Assessing Workplace IH Hazards Using Qualitative Risk Assessment

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Presentation Overview

- Qualitative vs. quantitative (IH) hazard assessments
- Qualitative hazard assessment process
- Real-world scenarios
- Benefits and limitations of qualitative hazard assessments
- Role of qualitative hazard assessments in your overall EHS-MD program
U.S. Workplace Injuries and Illnesses

- ~3 million private sector OSHA recordable injury and illness cases in 2011
- More than one-half of these cases were more serious (DART)
- Mid-size companies (50 – 250 EEs) had the highest incidence rates
- Notable industries/sectors include:
  - Manufacturing
  - Construction
  - Education and Health services
  - Transportation
  - Services
Common Industrial Hygiene (IH) Hazards

- Chemical Agents
- Biological Agents – viruses, mold, bacteria
- Noise
- Non-Ionizing Radiation – microwaves, RF, EMF, lasers
- Ionizing Radiation – alpha, beta, X-rays
- Heat & Cold Stress
Industrial Hygiene Fundamentals

- **Industrial Hygiene** – anticipation, recognition, evaluation, and control of occupational hazards
- **PEL** – Permissible Exposure Limit (OSHA)
- **OEL** = Occupational Exposure Limit (ACGIH, NIOSH, AIHA)
- **Engineering Controls** – Modifications to workplace equipment, processes, or materials which reduce exposures (e.g., ventilation, enclosures, isolation, substitution)
Industrial Hygiene Fundamentals

- **Exposure** – Contact with a chemical, physical, radiological, and/or biological agent
- **Risk** = Severity x Probability
- **Risk Assessment** - A logical and objective approach to gathering, analyzing and interpreting information/data with the purpose of predicting potential adverse effects
Qualitative vs. Quantitative Assessments

- **Qualitative Exposure Assessments** - Evaluation of *potential* personal exposure(s) to workplace chemicals, physical, radiological, and/or biological agents based on process information, known workplace conditions, and professional judgment.

- **Quantitative Exposure Assessments** - Evaluation of *actual* personal workplace exposure(s) to chemical, physical, radiological, and/or biological agents using *recognized measurement techniques*, process information, known workplace conditions, and professional judgment.
Basic Qualitative Exposure Assessment Process

1. Determine Objective
2. ID Your Team
3. Collect Information
4. Exposure-Risk Assessment
   - Acceptable
     - Document
     - Reassess as needed
   - Uncertain
     - Document
     - Further Info/data Collection
   - Unacceptable
     - Document
     - ID Hazard Controls

Communicate as needed.
Determine Your Assessment Objective(s)

- Demonstrate compliance with OSHA standard or other OEL
- Verification of worker compensation claims alleging health effects due to exposures
- Determining need for engineering controls
- Verification of effectiveness of engineering controls
- Reassurance for workers that the workplace is safe
- Establishing a program for periodic monitoring and re-monitoring
- Selection of appropriate respiratory protection or other PPE
Who Should be Involved?

- IH/safety professionals
- Employees familiar with operations
- Supervisors & managers
- Medical professionals
- Safety committee members
- Human Resources
- Legal
Information to Request & Collect

- ID Work Task(s) and operations – SOPs, JHAs, job description, MSDS
- ID Agents: chemical, biological, radiation, other & exposure routes
- Regulatory requirements (PELs, OELs)

- Effects: symptoms, chronic and acute, local & systemic, etc.
- Previous IH data & exposure monitoring
- Related Injury/illness/incidents
Information to Request & Collect

- Inspection/observations:
  - Agent use – quantity, duration, frequency
  - Normal, startup, shut down,
  - Infrequent tasks (maintenance, clean-up)
  - Hazard controls
  - PPE
  - Exposure routes

- Employee(s) interview - concerns, training, behavior

- Equipment records
  - Ventilation survey
  - Interlock test
## Frequency of Hazard / Exposure

<table>
<thead>
<tr>
<th>Description</th>
<th>Definition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>Daily</td>
<td>A</td>
</tr>
<tr>
<td>Likely</td>
<td>Weekly</td>
<td>B</td>
</tr>
<tr>
<td>Occasional</td>
<td>Monthly</td>
<td>C</td>
</tr>
<tr>
<td>Rare</td>
<td>Annually</td>
<td>D</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Once per 5 years or more</td>
<td>E</td>
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## Severity of Hazard / Exposure

