



RECONNECT

SYMPOSIUM 2022

KNOWLEDGE • OPTIMIZATION • INNOVATION

Lessons Learned from LTA Studies on Pipelines in Urea Plants

Workshop 14th Stamicarbon symposium

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Question 1

What is LTA of HP piping?

Why is this activity important?

LTA and its Importance

- Not easy to perform thorough inspections on all piping during TA's
- Wide spread of pipelines in chemical plant (fragmentation of responsibilities)
 - Allocation of responsibility when pipelines cross battery limits
 - Including all piping in standard inspection program is costly (time and money)
- **Thus: Failures in pipelines are more likely to occur compared to static equipment!!**

LTA and its Importance

Inspection and maintenance of process pipelines needs a more systematic and streamlined approach

- Lifetime Assessment (LTA) based on Risk Based Inspection (RBI) methodologies
 - Thorough understanding of failure modes
 - Involve all stakeholders, also third-party contractors
 - Incorporate learned, new insights into inspection program i.e., living document.

LTA and its Importance

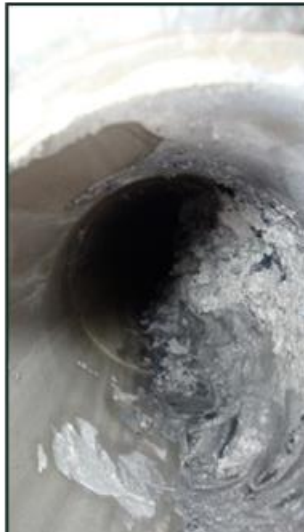
Process and deliverables

- a) Identified risk drivers / possible failure modes/ risk ranking
- b) Determine monitoring locations
- c) Select/determine inspection methods
- d) Review results/corrosion rates
- e) Risk mitigation factors?/ re-rank lines
- f) Determine inspection intervals

Question 2

In case of an upset in the synthesis section, how are affected piping treated?

