LFI: Flange Fire at the Catalyst Reduction Unit

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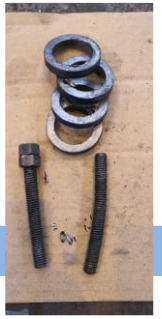
1. What happened?
2. Why did it happen?
3. What were the learnings?

What happened?



On the 3rd of October 2020 at approximately 09:40 after the completion of catalyst reduction cycle, during the cooling down period, a flame was noticed at the bottom flange of one of the butterfly control valves X on the hydrogen reactor. The outside production operator activated the manual fire alarm and the unit was shut down as per emergency procedure. It took approximately 10 minutes to extinguish the fire with a fire extinguisher and water. The unit was then swept with high pressure nitrogen. There were no injuries nor major equipment damage that occurred.

Fire damage to Instrumentation lines and fire blanket at 11-KV1030D

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Why did it happen?

1.Incorrect installation of the Instrumentation Control valves

Upon the removal and stripping of the valve, it was observed that the bolting of the valve was compromised. The washer packing was also very tight (no spring memory resistance). There was also no consistency on the valve installation and upon inspection it was found that one of the bolts was still loose after the valve was reinstated in the plant.

Mechanical failure on the gland packing of the valve resulted in hydrogen leak and ultimately the fire.

2. Inadequate start-up or leak test procedure

Although the conditions were met with the introduction of Hydrogen and the set pressure was met as per the start-up procedure it is however open to interpretation as to which flanges need to be soap tested for leaks.

3. Inadequate response time to DCS alarm

The alarm report showed that the first initial alarm of Control Valve X not closing came on approximately 30 minutes prior to when the manual fire alarm was activated. The response time of the DCS operator therefore needs improvement.

Recommendations for Improvement

1. **Review and update the installation procedure for the unit control valves.**

The installation process of the above mentioned valves needs improvement. An installation checklist needs to be drafted to ensure that all requirements are met.

2. Review the start-up and leak test procedure.

The current procedure was observed to be vague and open to interpretation, the steps and actions needed to be clearly identified. A list of the flanges that need to be soap tested needs to be included as a checklist in the procedure.

3.Improve the response time to DCS alarms

Alarm rationalization of critical alarms of the unit needs to be considered. The response time to critical alarms needs to be improved and DCS operators need to be aware of these alarms. Further investigation is required with regards to the priority of the DCS alarms.

Thank You…

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