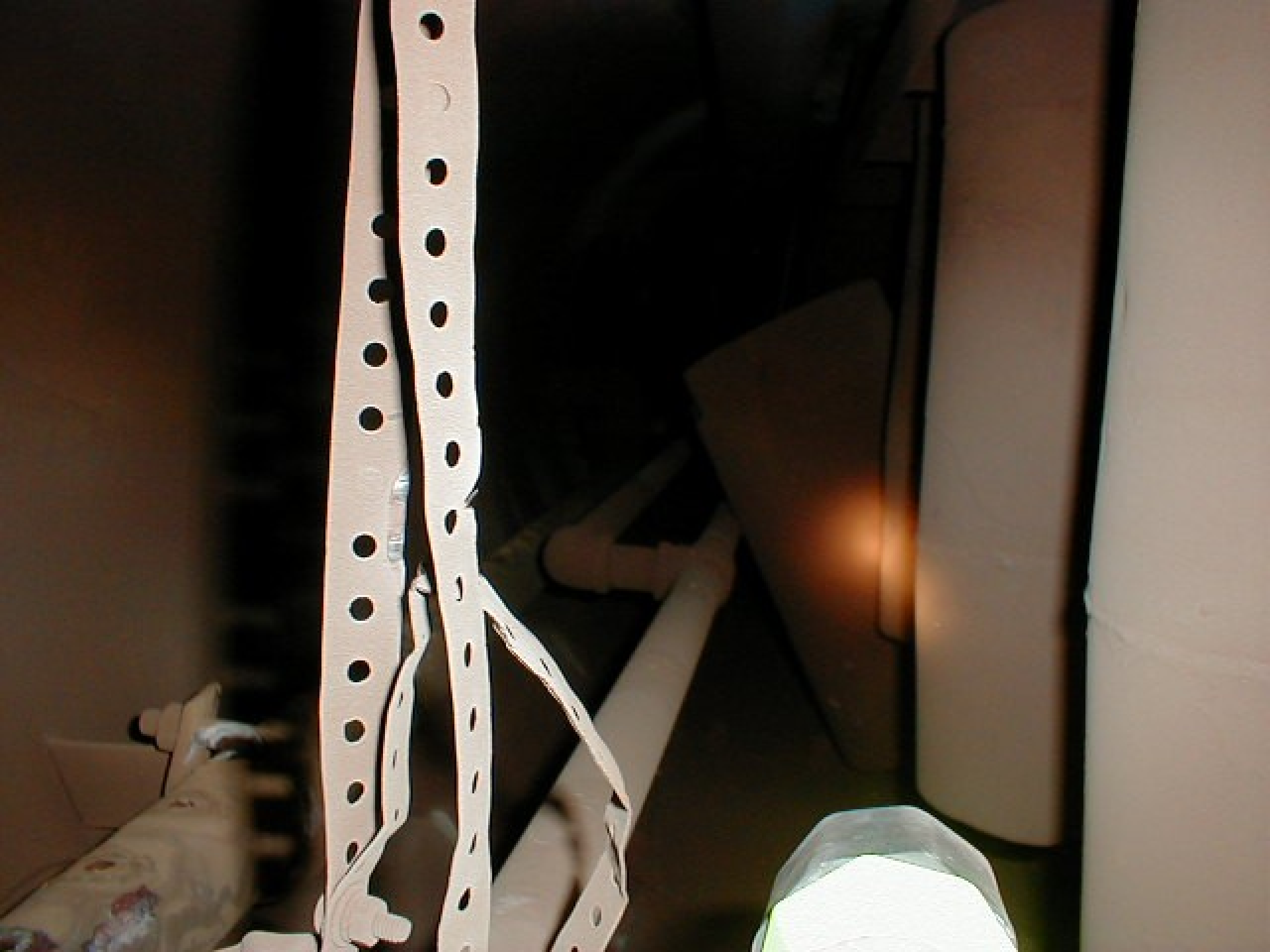
What to look for:

- Loose, plugged, or missing internals
 - Check for loose equipment
 - Note findings for report
- Water level control in steam drum
 - Note steam drum wall levels indications
 - Low or high
 - Varying across drum in certain areas

































Conducting the Inspection

What to look for:

- Indications of deposition concerns
 - If deposits found in drums, sample if possible (note where they were taken)
 - Deposits in drum show real concern
 - No deposits visible in drum does not necessarily mean no deposition concerns on heat transfer surfaces



GE
Water & Process Technologies

Conducting the Inspection

What to look for:

