Comparison of DOE and DoD Fire Protection: A first hand account

By Daniel Garcia, PE
Outline of Presentation

- My background
- Compare DOD and DOE fire protection requirements
  - DOD Lesson Learned #1
  - DOD Lesson Learned #2
- Compare my job duties at DoD and DOE
- Apply lessons learned to current position
My background

- BS and MS in Mechanical Engineering, University of New Mexico

- 5 years as fire protection *design* engineer with the US Army Corps of Engineers (USACE), Albuquerque District

- 8 months as fire protection *non-design* engineer with Sandia National Laboratories (SNL), NM Site

- Currently enrolled in Cal Poly Fire Protection Engineering MS program
Just one letter difference right?

<table>
<thead>
<tr>
<th>Topic to Compare:</th>
<th>DOE (SNL)</th>
<th>DoD (USACE)</th>
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<tbody>
<tr>
<td>Governing Criteria</td>
<td>Orders and Standards</td>
<td>United Facility Criteria (UFCs)</td>
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<tr>
<td>AHJs</td>
<td>Local site designation</td>
<td>Project Dependant (usually local Base Fire Department)</td>
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<tr>
<td>Non-standard Hazards</td>
<td>Open to AHJ discretion</td>
<td>Strict Requirements</td>
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<tr>
<td>“Worst” Hazard</td>
<td>Chemicals, Explosives, Experiments, etc…</td>
<td>Fuel fire in hangar</td>
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<tr>
<td>Customers</td>
<td>Internal DoE based on site</td>
<td>Air Force, other government agencies</td>
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<tr>
<td># of FPEs (Dept. Wide)</td>
<td>Very High</td>
<td>Low</td>
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DoD Lesson Learned #1: “Don’t Blow a Gasket”!

- High Expansion Foam (HEF) Suppression System in an aircraft hangar at an Air Force Base
- On 2 of the 3 HEF risers, gaskets ruptured and the fire pump kicked on. First time, damage was localized to the mechanical room; 2nd time was full foam discharge
- Contractor’s side: Fire Pump kicked on for some unknown reason and over pressurized system leading to gasket failure (e.g. “Not their fault!”) even though there was a 10 lb surge arrester/tank upstream of the gasket!
- When asked how system could be over pressurized with surge tank installed, contractor replied “Hydraulics are funny things!”

Food for thought: What’s the proper way to arrange the foam pressurized line from the bladder tank?
DoD Lesson Learned #2: “Don’t stand for un-needed pipes!”

- AHJ at Air Force Base consistently requested (dictated) standpipes for buildings during A/E reviews for buildings undergoing low to moderate level modifications. (Example: Two story building with 200’ maximum travel distance allowed.)

- No mention of standpipe during “Request for Proposal” development except one case where it was required

- DOD criteria is clear: Per UFC 03-600-01 paragraph 4-5.1:
  - Class I standpipes required when building is 4 stories or more in height
  - Class I standpipes required when hose lines would exceed 450 feet.

- Same AHJ has service contract with SNL: No “special standpipes” required!
Fire Protection from different views

- Previous FP role: Design fire suppression and alarm systems
- Current FP role: Fire Protection ITM lead
  - Includes standard sprinkler systems shown below (ITM: in-house staff)
  - Includes specialty systems such as FM-200 and CO2 (ITM: contractors)

**Standard Sprinkler Systems Breakout**
- Wet, 248, 74%
- Antifreeze, 58, 17%
- Dry, 14, 4%
- Preaction, 13, 4%
- Deluge, 3, 1%

**Specialty Suppression Systems Breakout**
- CO2, 12, 21%
- FM-200, 15, 26%
- Dry Chemical, 17, 29%
- Halon, 10, 17%
- Wet Chemical, 4, 7%

Based on 2012 data
Lessons learned applied to DOE job

- AHJ does not equal total authority!
- Follow the Physics!
- Communication is key!
- False Alarms happen!
- It’s a big place!
Thank you. Any questions?
Backup Slide

FIGURE A.5.3.25.1 Balanced Pressure Proportioning (Pump-Type) with Single Injection Point.

FIGURE A.5.3.25.1.1(a) In-Line Balanced Pressure (Pump-Type) Proportioning with Multiple Injection Points.