ABB were asked to carry out a HAZOP review of a number of the customers offshore facilities. The intention of this review was to identify if changes in process or utility systems, fluid compositions and operating / maintenance arrangements had introduced new hazards to the SNS assets since its installation and various upgrades over the years. The study also helped the customer to comply with the five yearly review cycle to meet corporate requirements and the health and safety executive’s review of the safety case.

Reviewing the installation comprehensively and systematically by HAZOP study is intended to establish whether process and utility systems are able to perform in a safe manner under all reasonably foreseeable scenarios, including normal operating modes e.g. start-up, shutdown, emergency shutdown, as well as special operations, such as pigging, flushing, etc.

It could also identify:
- Omissions in procedures / maintenance / inspection / verification
- Degradation of safeguards over time
- Changes in the manner in which the facilities are used
- Other changes creeping in
- Step changes that have not been formally identified and managed
- Lack of compliance with the customer’s asset integrity principles

The HAZOP review outcomes will also be used to enhance facilities and update reports / procedures / drawings and other documentation.

ABB was selected based on its expertise in hazard identification and risk assessment and process safety. ABB were asked to carry out a re-validation HAZOP in 2010. The standard ABB revalidation methodology was adapted to customer requirements including an assessment of safety critical procedures. Further revalidation using the same approach was requested in 2011 and 2012, including detailed assessment of a selection of safety critical procedures using ABB’s methodology.
**Solution**

The initial requirement was to identify all the credible major accident hazards related to the SNS assets with the information then used by specialist staff to update the safety case report. ABB advised the use of HAZOP re-validation on all the platforms, providing a time efficient and structured method to identify credible scenarios.

A series of HAZOPs covering all platforms were carried out during 2010-2014, led by an ABB specialist with a team of experienced the customer’s technical and operations staff. The scope meeting set the scene by gathering information on the systems to be included in the review, hazardous properties of substances, emergency facilities, and the history of process safety incidents on the platforms. Using process P&ID’s, team based sessions were carried out to identify potential ‘loss of containment’ events on each system on the platforms.

For each credible event, the severity was estimated, the existing risk control measures for prevention and mitigation were identified, and the resultant likelihood and risk assessed using the standard customer risk matrix. The review was used to confirm that relevant good practice was being followed, and resulted in several recommendations for further assessment of hazards or improvements to risk control systems. The value of routinely reviewing and revalidating process safety assessments became apparent during these studies, demonstrating the continuous efforts to drive down risks.

At the end of each day, the key findings were reviewed, partly to summarise and partly to check if any risk actions had been identified that need to be acted on immediately.

Several younger engineers were involved as ‘observers’ to help improve their understanding of the HAZOP process and process safety considerations in general.

**Benefits**

- Reduced risk of incidents through effective identification of all credible major accident hazards
- Regulator safety case requirements satisfied
- Effective and time efficient periodic reviews fully utilising the knowledge and experience of platform staff
- Continuous improvement in the control of process safety risks on the platforms, building in the learning based on new knowledge and experience
- Effective close out of the actions raised during process safety studies

“I would like to thank ABB, for this work.”

“Some highlights of the HAZOP re-validation are:

- High risk items were immediately brought to our attention while the HAZOP was in progress, enabling us to take immediate action
- Resourcing the HAZOP team with a good asset process engineer and good operations representative has always been a challenge, and ABB have been very flexible in accommodating us
- The post-HAZOP peer review (CPUK procedure requirement) made no significant changes to the HAZOP findings, indicative of a good quality review
- Most importantly, having closed all the significant (and higher) actions on all but the two most recent HAZOP reviews, we’ve made a noticeable reduction in overall plant risk and are continuing to do so
- It was valuable knowledge sharing (we sent some of our younger engineers to attend as guests because these HAZOP reviews were regarded as examples of how it should be done)
- The experience enabled us (Process Engineering) to facilitate an update of the HAZOP procedure, making our systems more robust”

Process Engineering Supervisor, UK Integrated Operations EM&R