Treatment of Piping Affected by Upset Conditions

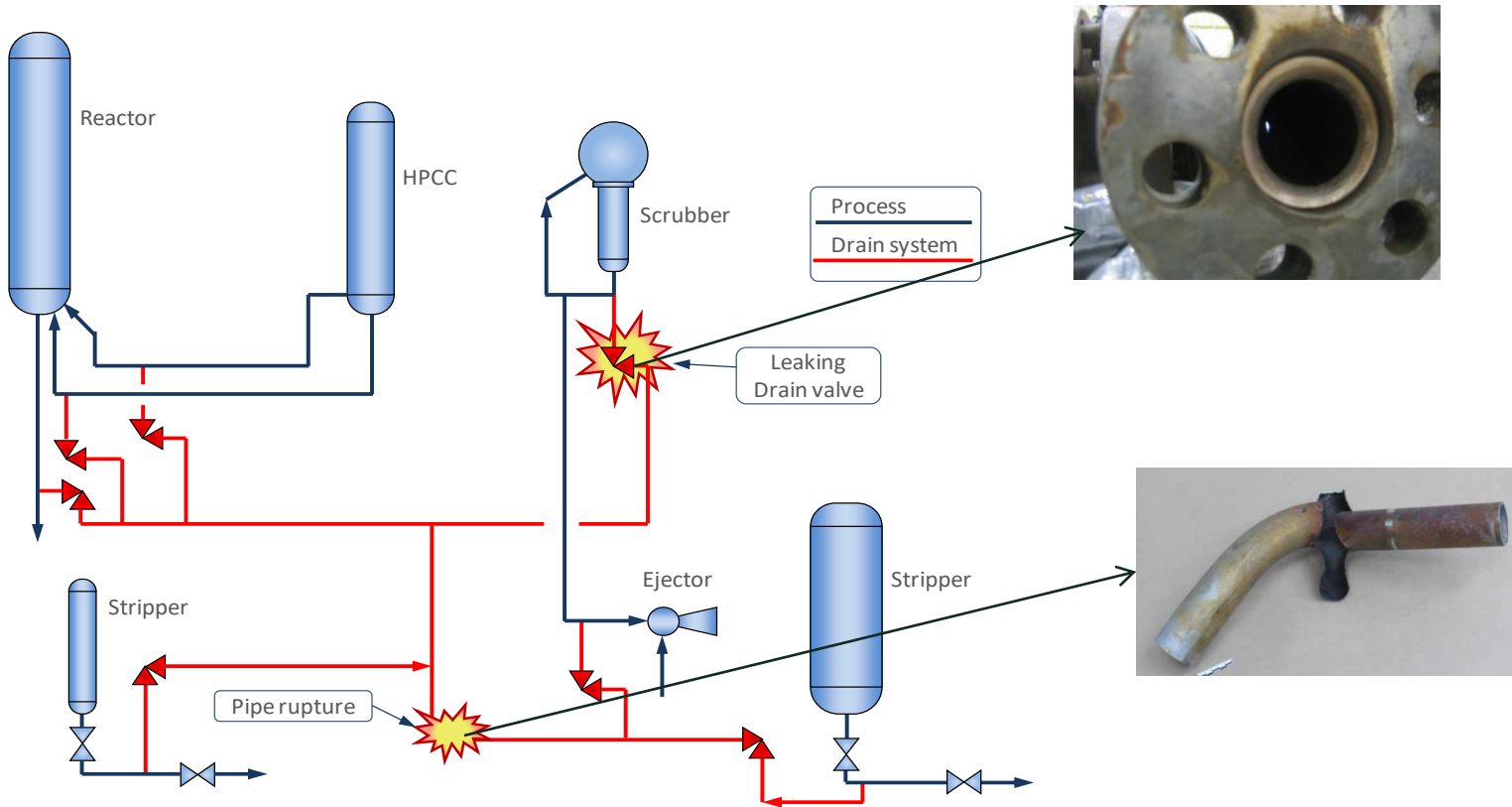


- Affected HP Equipment and piping should be cleaned and **inspected**
- Cause of upset condition(s) should be determined
- Can upset trigger a failure mode for piping?
- **If yes: inspection plan of affected piping should be updated!**
- In images shown, Stress Corrosion Cracks at process side led to failure

Question 3

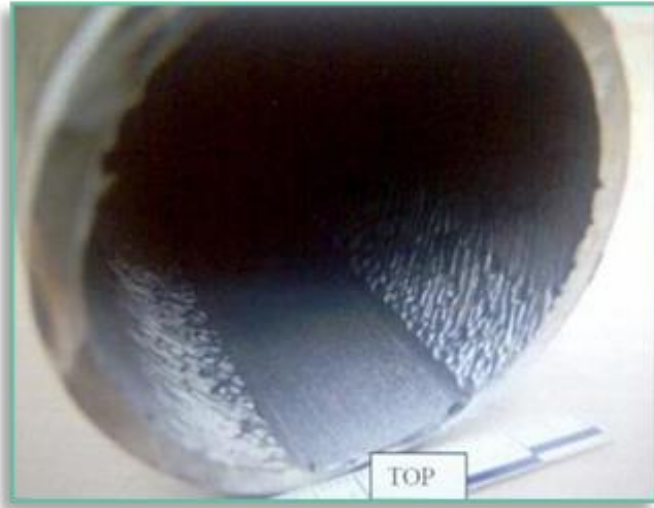
Should drain lines be part of a LTA?

Drain lines



- Leaking block valve
- Drain line over-pressurized with steam condensate. **Stagnant conditions created!**
- MOC: 316L not urea grade
- Drain system not part of inspection plan

Drain lines



- Local heating by tracing can cause localized thinning

Incorporate drain system in inspection program

Avoid direct contact steam tracing with piping

Material quality of MOC of drain system should be given more thought

Question 4

What about pipe fittings?

