

# CODES FOR 2006 AND BEYOND

Presented by:  
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2006 Code Update

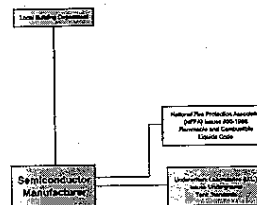
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1979

## REGULATORY STRUCTURE & STANDARDS



1966

RH000076



# INTERNATIONAL CODE COUNCIL

- Formed from:
  - Uniform Building Code (UBC) - ICBO
  - National Building Code (NBC) - BOCA
  - Standard Building Code (SBC) - SBCCI
  - Does not include NFPA which withdrew from IFC development council



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# INTERNATIONAL CODES

2006



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# ADOPTION TIME LINE

- Adopted ⇨ July 1, 2007 ?
- Enforced ⇨ January 1, 2008 ?

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# CODE ADOPTION WORK PLAN

**Core Group Membership**  
 OSHPD  
 DSA  
 HCD  
 Calbo  
 Cal Chiefs  
 FPO  
 League Chiefs  
 CSAC  
 Metro Chiefs  
 FDAC  
 ICC

Ruben Orjavia  
 State Fire Marshal  
 Assistant State Fire Marshal  
 Core Group

A Occupancy Workgroup	I-3 Occupancy Workgroup	B Occupancy Workgroup	M Occupancy Workgroup	R-1,2,3,6 Occupancy Workgroup	E, I-4 Occupancy Workgroup	S Occupancy Workgroup	F Occupancy Workgroup	U Occupancy Workgroup	H Occupancy Workgroup	Special Occupancy Ch. 44 Workgroup	I-1, R-4 Occupancy Workgroup	Roofs Wire/Cables FCIS Workgroup	I-2 Occupancy Workgroup
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# LOCAL AMENDMENTS

- Hazardous Materials – Chapters 27, 37, 39, 43, 44
- Flammable Liquids – Chapters 34, 35, 36, 38, 41
- Toxic Gas Ordinance (TGO)

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# LOCAL ISSUES

- Special issues:
  - Inventory Reporting  
Internet availability  
[www.unidocs.org](http://www.unidocs.org)  
ChemSW
  - Backflow Testing

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# LABORATORIES

- > 200 Sq. ft.
  - 2 exits – “Exit Access”
  - With 75 ft. of Exit
  - Door swing in direction of travel if Hazardous Materials are present
- Special Hardware
- Laboratory TGO Guidelines



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# VENTILATION

- Key Mitigator – For All Hazardous Conditions
- Capture Velocity –
  - Per Vapor Pressure
- Consistent with ACGIH

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# BATTERY ROOM EXPLOSION



## EXEMPT AMOUNTS

- Irritants – N.L.
- Sensitizer – N.L.
- Carcinogens – N.L.
- OHH – N.L.

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# IBC - CHAPTER 4 CONTROL AREAS

- New Concept
- 23 Control Areas
- IBC 414.2.2

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# IBC - CHAPTER 12

- Interior environment
  - Special regulation
  - Ventilation
  - Recirculation

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# IBC - CHAPTER 16

## Seismic

- I = 1.0, 1.25, 1.5
- To current code!

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# UMC / IMC

2006



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# UMC/IMC - CHAPTER 1

- Maintenance – As Constructed
- Hazardous Condition Abated
- Moved Equipment = New
- Unsafe Equipment!

