Applying Risk Assessment to Overpressure Protection System Concerns

James Woodard, PHA Facilitator
Nancy Faulk, Process Engineer
Lloyd’s Register Celerity 3, Inc.

Vijay Shirsat, Protective Systems Manager
BP Texas City Refinery
Overview

- Introduction to Overpressure Protection System Concerns
- The Risk Assessment System Plan for Relief Systems
  - Assigning Risk
  - Developing a Course of Action
  - Follow Through
- Concluding Statements
Overpressure Protection System Concerns

Bhopal, India

Even disregarding issues of non-functional alarms and scrubber, wrong materials of construction, and improper operations, the flare system had only one quarter the necessary capacity.
Overpressure Protection System Concerns

• Risk-based process safety includes 20 elements (CCPS Guidelines)
  • One element is HIRA (hazard identification and risk analysis)
  • Hazard identified through:
    • Process hazard analyses as revalidations
    • Management of change procedures
    • Mechanical integrity reviews
Overpressure Protection System Concerns

• The concerns and action items resulting from HIRA often include overpressure protection and effluent handling systems
• Task then becomes evaluation of the tolerability of risks presented
• If many concerns exist, will need to prioritize them qualitatively
Overpressure Protection System Concerns

• The Risk Assessment System Plan for Relief Systems was developed to prioritize and make recommendations for such concerns.
• This plan has been used successfully for a year at the BP Texas City Refinery, in HIRAs performed jointly with Lloyd’s Register Celerity3, Inc.
• This talk outlines the plan and discusses applying it.
Assigning Risk

- Preliminary qualitative assessment performed to determine if the concern:
  - Short-term or long-term operation acceptable
  - More detailed analysis required
  - Swift action required
- Ensures correct level of analysis performed to reach a decision
Assigning Risk

- Determine a value of probability $P$ and the severity $S$ of the occurrence
  - Used values ranging from 1 (low) to 8 (high)
  - Experienced HIRA facilitator guides to correct value
- The risk value $R$ can be calculated as:
  \[ R = S + P - 1 \]
Assigning Risk

• Prioritization based on the risk value
  • Low priority $1 \leq R \leq 5$
  • Medium priority $6 \leq R \leq 7$
  • High priority $8 \leq R \leq 9$
  • Extremely high priority $10 \leq R$
Assigning Risk

• Establishing a detailed list of events, probabilities, and severities enables the team to make consistent and qualitative decisions.

• Helps eliminate discretionary decisions.
Developing a Course of Action

• Once \( R \) has been determined, a proper and consistent resolution should be followed

• The Risk Assessment System Plan for Relief Systems employs a flowchart to determine this course of action
Follow Through

• Prepare a thorough risk assessment report, including:
  • Potential concerns identified
  • $R$, $P$ and $S$ values
  • Priority
  • Recommendation
Follow Through

• Management should develop a system to ensure formal resolution
  • Implement the proposed change
  • Implement an alternative risk reduction measure
    or
  • Accept the risk and document the rationale
Follow Through

• The risk criteria should be:
  • Reviewed periodically
  • Revised proactively

• Basis for review:
  • Losses
  • Stakeholder expectations
  • Regulatory changes
Concluding Statements

• The Risk Assessment System Plan for Relief Systems is a methodology designed to:
  • Perform risk assessment
  • Assign priority ranking
• The HIRA facilitator and team determine if resolution is possible or if LOPA or other assessment technique is needed
Concluding Statements

• Recommendations can range from:
  • Resolution per work practices (low risk)
    up to
  • Approval of action items acceptable (high or very high risk issues)
Concluding Statements

- Management should develop a system to ensure formal resolution
- Hold periodic reviews and revise the risk criteria