Preface

- This content is from ASSE’s The Safety Professional’s Handbook, Joel Haight, Ed., 2nd Edition (2012)
- Best Practice = best way to do something
- There is little documented as best practice
- There could be others and other opinions

ORGANIZATION OF THE BEST PRACTICES

- The best practices in industrial hygiene (IH) are organized according to the five basic tenants of IH:
  - Anticipation
  - Recognition
  - Evaluation
  - Prevention
  - Control
- We will discuss 13 best practices within the five tenants
- Best practices are bolded in the slide text
ANTICIPATION

- Anticipation of risk or hazards is the most difficult of the five tenants.
- It requires the greatest level of training, experience and skill. It is analogous to anticipation of a risk or hazard in traditional safety. The difference is that IH involves exposures which means the dose is important.
- Anticipation requires an estimation of the level of risk present.

- Reviewing all new chemicals, processes and significant process changes in advance of their use or application.
- "An ounce of prevention is worth a pound of cure"—(Ben Franklin) or said more currently... it is much easier and cheaper to fix it at the start!
- There should be a system or program to assure that all major or significant changes or additions are reviewed before being put into place (essentially management of change).
- This can be done locally as well as divisionally or at headquarters, especially for capital projects.
ANTICIPATION

- Performing either a quantitative or qualitative assessment annually (doing a risk assessment)
- High risk operations (especially chemical) require a quantitative approaches (may also be mandated)
- These are generally low frequency and high risk (e.g., explosion, fire, etc.)
- Quantitative risk assessments include:
  - HAZID
  - HAZAN
  - FTA
  - FMEA
  - Variations of the above

ANTICIPATION

- Lower risk or routine operations can be evaluated using a more qualitative approach (risk estimation)
- This is oriented to scenario development and the “what if” question
- This is an “old” technique that is not as difficult or expensive as the quantitative approaches and does not require as high a level of expertise
- This approach has the advantage of involving more workers, supervisors and non-EHS personnel
- We will go through an example

ANTICIPATION

- Qualitative risk assessments are basically a six step process
  1. Assessment team formation (who to include)
  2. Collect information (including historical) on the production process
  3. Identification of potential hazards (like a JHA/JSA) but more “blue sky” and creative. This may involve “what if” or other scenario development.
  4. Systematic evaluation by the team of each hazard identified in terms of frequency, severity and potential controls
  5. Mapping of frequency against severity to achieve risk level
  6. Identifying ways to lower the risk identified
## Anticipation

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>A</td>
<td>Once per week</td>
</tr>
<tr>
<td>Probable</td>
<td>B</td>
<td>Once per year</td>
</tr>
<tr>
<td>Occasional</td>
<td>C</td>
<td>Once per 3 years</td>
</tr>
<tr>
<td>Rare</td>
<td>D</td>
<td>Once per 10 years</td>
</tr>
<tr>
<td>Improbable</td>
<td>E</td>
<td>Once per 100 years</td>
</tr>
</tbody>
</table>

## Description Level Definition

<table>
<thead>
<tr>
<th>Level</th>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>1</td>
<td>Single or multiple deaths, severe and immediate operational difficulties, site closure</td>
</tr>
<tr>
<td>Critical</td>
<td>2</td>
<td>Severe multiple injuries or potential mortal disease, severe operational difficulties, severe reputational damage</td>
</tr>
<tr>
<td>Major</td>
<td>3</td>
<td>Severe injury or disease, loss of critical equipment</td>
</tr>
<tr>
<td>Minor</td>
<td>4</td>
<td>Minor injury or disease, irritation, loss of productivity</td>
</tr>
<tr>
<td>Negligible</td>
<td>5</td>
<td>No injury or disease, no significant impact on production</td>
</tr>
</tbody>
</table>

## Venn Diagram

- **Increasing Frequency**
- **Probability**
- **Increasing Severity**
- **Gravity**

<table>
<thead>
<tr>
<th>VH</th>
<th>H</th>
<th>M</th>
<th>L</th>
<th>VL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>VH</td>
</tr>
<tr>
<td>B</td>
<td>VL</td>
<td>M</td>
<td>H</td>
<td>VH</td>
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<tr>
<td>C</td>
<td>VL</td>
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<td>H</td>
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<tr>
<td>D</td>
<td>VL</td>
<td>L</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>E</td>
<td>VL</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>
**ANTICIPATION**

<table>
<thead>
<tr>
<th>RISK RANK</th>
<th>DEFINITION</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VH</td>
<td>Very High</td>
<td>Immediate Action Required (within one week)</td>
</tr>
<tr>
<td>H</td>
<td>High</td>
<td>Take steps to reduce risk (within one month)</td>
</tr>
<tr>
<td>M</td>
<td>Medium</td>
<td>Establish a plan to reduce risk (within 1 year)</td>
</tr>
<tr>
<td>L</td>
<td>Low</td>
<td>Consider reducing risk</td>
</tr>
<tr>
<td>VL</td>
<td>Very Low</td>
<td>No action</td>
</tr>
</tbody>
</table>

**RISK RANK**

- **VH** (Very High): Immediate Action Required (within one week)
- **H** (High): Take steps to reduce risk (within one month)
- **M** (Medium): Establish a plan to reduce risk (within 1 year)
- **L** (Low): Consider reducing risk
- **VL** (Very Low): No action

