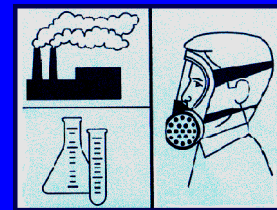


# American Industrial Hygiene Conference and Exhibition

Round Table 213



**“Hazardous Exhaust Systems in Research  
Laboratories- The Need for a Code Change”**

**P. Harnett, COEH Inc., Ringoes, NJ**

**Phone: 908 284-1001**

**May 12, 2003**

# Reference to Previous Abstract from 1997 AIHCE- Lab Health and Safety Platform Session

Building and Fire Code Development of a Single  
Model-M.L. Austin, University of Minnesota,  
Minneapolis, MN

Abstract began...

**The World Is Run By Those Who Show Up**

(underlining added). We were caught unprepared  
for changes in the building and fire codes. Prior to  
1991, little in the building and fire code affected  
us. ...

# International Code Council

- “The International Code Council (ICC) was established in 1994 as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes. The founders of the ICC are the Building Officials and Code Administrators International (BOCA), International Conference of Building Officials (ICBO), and Southern Building Code Congress International, Inc. (SBCCI).” The ICC is headquartered in Falls Church, Virginia (close to AIHA Headquarters.)

**Reference: ICC Website- [www.iccsafe.org](http://www.iccsafe.org)**

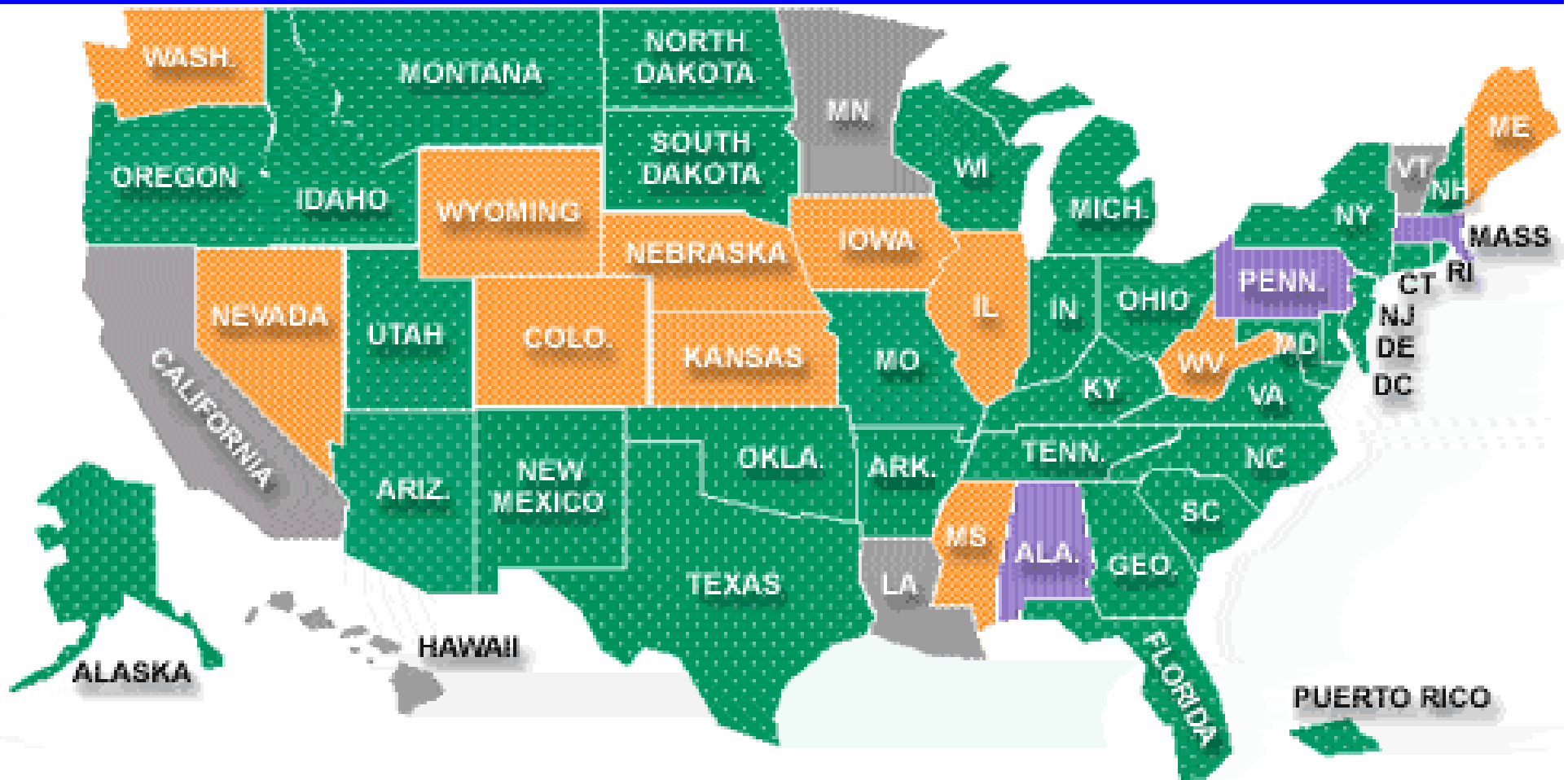
## International Code Council, cont'd.

