

OSC | 11
Ohio Safety Congress & Expo



#104 – Managing hazards through the hierarchy of controls

David Coble, MS CSP

Wednesday, March 30, 2011
1 to 2 p.m.



Managing Hazards Through the Hierarchy of Controls
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presented by

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Hazard Recognition

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- 36 years of safety and health experience (12 yrs. with NC OSHA, 24 yrs. in consulting)
- Master's Degree in Safety Management from Univ. of Arizona
- Visited nearly 3000 facilities in North America, Asia and Europe to identify and suggest controls for hazards
- Vice Chair of ANSI B11.19
- Administrator of ASSE Manufacturing Specialty

Goals

- Understand the Different Hierarchy of Controls
- The Importance of Codes and Standards to Controlling Hazards
- Practice Using the Various Hierarchy of Controls

Hazard Recognition

Which of these controls does one choose?

What is an acceptable risk?

Hazard Recognition

Therefore...

Is there a systematic way to determine the appropriate controls to use?

Hazard Recognition

The Different Hierarchies Available Include...

Hazard Recognition

- OSHA
- NIOSH
- Europe
- Canada
- Australia
- Regulatory Hierarchies

OSHA Hierarchy of Controls
Source: OSHA Small Business Handbook [OSHA 2209-02R 2005]

Hazard Recognition

Preferred

Least Preferred

- Eliminate the hazard
- Limit exposure or control at its source
- Training and safe work procedures
- Personal protective equipment

OSHA Hierarchy of Controls
Source: 1910 General Industry Standards such as 1910.95(b)(1)[Noise] 1910.1000(e)[Air Contaminants] and 1910.1026(f)[Chromium]

Hazard Recognition

Preferred

Least Preferred

- Engineering
- Work practices
- Personal protective equipment

NIOSH Hierarchy of Controls
Source: NIOSH website at <http://www.cdc.gov/niosh/topics/engcontrols/>

Hazard Recognition

Preferred

Least Preferred

- Elimination
- Substitution
- Engineering
- Administrative
- Personal protective equipment

Australian Hierarchy of Controls
Source: <http://www.safework.sa.gov.au/contentPages/EducationAndTraining/HazardManagement/Noise/TheAnswer/noiseAnswerHierarchy.htm>

Hazard Recognition

Preferred

Least Preferred

- Elimination
- Substitution
- Isolation
- Engineering
- Administrative
- Personal protective equipment

Canadian Hierarchy of Controls
Source: http://www.ccohs.ca/oshanswers/hsp/programs/hazard_control.html

Hazard Recognition

Preferred

Least Preferred

- Elimination (including substitution)
- Engineering
- Administrative (including work practices)
- Personal protective equipment

European Hierarchy of Controls
Source: European Agency for Safety and Health at Work

Hazard Recognition

1. **Elimination:** the best way to reduce the risks from dangerous substances is to remove the need to use them by changing the process or product in which the substance is used.
2. **Substitution:** substitute the dangerous substance with a less hazardous one or change the process to reduce the risks if elimination is not possible.
3. **Control:** if a dangerous substance process cannot be eliminated or substituted then exposure must be prevented or controlled.

European Hierarchy of Controls

ELIMINATE

Can you stop using or producing the substance?
Can you stop the process or use a different method?

Do you need to use caustic soda if elbow grease will do the job?
Would you need to grind down components if the first cut was accurate?
Do you need to keep motor vehicle engines running while stationary at the depot?
Can you replace a diesel vehicle with an electric one?

NO → NEXT STEP SUBSTITUTE

YES → PREVENT EXPOSURE

European Hierarchy of Controls

DANGER → ELIMINATE

NO

SUBSTITUTE

Can you use safe alternatives?
Can you use a safe process?

Do you need to use chemical cleaners if soap and water will do the job?
Can you use a vacuum instead of sweeping?
Can your supplier provide you with safer chemicals with a similar performance?
Can you obtain raw materials in solid pellet form instead of a dusty powder?

YES → PREVENT EXPOSURE

NO → NEXT STEP CONTROL

European Hierarchy of Controls

DANGER → ELIMINATE → SUBSTITUTE

NO

CONTROL

Can you separate people from the substance?
Can you reduce exposure to a safe level?

For example:
Can you restrict chemical cleaning to when the least workers are on site?
Can you use water when cutting or grinding to create sludge instead of dust?
Can you contain the process in a sealed vessel?
Can you restrict access to the environment through a safe system of work?

YES → PREVENT EXPOSURE

All Have Common Elements...

Hazard Recognition

- Eliminate the hazard first, where feasible
- Personal protective equipment is the least desirable control
- Assess the risk

How Does One Determine Risk – Acceptable or Not?

Hazard Recognition

- There are standards such as ANSI B11.TR3; RIA 15.06 and ISO 14121
- There are quantitative techniques to determine risk...

Hazard Recognition

How Does One Determine Risk – Acceptable or Not?

- But what about in the field on the spot?
- Qualitative risk assessment...

Hazard Recognition

How Does One Determine Risk – Acceptable or Not?

- Would I let my adult child perform this job?
- Can I sleep at night knowing what my employees are doing?
- Or...

Hazard Recognition

Risk – Acceptable or Not?

- If someone is injured, would anything be changed?
- If not, then the situation is an acceptable risk.
- If something would be changed after an injury, then change it now before someone is injured.

Hazard Recognition

The Hierarchy of Controls

The Importance of Codes and Standards to Controlling Hazards

Hazard Recognition

**Regulatory Hierarchy of Controls
Live Electrical Parts**
[Source: OSHA 1910.303(g)(2)]

Preferred
↓
Least Preferred

- Located in an approved cabinet
- Located in a vault or room accessible only to qualified personnel
- Permanent partitions or screens
- On a balcony, gallery or platform
- By elevation of 8' or more above the working surface

Hazard Recognition

**Regulatory Hierarchy of Controls
Fall Protection**
Source: OSHA 1926.502

Preferred
↓
Least Preferred

- Fall prevention including walls, guardrails, distance from the edge
- Fall arrest including catch nets, rubber bladders, harnesses and lanyards and lifelines
- Controlled Access Zones and Warning Line Systems
- Monitoring Systems

Standards May Give Us...

- Explanations of Hazards
- A Required Hierarchy of Control Measures
- Specific Controls Required

Fundamentals of Hazard Control

- Hazard control is both a management and employee responsibility
- Hazard control must be planned, organized, implemented and evaluated
- Hazard control should not introduce new hazards into the work environment
- Hazard control must allow the work to be performed

Most Common Engineering and Administrative Hazard Controls

- Barriers
- Devices Such as Interlocks and Limit Switches
- Good Housekeeping
- Ventilation
- Adequate Work Space
- Signs and Labels
- Fire Protection
- Automated Material Handling
- Alarms and Warning Devices
- Proper Placement and Storage
- Proper Ergonomic Design
- Proper Use of Equipment
- Proper Personal Protective Equipment

Summary

- Hazards must be controlled to an acceptable risk
- The hierarchy of controls is a systematic way of thinking about hazard control
- Use the codes and standards to understand risk and controls

Thank you!

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