Prevention through Design in the 2020 workplace

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1 July 2020
DISCLAIMER: The findings and conclusions in this report are those of the author and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.
A Webinar on “Engineering Controls” ...

• By “Engineering Controls” many of us think of PASSIVE controls that work on their own without human intervention.

• “Administrative” and “PPE” controls require consistent, effective, and very ACTIVE performance by humans.

• If passive methods actually control the hazard, great!

• But what if they don’t?
**DESIGN priority is SOURCE control**

Hierarchy of Controls:
- **Elimination**: Physically remove the hazard
- **Substitution**: Replace the hazard
- **Engineering Controls**: Isolate people from the hazard
- **Administrative Controls**: Change the way people work
- **PPE**: Protect the worker with Personal Protective Equipment
**DESIGN** priority is **SOURCE** control

• We prefer to eliminate the hazard SOURCE to protect workers

**But the source here IS the worker!**

• Therefore many *actively managed* controls are needed to reach the top of the Hierarchy of Controls ... organized teamwork

• **DESIGN** must consider the *entire Hierarchy of Controls*
American Institute of Architects (AIA) “Reopening America: Strategies for Safer Buildings” May 28, 2020

Figure 1: Applying the hierarchy of controls for COVID-19 (adapted from NIOSH)

Applying the hierarchy of controls for COVID-19

Most effective

Elimination

Substitution

Engineering controls

Administrative controls

PPE

Least effective

We use ALL levels

Needed: A collaborative, multi-discipline team with an organized PROCESS to DESIGN your pandemic business system
PtD Design Safety Review (DSR) **PROCESS**

**DSR Team Meetings**

1. **Collaborative, Multi-Discipline <=8?**
   (Key worker/labor, OSH/Medic, Ops/Maint, Designer, Mgt, Finance, HR, Communication)
2. **Hazard ID**
3. **Risk Assessment and Ranking**
4. **Alternatives Assessment**
   (Design-Out, Reduce, Control, Protect)
5. **Change Plans, Contract Provisions, & Purchasing Specs**
6. **Provide Guidance for Remaining Hazards**
7. **Document All** (*hazard tracking table*)

**Lessons Learned**

- **Experience**
- **Expertise**
- **Different views**
## Risk and Alternatives Assessment

### 1. Hazard ID

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Falls from roof while cleaning or maintaining skylights</td>
</tr>
</tbody>
</table>

### 2. Hazard Analysis

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Cause</th>
<th>Design Process element affected</th>
<th>Impact on Project Objectives</th>
<th>Risk Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Roof pitch or weather conditions</td>
<td>(whatever makes sense for your design methods)</td>
<td>Cost, Schedule Slippage</td>
<td>Designer, Const. Mgr, Constructor</td>
</tr>
<tr>
<td>HIGH</td>
<td>Exposure to chemicals</td>
<td>Investigative, Construction</td>
<td>Cost, Schedule Slippage</td>
<td>Designer, Const. Mgr, Constructor</td>
</tr>
</tbody>
</table>

### 3. HAZARD TRACKING LIST

<table>
<thead>
<tr>
<th>Risk</th>
<th>Hazard</th>
<th>Cause</th>
<th>Design Process element affected</th>
<th>Impact on Project Objectives</th>
<th>Risk Manager</th>
<th>Agreed Response to Risk</th>
<th>Expected Resulting Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Falls from roof while cleaning or maintaining skylights</td>
<td>Roof pitch or weather conditions</td>
<td>(whatever makes sense for your design methods)</td>
<td>Cost, Schedule Slippage</td>
<td>Designer, Const. Mgr, Constructor</td>
<td>Fixed exterior ladder. Tie-off points for work performed on roof.</td>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
<td>Harm from chemicals</td>
<td>Exposure to chemicals</td>
<td>Investigative, Construction</td>
<td>Cost, Schedule Slippage</td>
<td>Designer, Const. Mgr, Constructor</td>
<td>Add HTRW CEGS to Design Specification</td>
<td>LOW</td>
</tr>
</tbody>
</table>
Checklists in Design Safety Reviews

• Do NOT start your first DSR team meeting with “let’s brainstorm!”