### Map June 2002

**Green**- State with one or more enforced ICC standards.

**Orange**- One or more enforced ICC standards within or at local level in that State.

**Purple**- State adopted one or more ICC standard but the enforcement date has not arrived yet.



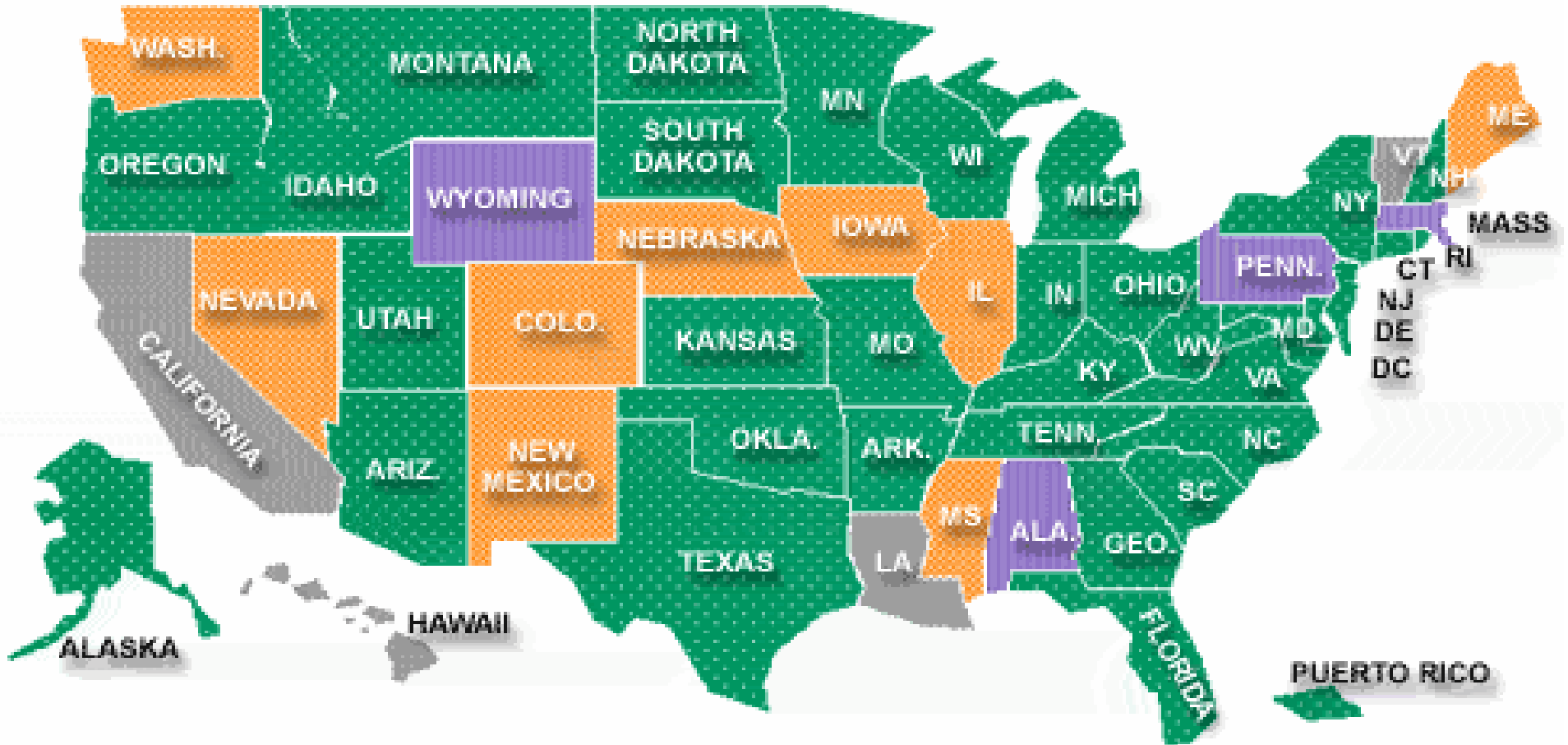
# International Code Council, cont'd.