<table>
<thead>
<tr>
<th>Description</th>
<th>Definition</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>Single or multiple deaths. Severe operational difficulties. Site closure.</td>
<td>1</td>
</tr>
<tr>
<td>Severe</td>
<td>Severe injury or disease. Potential mortal disease. Loss of critical equipment. Severe reputational damage.</td>
<td>2</td>
</tr>
<tr>
<td>Moderate</td>
<td>Minor injury or disease. Irritation. Loss of productivity.</td>
<td>3</td>
</tr>
<tr>
<td>Negligible</td>
<td>No expected injury or disease. No significant impact on production.</td>
<td>4</td>
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## Risk Assessment Matrix

<table>
<thead>
<tr>
<th>RISK ASSESSMENT MATRIX</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequent</td>
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<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Catastrophic</td>
<td>1A</td>
</tr>
<tr>
<td></td>
<td>2A</td>
</tr>
<tr>
<td>Severe</td>
<td>3A</td>
</tr>
<tr>
<td>Moderate</td>
<td>4A</td>
</tr>
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- **Halt process Immediately. Immediate Action Needed.** Critical
- **Consider delaying process. Provide temporary controls/PPE until permanent controls ID’d.** High
- **Provide temporary controls/PPE until permanent controls ID’d.** Medium
- **Consider optional control methods.** Low
- **No further action warranted.** Reassess As Needed
Planning: Hazard Control & Assessment

- Follow hierarchy of hazard control
  1. Substitution/elimination
  2. Engineering
  3. Administrative
  4. PPE

- Plan for additional action, necessary resources
  - Follow-up qualitative assessments
  - Quantitative assessments (IH monitoring)
  - Procedure modifications, development
  - Process shutdowns, capital expenses
  - Employee training
## Area Tool Task

<table>
<thead>
<tr>
<th>Area</th>
<th>Tool</th>
<th>Task</th>
<th>Inspection / Observations / Assessment</th>
<th>Process-specific Info</th>
<th>Frequency Hazard (Frequent, Likely, Occasional, Rare, Unlikely)</th>
<th>Severity Hazard (Catastrophic, Severe, Moderate, Negligible)</th>
<th>Overall Risk Rating (Critical, High, Medium, Low, Reassess as Needed)</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>Chem Sink</td>
<td>Pouring/mixing</td>
<td>IPA, Acetone: Irritation, CNS (MSDS attached)</td>
<td>1 employee pours 2 gallons of IPA and Acetone in container, 15 minutes on benchtop, 1x week, no ventilation, EE</td>
<td>Likely</td>
<td>Moderate</td>
<td>3B - Yellow</td>
<td>IPA: 400ppm, 500ppm STEL; Acetone: 500ppm, 750ppm STEL</td>
</tr>
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Cal-OSHA Exposure Limits:
- 8-hr PEL-TWA
- 15-minute STEL
Exposure Scenario 1

Production Task

- Chemical operation (3 subtasks)
- EE reporting dizziness
- Recently diagnosed with leukemia by family doctor
Exposure Scenario 2

- EE reports headaches and back aches
- Office on top floor of 8-story building
- Cell towers and related communication antennas on building roof
- How would you handle this situation?
Risk assessment is not an objective scientific process; facts and values frequently merge when we deal with issues of high uncertainty; cultural factors affect the way people assess risk.

_Sheila Jasanoff_
### Benefits / Limitations of QEA

<table>
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<tr>
<th>Benefits</th>
<th>Limitations</th>
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<tr>
<td>- Can be performed quickly</td>
<td>- Can be resource intensive</td>
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<tr>
<td>- Effective method for prioritizing further assessment</td>
<td>- Data and/or info may be limited</td>
</tr>
<tr>
<td>- Effective for screening job tasks and ID’ing potential high risk activities</td>
<td>- Requires professional judgment which can be affected by uncertainty</td>
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<td>- Important component of complete H&amp;S program</td>
<td>- Most affective when used as a pro-active assessment tool</td>
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An Integrated H&S-MD Program

Analyze Relationship Between Medical Results and Occupational Exposures
Identify Individuals at Risk Based on Exposure
Perform Qualitative Assessments
Implement Workplace Controls
Perform Quantitative Assessments
Accommodate Medical Restrictions
Conduct Medical Examinations
Report Findings to Employees
Additional Resources

- AIHA - Strategy for Assessing and Managing Occupational Exposures
  - Exposure assessment
  - Determining potential health risk
  - Judging exposures
  - Determining acceptable exposures
Thank You - Questions?

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