Early-on HAZOP (PHAZOP) Advocation: Best Practices
Building from the Past to the Future in Integrity Management

Bob Wittkower, Dr. Binder Singh, Dr. Paul Jukes, Adriana Botto,
Megan Hull, David Kehn*
J P Kenny, Inc./Wood Group Integrity Management/MCS Kenny
*affiliated Chevron
bob.wittkower@jpkenny.com

ABSTRACT

The development and use of the fundamental risk assessment process, the HAZOP (Hazards and Operability Study), has been the subject of numerous articles and books and subject matter content in university textbooks. The origin and development of the HAZOP was, in fact, discussed by the noted safety author, Trevor Kletz, at the 2009 Texas A&M MKOPSC Symposium, and in particular, Kletz stated the one aspect he would do differently, if he could do it over, would be to add a HAZOP earlier in the design process. This Early-on HAZOP, and which is called an End of FEED HAZOP, PHAZOP (preliminary HAZOP) or even concept stage HAZOP can be an essential tool to finding hazards sufficiently early on in the design process to have appropriate design changes made to mitigate the findings of this PHAZOP.

The risk assessment process is conceptually and practically flawed but is the best tool that we have to identify hazards which are inherent in all production processes and facilities. At the end of the risk assessment process the quantification of residual hazards not detected is unknown. The theoretical limit of not knowing what hazards exist is 100%. The certainty of what is known is 100% but the exact determination of residual risk after risk assessment studies, reviews or checklists can never be determined.

The authors’ use career experiences while offering rational pragmatic options illustrated through case histories for the advocacy of the PHAZOP as a key early-on risk assessment tool. Conclusions and recommendations are offered for predictions, interpretations, and viable solutions. The newer methods of ‘concurrent design’ and inherently safe design are discussed in the context of mechanical, materials, and corrosion engineering.

Inherently Safe Design, as well as, Corrosion and Integrity Management has evolved largely over the past 30 years or so. The modes of failure such as loss of material properties, corrosion, erosion, environmental cracking are critical in deepwater projects. This is due to repair, retrofit, or re-habilitation being costly, or impossible. Early recognition and inclusion of these aspects and knowledge base is arguably the best way forward early in the design process. Purposeful design investment at CAPEX is vital rather than at OPEX, and the ‘gray’ zone between the two cost centers must be therefore be better reconciled.