- Indications of deposition concerns
 - For best inspection of tube heat transfer surfaces, inspect tube with TV camera, or Boroscope
 - Preferably, tube specimens are taken and submitted for metallurgical evaluation and deposit weight densities of any deposit



GE
Water & Process Technologies





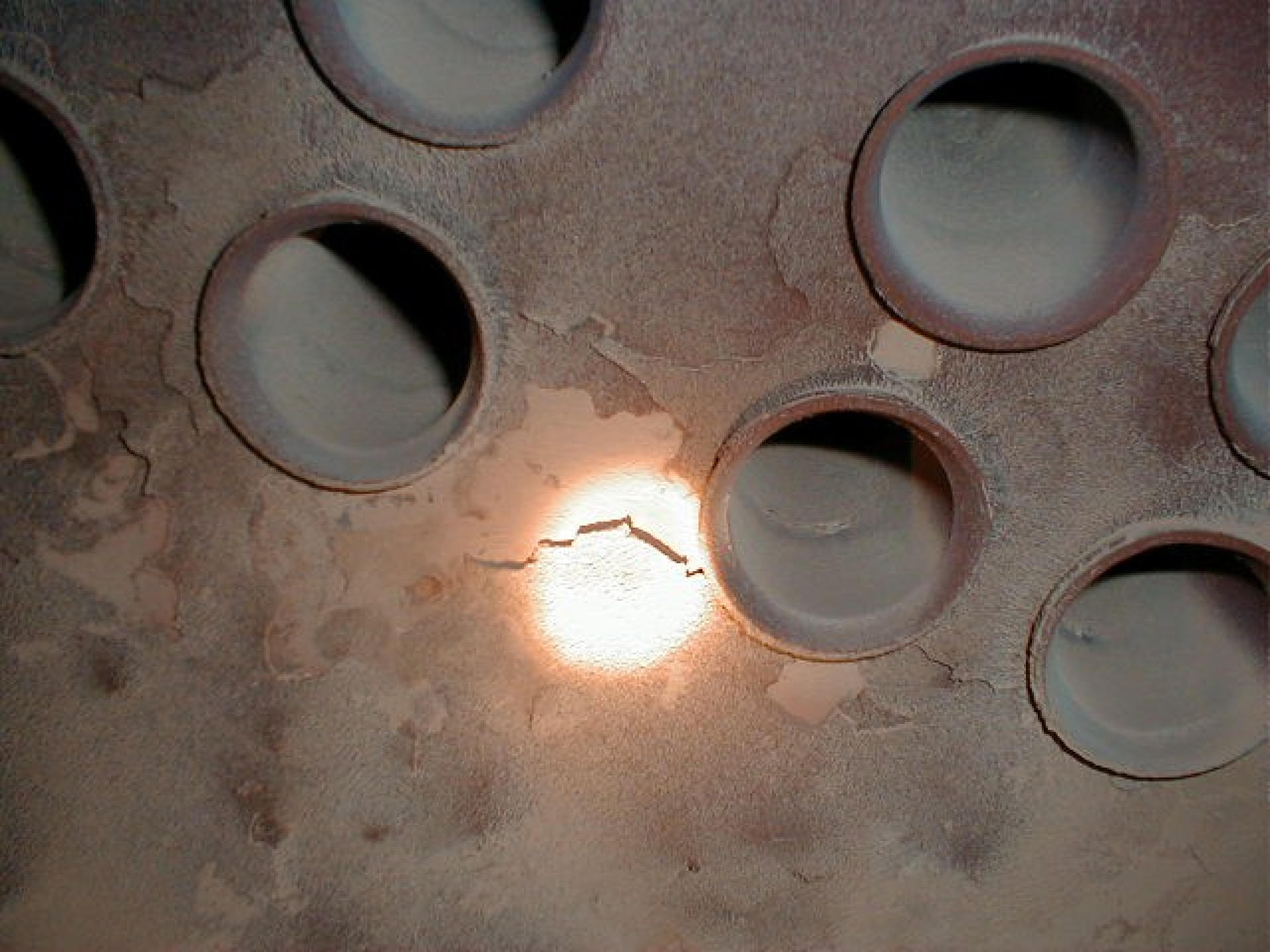




~~Row 4~~
Row 4
↓









Long Term Overheat



Short Term Overheat





Conducting the Inspection

What to look for:

- Indications of corrosion concerns or lack of passivation
 - Noted pitting
 - Noted redness on drum wall or, on or near, the feedwater line



