GENERAL FACTSHEET

Retrospective Hazard Review (RHR)

RHR is a team based risk assessment for existing high hazard facilities that ensures continuous improvement by assessing operations against the highest possible process safety standards.

RHR is ABB's preferred risk assessment approach for existing facilities that maximises the value of operational experience whilst maintaining a clear focus on major accident hazards. Reviews can be conducted using ABB's Process Hazard Review (PHR) or retrospective HAZOP methodologies. The reviews have a structured system-by-system (PHR) or line-by-line (HAZOP) approach focusing on hazardous events with the potential to cause significant harm to people, the environment or the business / reputation. ABB's unique PHR approach is higher level and more time efficient, focussing on loss of containment and release of energy events, but some companies may require the more detailed HAZOP studies for full re-assurance.

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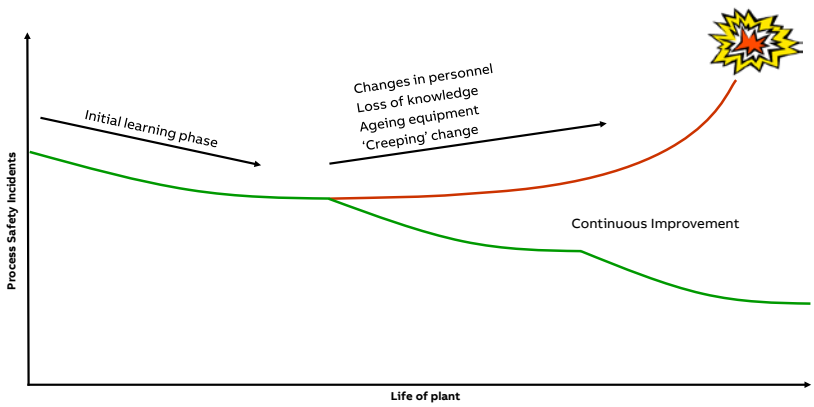
The need for retrospective HAZOPs.



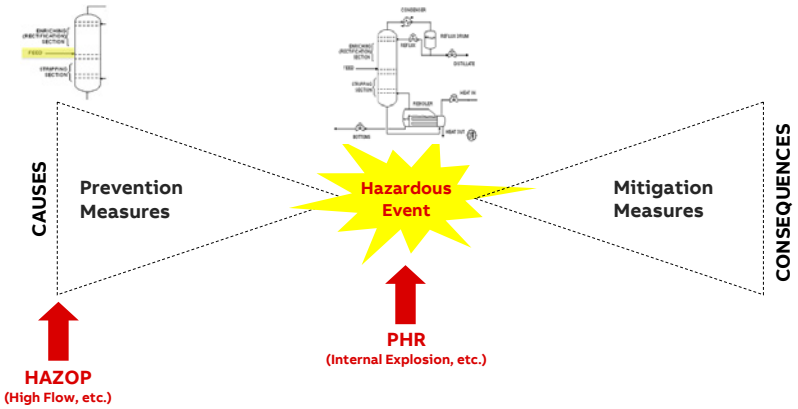
Companies are under increasing pressure to achieve continuous improvement in process safety whilst minimising the associated costs. Periodic reviews are an essential part of achieving improvements and if done effectively can offset a potential drop in process safety performance on existing facilities.

With ageing assets, tighter standards and increasing stakeholder expectations, companies need to find a time efficient methodology to ensure that all resonable measures are being taken. These retrospective reviews require key input from busy operational staff, and where availability of knowledgeable staff for an extended period is a challenge, ABB's PHR method provides benefits over the more detailed HAZOP approach.

Retrospective reviews are designed to meet the requirement for periodic reviews of major accident hazards under the EU major hazards directive and for Process Hazard Analysis (PHA) revalidation in compliance with the US Process Safety Management (PSM) standard.

ABB's RHR methodology utilises a structured guideword-based approach, focusing on hazardous events related to loss of containment, release of energy or deviations from design intent, with the potential for significant harm to people or the environment.

The need for retrospective HAZOPs.



What we offer

ABB's RHR methodology utilises a structured guideword-based approach, focusing on hazardous events related to loss of containment or release of energy, with the potential for significant harm to people or the environment. RHR includes the following key steps:

- Identify foreseeable hazardous events
- Assess severity of potential consequences
- Review the robustness of existing safeguards
- Assess the likelihood and risk of the event
- Make recommendations for further risk reduction

This proven approach provides peace of mind that foreseeable process safety hazards have been identified and plans put in place to reduce the associated risks to a tolerable level. This is achieved by demonstrating that relevant good practice has been applied, in order to satisfy company and regulator demands.

RHR sessions are facilitated by an experienced ABB process safety specialist, and include client representatives such as process, control and mechanical engineers, senior operations personnel and other specialist disciplines. To assist the efficient running of the review ABB normally provides a technically competent scribe to record sessions using suitable recording software, e.g. PHA Pro or ABB's Excel based spreadsheet.

All hazardous events are risk ranked using a suitably calibrated risk matrix, either the company in-house version or ABB's standard risk matrix that has been calibrated against UK HSE risk tolerability criteria. This approach provides a risk prioritised set of recommendations to be produced, allowing resources to be focused in the right areas and for the greatest gain.

RHR also provides a 'baseline' risk assessment document which can be used for subsequent revalidation, typically at 5 year intervals. This ensures that the assessment is kept 'evergreen' thereby becoming a living document that reflects the current understanding of hazards and risks on a facility. The 'evergreen' RHR report provides a comprehensive major accident hazards risk assessment that can help support thorough reviews of onshore safety reports and offshore safety cases.

Benefits

- Provides assurance that major accident hazards are being effectively controlled
- Offers pragmatic and achievable recommendations
- Ensures operational learning is fully utilised in risk assessment
- Focuses on the risks associated with major accident hazards
- Satisfies company and regulator demands

Why ABB ?

ABB RHR leaders have an operational background and appreciate the need for pragmatic and achievable recommendations. ABB has helped many clients convert recommendations into effective actions by providing the necessary technical expertise and project management support to implement and close-out these actions in order to gain full benefits.

ABB has a long track record of carrying out RHR and subsequent revalidation studies in the high hazard process industries using both PHR and HAZOP techniques. ABB has a rigorous accreditation and refresher training scheme for all of its RHR leaders and technical scribes. ABB RHR leaders are also competent to facilitate related LOPA studies, allowing a seamless transition from the RHR hazard identification stage.

ABB is a proven leader in process safety, offering a wide range of consultancy and training services, which address the way in which people, plant and systems inter-relate to ensure effective Process Safety Management. As a follow-up to RHR studies ABB can provide further support including; SIL determination / LOPA, quantified risk assessment, pressure relief design, hazardous area classification, safety critical task analysis, RHR action closure management, etc.

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