
Delta HAZOP Reviews at Imperial Oil Refining & Chemicals

**Syed I Ahmed
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Delta HAZOP Reviews at Imperial Oil

- **BACKGROUND**

- A formal program of periodic, detailed HAZOP reviews was initiated in 1992
- Required by Imperial Oil's Operations Integrity Management Framework
- All Refining & Chemicals facilities - Process, Offsites and Infrastructure - are reviewed on a five year cycle
- Resources committed are significant
 - A team of up to five experts (technology, design, operations, process engineering, risk assessment) were dedicated full time for up to two weeks on each HAZOP review
 - Part time participation by key maintenance, inspection, I&E, rotating equipment, environmental management and IH personnel
 - 22 to 25 reviews each year

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- **BACKGROUND (cont'd)**

- The review team uses ExxonMobil's 'Knowledge-Based HAZOP'
 - a meticulous, detailed process which includes
 - a line by line review of P&IDs for identification of potential deficiencies, failure modes and associated risks
 - interviews to gather information from and concerns of key site personnel
 - review of incidents and near misses since the last HAZOP review
 - site visits to assess facility condition and control of hazards
 - review of documentation and maintenance of safety critical equipment and devices and safety critical procedures
 - categorization of all identified risk scenarios using IOL Risk Matrix

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- **BACKGROUND (cont'd)**

- By 2002, HAZOP reviews were in the third cycle
- For facilities where little or no change had occurred, fewer and mainly lower risk items were being identified
- Also by 2002, Operations Integrity Managing Systems (OIMS) were firmly entrenched at all Imperial Oil sites and was driving diligence in
 - follow-up and resolution of HAZOP identified risks
 - timely inspection and maintenance of equipment, especially safety critical equipment
 - using a prescribed Management of Change (MOC) process to document, assess, approve and manage the risk of all changes
- as well as in all other OI areas such as documentation of procedures, facilities design and construction, personnel training, etc.

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- **The Delta HAZOP Concept**

- In delta HAZOPs, the review process and team membership remain the same but the review is focussed only on CHANGES made since the last HAZOP
- Diligent compliance to OIMS MOC documentation requirements was key to creating the conditions for considering the use of the ‘delta HAZOP’ methodology
- The MOC history related to the facility enables the identification of all changes such as to the physical facilities, feed rates and compositions, operating conditions, operating envelope, operating procedures, chemical injections, maintenance practices, staffing and training, P&IDs, applicable design standards and regulatory requirements, loss prevention goals, new risk perceptions
- A knowledge-based review process is used, as for the detailed HAZOPs, to identify (i) the impacts of the changes on previously identified risks and their mitigation and (ii) new risks that may have been created by these changes

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- **Learnings From Use of Delta HAZOP Methodology**
 - Methodology was tested to compare risk identification with a parallel detailed HAZOP review
 - Results confirmed effectiveness of delta HAZOP on units where a quality detailed HAZOP had been previously conducted, identified risks had been addressed and all changes were well documented
 - Used on two IOL offsite facilities in 2004 and in 2005. Time required to prepare for the review and to assess the individual changes during the review increased vs detailed HAZOPs.
 - Overall, time saved was still significant, mainly due to the small number of well documented changes. Changes made were not very complex.
 - Incentive for Delta HAZOPs is low if number of changes is large, or if changes are not well documented or significant incidents have been experienced at the facility