Conducting the Inspection

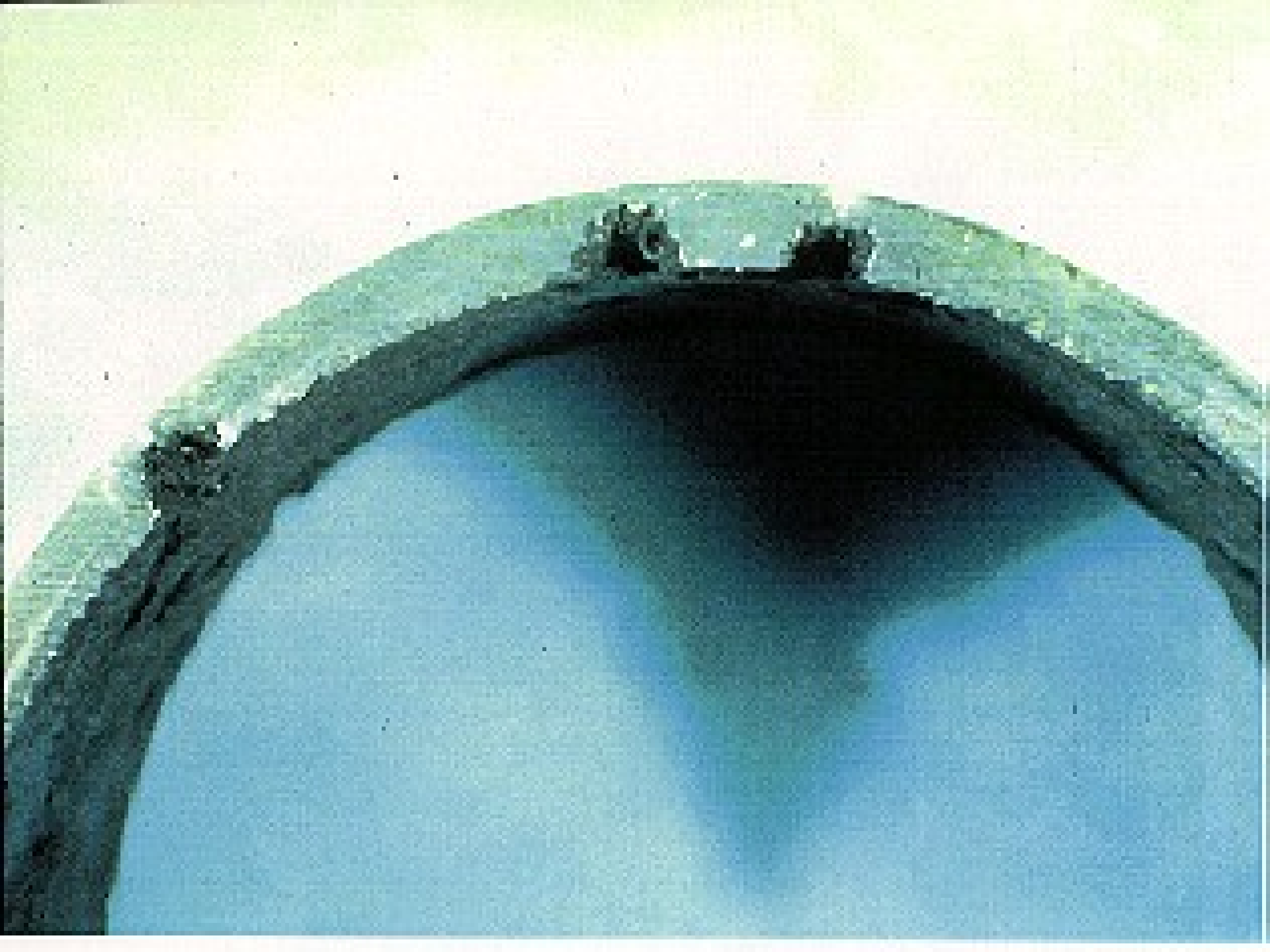
What to look for:

- Indications of corrosion concerns or lack of passivation
 - Inspection of economizer if the boiler has one and it is accessible (economizers will take the brunt of any oxygen attack first and foremost)
 - Steam blanketing corrosion



