The IBC, the IH and Laboratory Construction

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Codes as Laws

Webster’s
- A body of laws
- Set of principles
- Rules of Conduct

Codes as Mysteries

Webster’s cont’d
- A system of symbols used in secret writing...

History

- Greeks and Romans
- Millennia monuments
- Successes/Failures

Lessons Learned

- Major disasters
- Investigate
- Modify codes

Industrial & Laboratory Incidents

- Reshape thinking
- Influence code setting process
  - Locally
  - Nationally
  - Internationally
International Building Code (IBC)
- International scope
- Code blend: BOCA, ICBO, SBCCI; others
- Formal revision process
- Nationwide adoption
- State versions

Why the Building Code?
- Protect: Building occupants, Fire fighters, Structure, Contents
- Standardize: Design expectations, Reduce failures

Code Administration
- Code Official having jurisdiction
- NC U System: State Dept. of Insurance
- County and Municipalities: Building inspectors, Fire Marshall

Code Administration
- Various Interpretations
- Mitigating factors
- Alternative Methods and Materials
- One size does not fit all

NC University System Experience
- Higher Education Bond Referendum-2000 ($3.1 B)
  - New buildings
  - Renovations
- IBC Adopted in 2002
- New H&S issues
- Numerous lab buildings

Planning and Review Process
- Participants:
  - Architects/engineers
  - Committees
  - Users
  - U. Administration
  - State Construction/DOI
  - Trades
  - EHS
IH Issues
- Chemical control areas: B occupancy
- Hazardous exhausts
- Old Lab buildings

Building Grade
- Sloped sites-multilevel grade access
- Establishes number of control areas, max. storage and use
- Allow firemen access on grade (no steps)

Basements
- No Class I Flammable Storage
- Alternatives
- Proposed changes

Chemical Control Areas
- Maximum-floor above grade
  - 4 Control areas
  - 100% basis for storage and use quantities
  - Doubling for sprinklers, doubling again for approved storage cabinets
- Fire and exhaust separations
- Impact future space mods

Control area quantities
- User surveys
  - Existing inventories
  - Interviews
  - Maximize shell space
- Physical and Health Hazards-chemicals
- Proposal for radioactive materials (as Uniform FC)

Chemical Survey
- Room #
- Haz Material ID
- Max. storage
- Max. usage
- Units
- Handling Desc.
- Physical state
Chemical Survey by Room

<table>
<thead>
<tr>
<th>Room</th>
<th>PI</th>
<th>Hazard Material</th>
<th>CAS #</th>
<th>Max Stored in room</th>
<th>Unit</th>
<th>Max Quant. Used at 1 Time</th>
<th>UN/II</th>
<th>Use, proc, storage, dispensing</th>
<th>State S.L.G</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>Rob Wills</td>
<td>Acetic acid</td>
<td>106.19-7</td>
<td>L</td>
<td>5</td>
<td>HLL</td>
<td>Use in hood, store in safety cabinet</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Survey Analysis

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS #</th>
<th>Room</th>
<th>Combustible Liquid II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>Acetic Acid</td>
<td>106-19-7</td>
<td>110</td>
<td>1L</td>
</tr>
<tr>
<td>Total (metric units)</td>
<td></td>
<td></td>
<td>1L</td>
</tr>
<tr>
<td>Total in Control Area (English units)</td>
<td></td>
<td></td>
<td>0.36G</td>
</tr>
<tr>
<td>Control Area (Storage+Use) Limits in Gallons</td>
<td></td>
<td></td>
<td>480.0</td>
</tr>
<tr>
<td>Control Area (Use only) Limits in pounds</td>
<td></td>
<td></td>
<td>60.0</td>
</tr>
</tbody>
</table>

Control area reviews

- Exceed limits
  - Eliminate
  - Alternate forms
  - Reduce quantities
  - Store elsewhere
    - Ancillary hazardous storage rooms

Control area reviews

- Study/training
- Int. Fire Code
  - Classification rules/lists
- Published lists and resources
  - HMEX
  - Stanford chemtracker
  - Vermont SIRI MSDS index/tox database

Post-construction control

- PI
  - Acquisition limitations
  - Safe use, storage, disposal
  - Training
- EHS (compliance assurance)
  - Review lab safety plans
  - Laboratory inspections
    - Control area quantity spot checks
  - Follow-up on deficiencies

Mechanical Code Section 510

- Original version
  - No differentiation for chemical quantities
  - Prohibited hazardous exhaust manifolding
  - Required fire suppression- ducts and hoods
Mechanical Code Section 510
Lab H&S Committee Proposal
- Recognize small lab quantities used
- Ensure less than 25% LEL
- Ensure HH 1-4 are <1% Med. Lethal Dose (acute)
- Automatic fire protection not required

Committee Proposal Cont’d
- Allow manifolding of exhaust systems when
  - Continuous neg. pressure
  - Combine in occ. space in same fire area
  - Each branch has flow control device

Change outcomes
- AHA LHSC Proposal to ICC
  - Public Hearings 2003-2004
  - 2004 Final Action Hearing approved
  - Listed in 2004 Supplement to the IMC
  - Publish in 2006 IMC
- NC Building Code Council review on 12/04 and 3/05
  - recommended for early adoption

Consider high volume chemical usages in specialty labs
- Example: histology slide prep areas

Feasibility to achieve new code
- Age
- Condition
- Cost
- Conversions
- Partial upgrades
- Raze

Old Lab Buildings

Old Lab Buildings- Total Renovations
- Fire sprinklers/alarms
- ADA
  - Elevators
  - Ramps
- Toilet Fixtures
- Fire ratings/separations-walls, floors
- Exhaust
- Emergency power
Old Lab Buildings-
Partial renovation by room
- Change of use?
  - Example: convert Conf. room to lab
- Increased risk
  - Chemical review
  - Compare before and after renovation
- Bring room(s) to code
  - Fire separations
  - Chemical restrictions

Other Building Experience / Code Issues / Proposed Changes
- Card Access Doors and Building Security
- Smoke Control in Lab Buildings
- Proposal to Adopt of ASHRAE 62.1-2004
- Recirculation of Exhaust Air

Other Building Experience / Code Issues / Proposed Changes
- Link to ICC Code Change Process and Proposals at:
  - http://www2.umdnj.edu/eohssweb/aiha/technical/ventilation.htm#Hazardous

Summary on Building Codes
- Long history
- New attention required from IHs
- IBC Chemical Control-challenging
- Favorable changes to Mechanical Code
- More changes coming.....

Codes are evolving quickly - stay engaged!