**ANTICIPATION**

- **Using a control banding approach when there is little available information**
- Control banding is an approach using the relative toxicity of materials to establish control bands
- It has been used extensively in the pharmaceutical industries
- A good example of an application is nano materials where there is little known on toxicity and no good sampling and analytical methods
- UK Health & Safety Executive website and the NIOSH website have a number of references and resources for using this approach

**ANTICIPATION**

- **Integration of IH into the business practices**
- Ideally, there would be a “Prevention through Design” approach applied (See Methods for Implementing PTD, Frank Renshaw, Professional Safety, March 2013, pgs 50-55)
- The focus would be on assuring that all of the various business functions and departments understand the essential IH requirements (e.g., no noise exposure above 85 dBA)
- Additionally, there should be a capital projects review with EHS input
RECOGNITION

- Establishing a file or database for IH requirements
- Establishing a file or dossier on regulated and higher risk materials, processes and equipment
- Determining industry practice standards and best practice standards
- Establishing what to do and when

RECOGNITION

- Risk ranking operations to establish priorities (especially IH)
  - No organization or operation is risk free (think of driving your car). No organization has enough resources to identify, evaluate and control every risk. This means prioritization using risk ranking (worst first)
  - Risk ranking can be done many ways (we gave an example in the quantitative risk assessment discussion)
  - Maintaining a database of risks is the best method to be able to allocate resources

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  - Risk ranking can be done many ways (we gave an example in the quantitative risk assessment discussion)
  - Maintaining a database of risks is the best method to be able to allocate resources
• Establishing a justifiable exposure assessment strategy
• Important consideration especially when applying OEL’s that determine what is “acceptable (safe?)”.
• Who to sample, when to sample, how many samples, when to resample, etc.
• There are lots of limitations on sampling (e.g., air sampling) such as IH personnel, time, equipment, cost, etc.
• Statistical sampling strategies and application of statistics to the results (e.g., Bayesian statistics)
EVALUATION

• Establishing a standardized and written approach to hazard evaluations
• Technical reports are good, but the details are needed
• Most records involving employee risks should be kept forever especially given the latency of occupational disease

PREVENTION

• Ensuring effective hazard communication
• Effective hazard communication is difficult, especially for highly technical and controversial subjects
• Research has demonstrated that “outrage” occurs when people feel they have no control over their situation
• It is important that there be some way to demonstrate the communications have been understood
• Most workers would not place themselves at jeopardy if they knew the risk and the controls
PREVENTION

• Demonstrating the effectiveness of all health and safety training
• Health and safety training is a cornerstone of all good EHS programs
• There are extensive regulatory requirements for EHS training in the USA and most of the developed world but little on the effectiveness of the training
• It is important that those trained demonstrate they have retained and can use the most important information (e.g., an airline pilot)
• Training forklift operators presents a good example

• Fork lift training—some examples
  ✓ Providing classroom training
  ✓ Providing practical training driving a forklift
  ✓ Providing an OJT trainer/mentor
  ✓ Testing proficiency using written exams and actual driving tasks
  ✓ Providing certification/licensing
  ✓ Providing an annual training requirement
  ✓ Requiring forklift supervisors and managers to take the same training and qualify to drive
CONTROL

• Using the hierarchy of controls

- Elimination is always the first consideration but not normally feasible (automated closed systems)
- Substitution is usually the second consideration but also not easily achieved (e.g., water instead of solvent)
- Engineering controls such as ventilation, interlocks, guards, noise controls systems, etc. are the next consideration but they can create other problems and are expensive
CONTROL

- Using the hierarchy of controls
- Administrative controls such as warnings, worker training, safer work practices, worker rotation, etc. are considered the next level of control. Administrative controls are not usually very effective if they rely solely on the practices of workers.
- Personal protective equipment is the “last line of defense” but the most commonly used. The issue, simply stated, is…what happens if there is a failure of the PPE? If this is very minor, then PPE can be a good control. If serious, other approaches should be exhausted first.

CONTROL

- Product stewardship
- Actively support customers (such as other manufacturers, suppliers, end users)
- Especially applicable for problematic products
- Direct support through training and potentially auditing (example of pool chlorine)
- In-direct support through Associations such as with the: American Coating Association (paint), Silicones Health Council, Spray Polyurethane Foam Alliance, Compressed Gas Association, etc.

CONTROL

- Establishing an effective and recognized safety and health management system
- Most EHS professionals agree that having a management system for EHS is an example of best practice (not the single solution)
- The most recognized systems are:
  - OSHA VPP
  - ANSI Z10
  - OHSAS
  - ILO-OSH 2001: Guidelines on Occupational Safety and Health Management
- There are other systems (especially overseas)
CONCLUDING REMARKS

• We have identified 13 best practices within the categories of anticipation, recognition, evaluation, prevention and control
• You may add some or all of these to your programs or you may have others that have not been discussed
• What is most important is to constantly benchmark with your peers to see what works well and what does not work
• You will learn at least as much from mistakes as you do from success

In theory there is no difference between theory and practice. In practice there is—Yogi Berra