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# AIHA and Outlook on Code Standardization

- AIHA welcomes standardization of codes, since this often facilitates the administration of health and safety programs.
- Problems arise when certain codes are inappropriate for the work performed.
- Upon presentation of the necessary information, the AIHA Board of Directors agreed that research laboratories should seek an exception to International Mechanical Code 510 “Hazardous exhaust systems.”

## **What Approach Would Better Address Safety Concerns Related to Handling of Hazardous Chemicals in Research Labs?**

- Consider Standards specific to laboratories
  - 29 CFR 1910.1450- OSHA's Lab Standard
  - AIHA/ANSI Z9.5 "Standard for laboratory ventilation"
  - NFPA 45 Chapter 6 "Laboratory ventilating systems and hood requirements"

# IMC 510 “Hazardous exhaust systems”

- IMC is among the sister (companion) codes that make up ICC. Among the other 13-companion codes making up ICC are the International Fire Code (IFC) and International Building Code (IBC).
- IMC is among the first of the sister codes- ICC first published IMC in 1996.
- There are numerous provisions of IMC 510 that would be sensible for industrial settings with high production of a limited number of hazardous chemicals.



# ICC International Mechanical Code- 2000 (IMC) Section 510 Hazardous exhaust systems

- What is a hazardous exhaust system?
  - Independent of other types of exhaust systems,
  - Shall not share common shafts with other duct systems,
  - Automatic fire suppression (IMC, Section 510.7).

# Why Should AIHA Be Interested in this Issue?

- Involves health and safety of American workers, IMC impacts most States.
- Portions of IMC 510 fly in the face of conventional laboratory health and safety
  - Required use of fire suppression in chemical fume hood exhaust
    - Fire suppression in the ductwork of chemical fume hoods poses unnecessary safety concerns
  - Virtual prohibition on manifolding of chemical fume hood ductwork
    - The virtual prohibition of manifolding will result in less dilution ventilation in the exhaust from chemical fume hoods.

# IMC Effective Statewide

(as reported to ICC as of May 5, 2003)

- Alaska
- Connecticut
- DC
- Florida
- Georgia
- Idaho
- Indiana
- Michigan
- Missouri\*(State buildings)
- New Hampshire
- New Jersey
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Rhode Island
- South Carolina
- Texas\* (approved for local adoption)
- Utah
- Virginia
- Wisconsin
- Wyoming

# IMC Adopted- effective date in the future

(as reported to ICC as of May 5, 2003)

- Alabama
- Massachusetts
- Pennsylvania

# IMC Adopted by Some Local Governments within States

(as reported to ICC as of May 5, 2003)

- Arizona
- Colorado
- Delaware
- Illinois
- Iowa
- Kansas
- Maine
- Maryland
- Mississippi
- Nebraska
- Nevada
- New Mexico
- South Dakota
- Tennessee

# States/Territory with No Reported Action on IMC

(as reported to ICC as of May 5, 2003)

- Arkansas
- California
- Hawaii
- Kentucky
- Louisiana
- Minnesota
- Montana
- Vermont
- Washington
- West Virginia
- Puerto Rico

# International Code Council, IMC Section 510.2

ICC International Mechanical Code (2000)  
Section 510 “Hazardous Exhaust Systems”

- Section 510.2 states that “A hazardous exhaust system shall be required wherever one of the following conditions exist:
  - A flammable vapor, gas...is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature

# International Code Council, IMC

## Section 510.2, cont'd.

- A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration, or
- A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity



# **International Code Council, IMC Section 510.2, cont'd.**

- **Flammability concern- see “Empirical Data and Modeling of a Flammable Spill in a Chemical Fume Hood do not Support the Need for Fire Suppression Within the Chemical Fume Hood Ductwork” from last year’s AIHA Lab H&S Technical Session:**

<http://www2.umdnj.edu/eohssweb/aiha/administrative/presentations.htm#WI>

# International Code Council, IMC Section 510.2, cont'd.

NFPA health hazard rating of 4 some examples in  
research laboratories-

## Biology research-

phenol- nucleic acid extraction

osmium tetroxide- fixative for electron microscopy

## Chemistry research

hydrogen fluoride and phosgene gas- chemical  
syntheses

## Geology research

hydrogen fluoride- digest minerals in rocks

## Microelectronics

arsine, phosphine- doping agents for microchips

# International Code Council, IMC Section 510.2, cont'd.

- NFPA health hazard rating of 1, 2 or 3 if present at 1% of LC50

In theory this could include virtually all chemical solvents and numerous gases used in research laboratories

With the constantly changing mix of chemicals used in a research laboratory, how would one determine if a material were to reach 1% of the LC50 within the ductwork of a chemical fume hood?