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# UMC/IMC - CHAPTER 2

- Standards of quality
- Approved qualified welder
  - ASME
- Refrigerants
  - Recycled
  - Recovered
  - Reclaimed

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## UMC/IMC - CHAPTER 5

- Product Conveying –25% LEL
- Equipment – Motors & Fans

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## UMC/IMC - CHAPTER 6

- Duct Systems
  - Quality Standards
    - Metal Duct
    - Installation
    - Flame Spread
    - Galvanized Sheet Metal
    - Signal System - Fire, Smoke, etc...
    - Smoke Control

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# UMC/IMC - CHAPTER 11

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- Refrigeration
  - Safety Classification
  - Purity
  - New, Recovered & Reclaimed
  - Emergency Ventilation Control
    - Discharge @ 1/2 IDLH
  - NH<sub>3</sub>



# UMC/IMC - CHAPTER 11

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- High Probability
- Low Probability
- Machinery Room –  
Hazardous Occupancy per IBC
- Monitoring



# UMC/IMC - CHAPTER 12

- Hydronics
  - Steam & Water
  - Material
  - Fabrication
  - Testing
    - >100 psi or >50 psi over operating pressure

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## Summary of Trends in Refrigeration

- Increasing Environmental Pressures due to Green House effect and Ozone Depletion
- Increasing Awareness of Secondary Cooling Loops
- Ban on CFC's
- Increasing use of Natural Refrigerants
- Indirect / Secondary Cooling Systems

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# Wal-Mart in Aurora CO



**Wal-Mart  
Experimental store:  
Secondary Cooling-  
ABS with Armaflex for  
Medium Temp glycol  
Loop.**



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# Wal-Mart – Green Store

BUSINESS

LOS ANGELES TIMES

## Wal-Mart to Open 'Green' Store

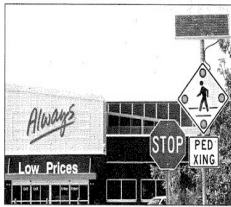
Environmentally friendly features will be used in an experiment in resource and energy conservation.

By ROSS VINCENT  
Times Staff Writer

Retail giant Wal-Mart Stores Inc. will open a prototype superstore in Texas today that relies heavily on "green" technology as an experiment in resource and energy conservation.

The project in the Dallas suburb of McKinney uses environmentally friendly features such as electricity-generating photovoltaic cells in the skylights. The store will collect rainwater from the roof and parking lot to test the landscaping near round.

Wal-Mart will open a second green store in Aurora, Colo., in October as part of a three-year test. Results from the experiments will be measured by independent auditors from Oak Ridge National Laboratory and



**PROTOTYPE:** This Texas Wal-Mart uses such green technology as solar-powered crossing signs and radiant floor heating.

Natural Renewal Energy Laboratory, who will make their findings public, said Don Moseley, head of experimental projects for Wal-Mart.

"A number of other big-box retailers are looking at this," said Rick Petritz, president of the nonprofit U.S. Green Building Council. "The No. 1 rule in retail is to get people in and have them

the most successful features into future Wal-Mart stores. The energy-efficient light emitting diode, or LED, lighting found in the Texas store will be used in other locations, Moseley said.

His favorite experiment is the radiant floor heating installed in store areas including the sometimes chilly maintenance pits in the garage where mechanics service customers' cars. Tubes below the concrete floor can fill with water heated by burning waste oil from the garage and cooling oil from the store's food service operations.

Other experiments include heat generated by refrigeration equipment being captured and used to heat the water in restroom sinks, said LPA President Dan Hirtzfeld. Fabric ducts hang 11 feet high will evenly distribute cool air in a manner expected to save enough electricity to power 70 homes. Condensation from air conditioners will be collected for plant irrigation.

Wal-Mart won't say how much the new stores cost to build, though the various experimental design elements did raise

the price of the Texas store, Moseley acknowledges.

Overall, the two green store will get about 8% of their energy from solar and wind power. Those technologies will save about 300,000 kilowatts of electricity a year, the retailer said.

Wal-Mart's move into green development may be in part an effort to polish its image, said retail consultant Bart P. Flickinger. "Wal-Mart has a big blue eye with American consumers for its wage and benefit level and aggressive expansion program, he said. "It could be an inspiring initiative, but it's to soon to tell."

In 2001 Wal-Mart agreed to pay a \$1-million fine and establish a \$4.5-million environmental-management program to settle federal charges that it violated Clean Water Act storm discharge rules at 17 sites in four states. Wal-Mart said the green stores weren't connected to the environmental settlements.