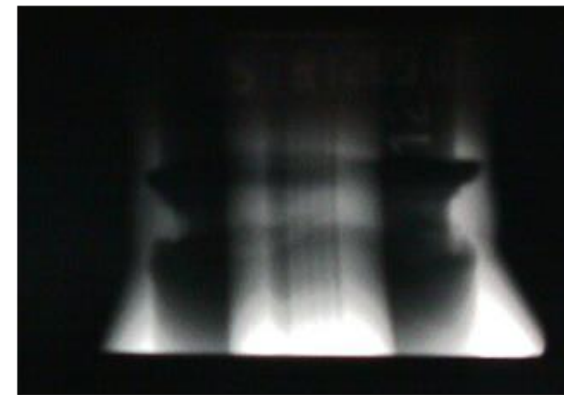
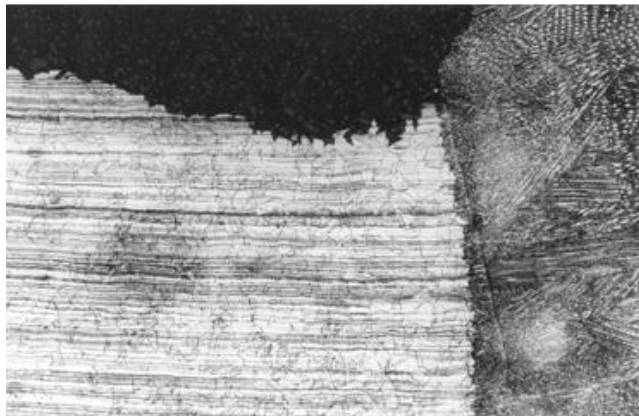
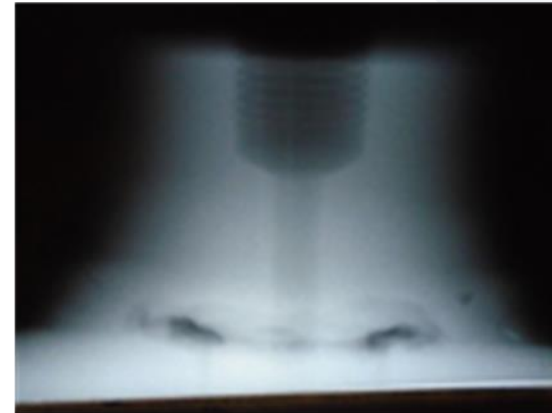
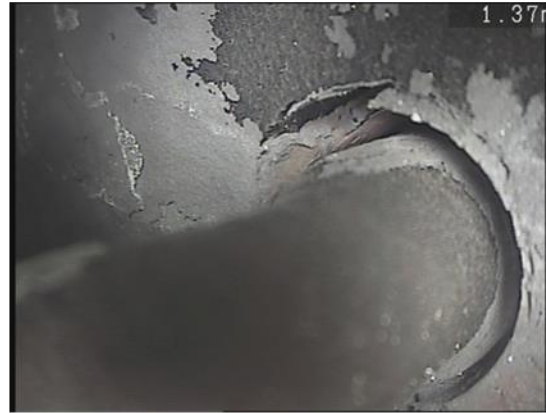
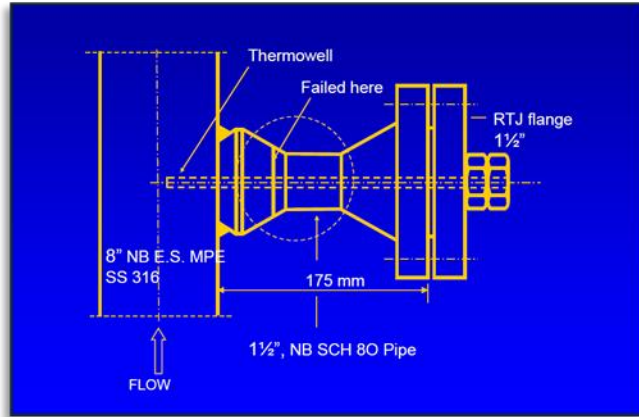
Valves

Weld-o-lets

Spacers for traced lines

Etc.

Pipe Fittings



Pipe Fittings

- Include PMI checks during plant construction
- Include PMI checks in inspection plans
- Include appendages in inspection program (i.e. On-stream radiography)

Questions?



Thank you!