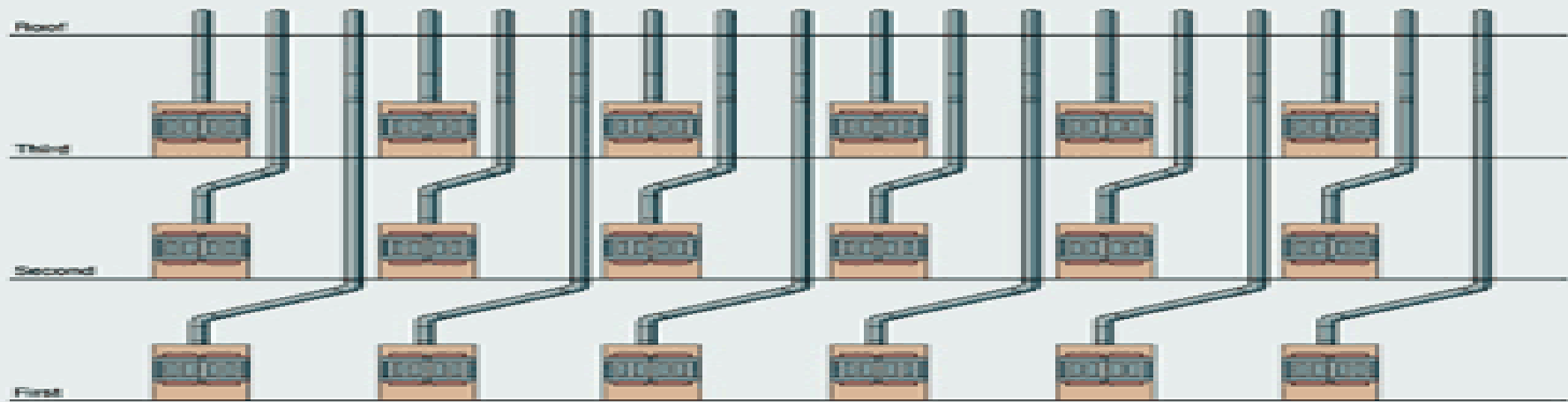
# **Concerns Regarding Fire Suppression Within CFHs**

- **Fire concern if water suppression system deploys during use of water-reactive chemicals (sodium, lithium, magnesium, metal hydrides)**
- **Accidental discharge with possible flooding in lab**
- **Initial cost and ongoing maintenance of fire suppression system**
- **Deployment may affect functionality of exhaust system in the event of a fire and act as a fire damper (Conflicts with NFPA 45).**

# International Code Council, IMC Section 510.4

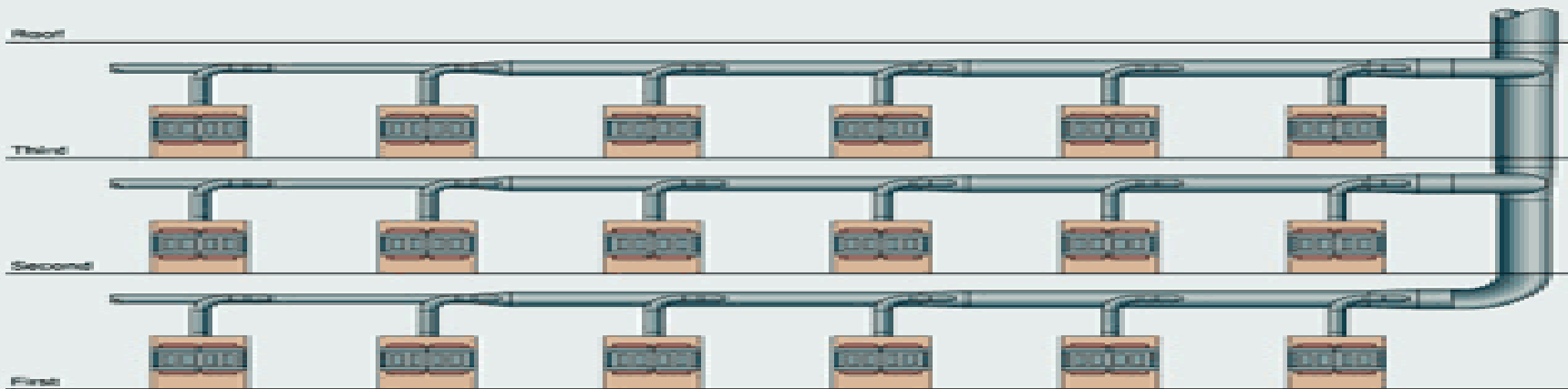
- Section 510.4 states that, "Hazardous exhaust systems shall be independent of other types of exhaust systems. Incompatible materials, as defined in the International Fire Code shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area."