• Instead, get your DSR team reviewing checklists of common problems for your project type

• Brainstorming will follow

[from CDC Resuming Business Toolkit]
Sources for great “Checklist” material

- NIOSH  www.cdc.gov/niosh/emres/2019_n cov.html

Other:
- AIHA  www.aiha.org/public-resources/consumer-resources/coronavirus_outbreak_resources
- NIEHS  https://tools.niehs.nih.gov/wetp/covid19worker/
- AIA  www.aia.org/resources/6299247-reopening-america-strategies-for-safer-bui
- ASHRAE  www.ashrae.org/covid19
- And more ...
This is the PtD Design Process

ANSI/ASSP Z590.3
Prevention through Design

GENERAL
A Design Safety Review PROCESS for any business and any hazard

CONCISE
17 pages
Helpful appendices

VALUABLE
“System Safety Light”
How to DO it
Engineer’s thoughts worth considering ...

• Interesting webinar by Allen & Shariff (free sign-up)
https://www.allenshariff.com/general-contracting-feature-project-services/mechanical-design-to-fight-illness/

• Interesting paper by Steve Taylor (active in ASHRAE)

  for example ...
Efficacy chart from Taylor Engineering...

<table>
<thead>
<tr>
<th>Measure</th>
<th>MOST effective</th>
<th>LEAST effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain social distancing</td>
<td>★★★★★</td>
<td>$$$</td>
</tr>
<tr>
<td>Frequent wash hands</td>
<td>★★★★★</td>
<td>-</td>
</tr>
<tr>
<td>Disinfect common areas</td>
<td>★★★☆☆</td>
<td>-</td>
</tr>
<tr>
<td>Conduct meetings via computer</td>
<td>★★★★★</td>
<td>-</td>
</tr>
<tr>
<td>Work from home as often as possible</td>
<td>★★★★★</td>
<td>$</td>
</tr>
<tr>
<td>Require employees</td>
<td>★★★★☆</td>
<td>-</td>
</tr>
<tr>
<td>Implement flexible paid sick leave</td>
<td>★★★★☆</td>
<td>$$$</td>
</tr>
<tr>
<td>Require masks worn at all times</td>
<td>★★★★★</td>
<td>-</td>
</tr>
<tr>
<td>Reduce office workstations density</td>
<td>★★★★★</td>
<td>$$$$$</td>
</tr>
<tr>
<td>Require and pay employees to be regularly tested</td>
<td>★★★★★</td>
<td>-</td>
</tr>
<tr>
<td>Install fever warning system</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Convert restroom fixtures, doors, and toilet seats to automatic and touch-free</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Install upper-room UV-C in restrooms</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Install upper-room UV-C in public waiting rooms</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Installs portable HEPA air cleaner in elevators</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Upgrade to MERV 13 filters</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Deactivate unoccupied standby</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Upgrade to MERV 13 filters</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Re-commission HVAC systems, update control sequences</td>
<td>★★★★☆</td>
<td>$</td>
</tr>
<tr>
<td>Disable zonal fans such as ceiling fans</td>
<td>★★★★☆</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes:
1. Cost of social distancing would be indirect in management of employee scheduling to minimize density.
2. Cost increase is for remote office setup and possible productivity reduction.
3. Paid sick leave may already be required in California.
4. Energy use is usually reduced when systems are recommissioned and substantially reduced if Guideline 36 control sequences are implemented.

Maintain a MIX of ACTIVE source controls and PASSIVE cleaning and dilution controls.

AVOID A FALSE SENSE OF SECURITY for any overly-simplistic choice.
Thank You … and may your PPE be cool


SEE Disclaimer
Definitely not NIOSH Guidance