Agenda

• What is Alarm Management?
• What is the Process of Alarm Management?
• What are Benefits of Alarm Management?
• What Services are Offered by General Vendors
What is Alarm Management

- Alarm management is the processes and practices for determining, documenting, designing, operating, monitoring, and maintaining alarm systems. (ANSI/ISA–18.2–2009, Clause 3.1.14)

- Characterized by the application of:
  - System design principles
  - Good engineering practices
  - Human factors principles
An alarm is an audible and/or visual warning message to the operator to which he must respond. It is generated by a process variable crossing a defined threshold into an abnormal, undesirable, or hazardous region.

An alarm is an intentional interruption to the operator.

An alarm is a demand for help from the process.
Alarm Management Lifecycle – ISA 18.2
Alarm Rationalization Project Execution

- Determine No. of Tags to Rationalize
- Prep work –
  - Review PHA/LOPA Results
  - Review SOL’s/COD’s
  - Collect Tag Info and Populate D&R Tool
- Training Session Options
  - Alarm Philosophy Development
  - ISA Standard Familiarization
  - D&R Training
- Rules of Engagement Session
Alarm Rationalization Flowchart

1-2 Days: Training
1-2 Days: Rules Of Engagement
10- Days: D&R Session 1 (Documentation and Rationalization)
10- Days: D&R Session 2
10- Days: D&R Session 3
Rationalization Process

1. Form Rationalization Team

Rationalization Team

Core
- Facilitator
- Experienced Operators
- Operations Supervisor
- Process Engineer

Supplemental
- I&C Engineer / Technician
- Health, Safety (Risk Management), & Environmental
- Risk Management
- Maintenance Supervisor / Technician
- Training Specialist
- Equipment Specialists
- Consultants as needed
Rationalization Process

1. Form Rationalization Team

2. Assemble Documentation

- **Documentation & Resources**
  - Alarm Philosophy
  - P&ID’s
  - Logic Diagrams
  - Operating Procedures
  - HAZOP’s / Process Safety Analysis (PHA)
  - Failure Mode and Effects Analysis (FMEA)
  - Safety Integrity Level (SIL) Assessments
  - Layer of Protection Analysis (LOPA)
  - Incident Investigations
  - Environmental Permits
  - Current Good Manufacturing Practice (cGMP)
  - ISO Quality Process
  - Packaged Equipment Manufacturer Requirements / Recommendations
Rationalization Process

1. Form Rationalization Team
2. Assemble Documentation
3. Rationalization & Documentation
   a. Select Alarms for Review

- Select Alarm(s)
  - MAdB Review
    - Common Elements
    - Method of Flows
    - Method of Elements
  - “Clean Slate”
  - Combination
Rationalization Process

1. Form Rationalization Team

2. Assemble Documentation

3. Rationalization & Documentation
   a. Select Alarms for Review

   b.1 Determine Priority (Consequences)
   b.2 Determine Priority (Time to Respond)

Priority – Relative Importance

- Consequence
  - Impact
  - Severity
- Maximum Time to Respond
  - Set point must be determined in order to give the operator sufficient time to respond.

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Urgency</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now (&lt; 5 min)</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Critical</td>
</tr>
<tr>
<td>Next (5-15 min)</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Critical</td>
</tr>
<tr>
<td>Later (&gt;15 min)</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Critical</td>
</tr>
</tbody>
</table>

Now
Next (5-15 min)
Later (>15 min)

Minor
Moderate
Major
Extreme
# Example: Consequence vs. Priority

<table>
<thead>
<tr>
<th>Safety</th>
<th>-</th>
<th>-</th>
<th>Safety Shower</th>
<th>Potential MTI or worse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental</strong></td>
<td>-</td>
<td>Minor release inside boundary</td>
<td>Significant release inside boundary</td>
<td>Notifiable release</td>
</tr>
<tr>
<td><strong>Production loss (examples)</strong></td>
<td>Lower efficiency, Increased fouling</td>
<td>Non-spared equipment has tripped</td>
<td>Non-spared equipment will trip</td>
<td>Downtime more than 1 week</td>
</tr>
<tr>
<td><strong>Equipment damage (examples)</strong></td>
<td>Pump damage (spare on)</td>
<td>Pump damage (no spare)</td>
<td>Damage to major equipment</td>
<td>Critical equipment destroyed</td>
</tr>
<tr>
<td><strong>Inefficient operation</strong></td>
<td>&lt; $50k</td>
<td>$50 to 100k</td>
<td>&gt; $100k</td>
<td>-</td>
</tr>
</tbody>
</table>

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Rationalization Process

1. Form Rationalization Team

2. Assemble Documentation

3. Rationalization & Documentation
   - a. Select Alarms for Review
     - b.1 Determine Priority (Consequences)
     - b.2 Determine Priority (Allowable Response Time)
   - c. Required Documentation

• Alarm Response
  - Cause
  - Corrective Action
  - Confirmation / Verification
Rationalization Process

1. Form Rationalization Team

2. Assemble Documentation

3. Rationalization & Documentation
   
   a. Select Alarms for Review
   
   b.1 Determine Priority (Consequences)
   
   b.2 Determine Priority (Allowable Response Time)

   c. Required Documentation

   d. Other Attributes or Documentation

• Other Alarm Attributes
  - Class
  - Description
  - Alarm Message
  - Destination / Routing
  - Linkage to other documents
Rationalization Process

1. Form Rationalization Team

2. Assemble Documentation

3. Rationalization & Documentation
   a. Select Alarms for Review
      d. Other Attributes or Documentation
      c. Required Documentation
      b.1. Determine Priority (Consequences)
         b.2. Determine Priority (Allowable Response Time)
Alarm Rationalization Steps

• Intersection of Safety & Alarm Management
  – Develop Consequence and risk ranking for Health/Safety, Environmental and Commercial impacts
    • From Alarm Philosophy Document
  – Primary Cause
  – Operator Corrective Action

• ORT (Operator Response Time)
• TTE (Time To Event)
  • ORT Explained.pptx

• Alarm setpoint
• Priority
• Advanced Alarming
  – Masking
  – Grouping
  – Overriding and Reason
Alarm Rationalization Steps

• ORT (Operator Response Time)
• TTE (Time To Event)
  • ORT Explained.pptx
• Alarm setpoint
• Priority
• Advanced Alarming
  – Masking
  – Grouping
  – Overriding and reason

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Typical Alarm Management Services

• Training
  – Principles of Alarm Management
  – Rationalization Process
• Alarm Philosophy development
• Alarm Philosophy Gap analysis
• Alarm Rationalization Facilitation
• Updating and harmonization of PSI documentation
Questions?