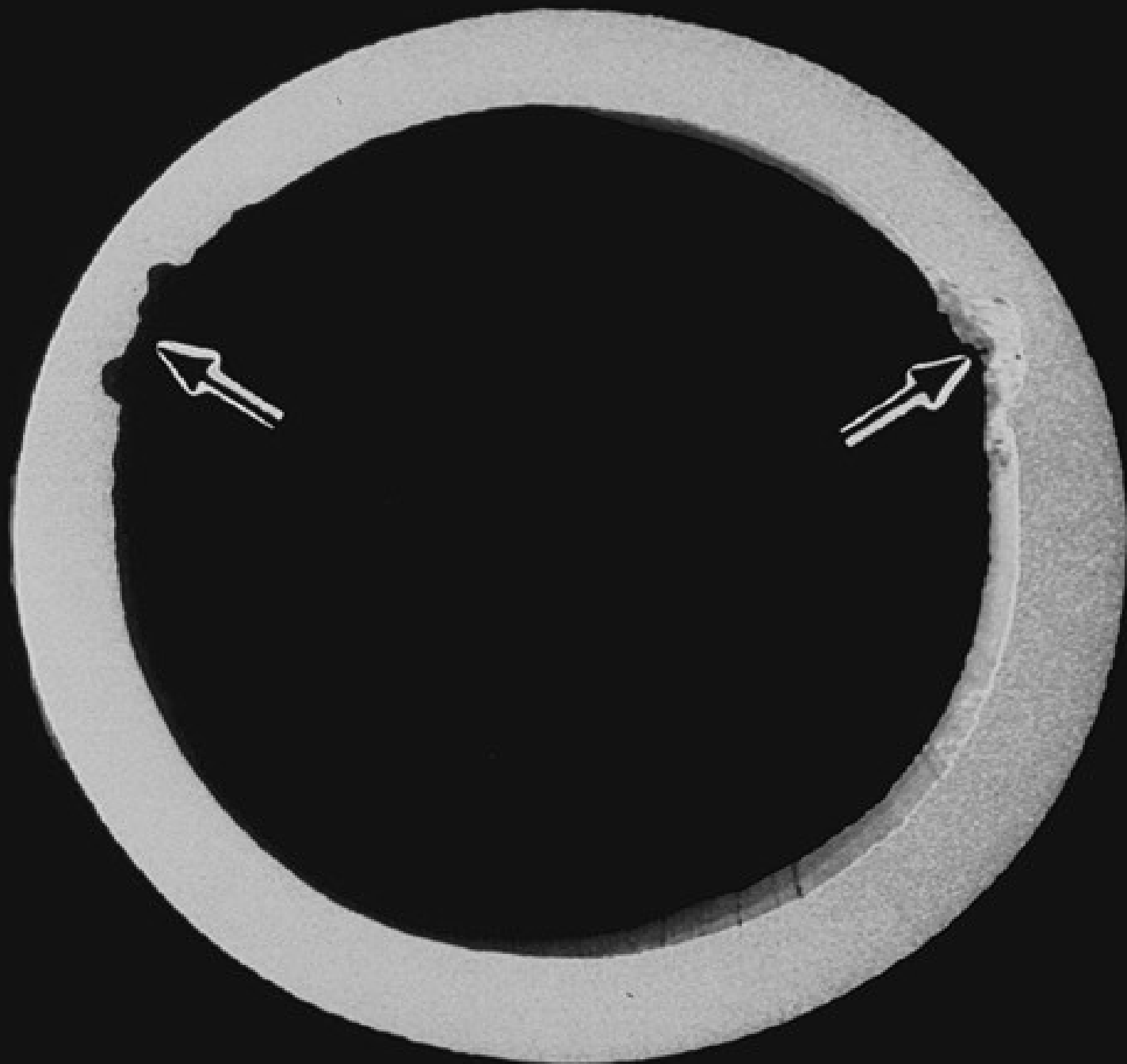
GE
Water & Process Technologies











Inspection Follow-up

- Discuss results and observations between the inspection team individuals (plant personnel, WT consultant, and insurance inspector)
- Send in deposit analysis samples if needed
- Send in any tube samples that have been taken for examination
- Also any TV camera footage should be reviewed by the team



GE

Water & Process Technologies

Inspection Follow-up

- Inspection report should be written by the Water Treatment Consultant to cover:
 - Photographic record of inspection
 - Any deposit analysis results
 - Recommendations that came out of the findings



Inspection Follow-up

- Bottom Line of, and for, the inspection
 - The boiler condition is relative to prior condition and conditions
 - Is it the same, better, or worse in condition based on the inspection results versus prior inspections?



Inspection Follow-up

- Bottom Line of, and for, the inspection
 - Does everyone on the team agree?
 - Does everyone agree on the future course of action to protect the boiler?
 - Group consensus and action plan needed



Inspection Follow-up (Best Practices)

- The three most important things for good follow-up:

- 1) Documentation
- 2) Documentation
- 3) Documentation

