

Incident:

Multiple boiler tube leaks developed in the interior chamber of the 900hp boiler resulted in an unplanned maintenance downtime.

What: 900 hp boiler tubing leaks

When: September 21, 2021

Where: Houston Terminal, US

Summary:

On Tuesday, September 21st, 2021, multiple boiler tube leaks in the interior chamber of the 900 hp boiler were reported at the Odfjell Terminals US (OTUS) Houston terminal. The boiler's operation was shut down immediately and the equipment was tagged/locked out. Maintenance began troubleshooting and evaluating repair options with the assistance of a third-party engineering company. The equipment failure resulted in Odfjell leasing a boiler to temporarily meet steam requirements for approximately three months.

Why did this happen?

The water level inside the boiler chamber is controlled by instrument relays. There were intermittent issues with the low-level water cutoff instrument causing an inefficient water level that was used to protect the tubes while the boiler is operating creating steam. As a result of the low water, boiler tubes that were not immersed in the boiler water, the excessive heat expanded the tubes creating the tube leak inside the boiler. Additionally, a severe scaling buildup had occurred on the lower portion of the lower tubes because of a less than adequate daily blowdown process resulting in corrosive pitting, further compromising the integrity of the tubes.

What went well?

- Completed full evaluation of boiler system
- Installed a new control system
- Experienced no Maintenance issues last 6 months

Related essentials / Directives / Procedures:

- Equipment Reliability Program
- Standard Operating Procedure
- Operator Training
- Operational Philosophy
- Automated Process

Lesson learned and follow-up for each site

- Perform GAP analysis on preventive maintenance program and develop Maintenance Plan (for equipment & instrumentation) including monthly/quarterly/annual inspections on the boiler by issuing a contract to the selected vendor **(Q4 2022)**
- Review and re-train all utility operators on updated boiler start-up/shut-down and layup procedures **(completed)**
- Re-train utility operators on the blow-down process by verifying conductivity analyzer is 100% operational **(completed)**
- Complete monthly analyses on incoming water to the DA (Deaerator) Tank. Record and compare samples were taken at different locations such as upstream/downstream of water softener, feedwater, and boiler and evaluate results implementing improvements **(completed)**
- Ensure the system runs in AUTO (instead of MANUAL) from all aspects to ensure proper functionality of the system and determine best method **(completed)**
- 2022 capital expenditure project will provide visibility of the boiler's functional state in the control room and the maintenance shop **(Q4 2022)**
- New coiler will be installed and commissioned by end of 2022 and will be utilized as the primary with the existing 900hp boiler used as a backup **(Q4 2022)**

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