Learning the lessons - retrospective HAZOPs

Abstract
This paper provides operators of up-stream oil and gas assets an over view of some of the lessons learnt from a range of retrospective full Hazard and operability studies (HAZOPs).

The Baker report into the Texas City incident highlighted the need for robust Process Hazard Analysis. This strengthened an already growing understanding for the need to re-validate the hazard identification for existing assets. HAZOP is recognized as a systematic methodology for the identification and initial assessment of process hazards. As a result full retrospective HAZOPs have now been undertaken for a number of upstream oil and gas facilities over the past few years. This paper aims to share the learning from these retrospective HAZOPs of existing installations. Key areas are a) How to do it better: taking into consideration that HAZOP fits into a wider Process Safety Structure, need for plant /process experience, preparation and the raising of recommendations/actions, close out of recommendations/actions, etc b) Some common themes identified from the HAZOP exercise: such as with, losses in knowledge, flare systems, Level instrumentation, Drainage/effluent systems, utility systems, methanol systems, redundant equipment, MOC failures, reliance on operators and procedure failures, aging equipment (isolation).

This paper also details potential ‘what next’ for PHA Hazard identification, as the effort and commitment to periodic full retrospective HAZOPs is considerable. However, the consequences for organizations in not remaining vigilant on changes to their asset Hazards can be significant.

Introduction
Full retrospective HAZOPs have been undertaken for a number of up (and down) stream oil and gas assets in order to re-validate the safe operation of an asset. The importance of adequate Process Hazard analysis has been indicated in the Baker report following the Texas City incident. The need to revalidate process hazard analyses has also been identified and is detailed in the CCPS book on revalidating Process Hazard Analysis, which includes HAZOP as a suitable methodology. HAZOP provides a structured approach to process hazard analysis, as indicated in the Mogford report, which if carried out correctly should ensure that hazard scenarios and their associated safeguarding measures are identified.

The main reason for revalidation is that Hazards change and in general the understanding of Hazards also increases. The acceptability of the associated hazard risks also decrease over time. The following factors can all lead to a requirement to revisit the Process hazard analysis of an asset:

- Operational learning - the original design and/or operational basis is shown, in practice, to be incorrect.
- Incidents - both directly on the installation, but also in similar/ third party operations
- Process changes - changes in composition/ concentration, Pressure/ temperature/ flow, new equipment (new modules / tie-backs, etc, start up / shut down rates, etc
- Management changes - Reduced manning, move to automatic operation, move to man-u-matic (as a result of instrument failures for example), Increased maintenance requirements, Change in ownership, etc
- New Knowledge - New corrosion knowledge, new environmental knowledge, revised fire/explosion knowledge, Hydrate modelling.
- MOC/ previous PHA failures - too specific without reviewing wider implications, incomplete coverage, etc
- Regulatory changes - the need for through reviews, new regulations (risk based), changes in public perception.
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PetroWiki was initially created from the seven volume Petroleum Engineering Handbook (PEH) published by the Society of Petroleum Engineers (SPE).
For a start a lessons learned is typically done at the end of the project. Sometimes a few weeks after. To my mind this has several effects; the team have typically worked themselves into a frenzy to complete the project, are exhausted, and don’t want to think about, let alone talk about, the project. Whilst there may be lessons that future projects can learn from, beyond the superficial, they tend to be caught up in the stress at the end of the project. The conversation is typically traumatic and cut to the quick. By contrast, agile retrospectives happen at the end of every sprint so are only ever a few weeks apart; you really have to work hard to build up hatred in that amount of time. So, whilst there will be issues, they tend to be smaller and less angst filled.