# Dedicated Hazardous Exhaust Systems



J.Koenigsberg, HPAC  
Engineering, August 2002

# Manifolded Exhaust System



J.Koenigsberg, HPAC  
Engineering, August 2002

# Concerns Regarding “Virtual” Prohibition of Manifolding of Chemical Hood Exhausts

- ANSI Z9.5 indicates that safety is not improved by limiting manifolding of laboratory exhaust systems.
- Lose additional dilution ventilation from lab and from other chemical hoods.
- Leads to increased time and potential for exposure to maintenance personnel working on roofs. ANSI Z9.5 requires redundant exhaust fans to support manifolded exhaust systems.



# Steps Towards an Exception for Research Labs from IMC 510

- **Members of the AIHA Lab Health & Safety Committee (Lindsey Kayman, Mike Austin, Ken Kretchman) are faced with IMC 510 concerns in their respective States resulting from plans for new laboratory buildings on their campuses,**
- **IMC 510 is an agenda item for AIHA Lab H&S Committee meeting in June 2002,**
- **Lindsey Kayman, Peter Harnett, Ken Kretchman, Mike Austin and Dave Lumby develop draft**
- **Same individuals along with Lou DiBerardinis refine draft.**

## **Steps Towards an Exception for Research Labs from IMC 510, cont'd.**

- **Work with AIHA Lab H&S liaison Ezekial Haslam to identify best approach for work with AIHA National**
- **E. Haslam presents AIHA Lab H&S materials (paper, letter, Public Proposal form) to AIHA Board of Directors at their September 2002 meeting.**
- **Work with AIHA National [Manuel Gomez, Scientific Advisor and Aaron Trippler, Government Affairs] to refine draft into a Position Paper, Public Proposal for exemption for research labs from IMC 510 and letter requesting interim relief.**

# Steps Towards an Exception for Research Labs from IMC 510, cont'd.

- Position paper “Hazardous exhaust Systems in Research Laboratories that Involve ‘Laboratory Scale’ Use of Chemicals” (and additional attachments) completed and sent along with Public Proposal, and cover letter to Greg Gress (IMC Secretary) in early December 2002. URL for position paper is <http://www2.umdnj.edu/eohssweb/aiha/technical/Position%20Paper.pdf>
- ICC agrees to consider AIHA request for exception from IMC section 510 requirements for research labs using “laboratory scale” quantities of chemicals.
- AIHA Lab Health & Safety Member (K. Kretchman) to attend ICC code meeting in Nashville, Tennessee in September 2003.
- If exception is granted, it could go into effect May 2004.

## Possible Future Actions on IMC 510 Involving AIHA Lab H&S Committee

- Attend the ICC code development meeting in September 2003 in Nashville, Tennessee.
- Work with AIHA Exposure Assessment Strategies Committee to develop understandable approaches showing manifold is generally preferred to dedicated hazardous exhausts.
- Ongoing participation in ICC on codes and standards impacting laboratories.

# Conclusions/Recommendations

- AIHA and the scientific community need to be represented at code development hearings. Current plans include an AIHA liaison to the ICC.
- As evidenced by the many hours of work by many people, it is a difficult task to change a code once it is adopted.
- Whenever possible, work locally with your code officials to create change. It is significantly more difficult to create change on the National level without appreciable work and influence.

# Conclusions/Recommendations, cont'd.

- When dealing with local or state code officials provide alternative documentation providing an alternative to code of concern
  - For example if you challenge the application of IMC 510 to research laboratories, use NFPA 45, ANSI Z9.5 and OSHA's Lab Standard as alternatives so that code official will be more likely to grant a variance.