Wal-Mart shares closed Tuesday at \$40.74, down 23 cents. Bloomberg News was used in compiling this report.

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# UMC only - CHAPTER 14

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- Special Piping and Storage Systems
  - (Formerly Process Piping)
- Inspection:
  - >100 psi
  - >1.5 x Max Oper. Pressure



# PIPE RACK

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# UMC only - CHAPTER 14 (CONT.)

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- HPP Fluids
  - In Accordance with Fire Code
  - Excess Flow Control
  - All Welded
  - Gas Detection



# IFC – CHAPTER 1

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- Supplemental Rules & Regs
  - Chief is required to make regulations available to the Public
- Alternate Methods
  - Building Official Involvement
- Existing Conditions
  - Life Safety
- Stop Uses



# IFC – CHAPTER 10

## Fire Protection Systems

- Quarterly Tests for High Risk Facilities
- Annual Inspection for Automatic Fire Extinguishing Systems
- Sprinklers / Water Reactives



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# IFC – CHAPTER 11

## General Safety

- Flame Restriction – 8 inches Max
  - In Restaurant Food Preparation
- Maintenance of Fire Resistive Construction

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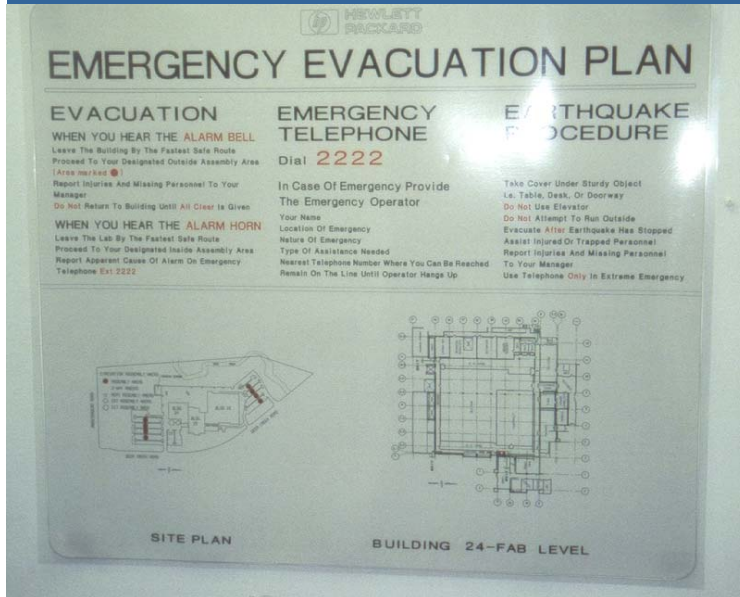


# EVACUATION PLAN

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**HEWLETT  
PACKARD**

## EMERGENCY EVACUATION PLAN

EVACUATION	EMERGENCY TELEPHONE	EARTHQUAKE PROCEDURE
<b>WHEN YOU HEAR THE ALARM BELL</b> Leave The Building By The Fastest Safe Route Proceed To Your Designated Outside Assembly Area (Arise marked ●) Report Injuries And Missing Personnel To Your Manager Do Not Return To Building Until All Clear Is Given	Dial <b>2222</b>  In Case Of Emergency Provide The Emergency Operator Your Name Location Of Emergency Nature Of Emergency Type Of Assistance Needed Nearest Telephone Number Where You Can Be Reached Remain On The Line Until Operator Hangs Up	Take Cover Under Sturdy Object i.e. Table, Desk, Or Doorway Do Not Use Elevator Do Not Attempt To Run Outside Evacuate After Earthquake Has Stopped Assist Injured Or Trapped Personnel Report Injuries And Missing Personnel To Your Manager Use Telephone Only In Extreme Emergency

**WHEN YOU HEAR THE ALARM HORN**  
Leave The Lab By The Fastest Safe Route  
Proceed To Your Designated Inside Assembly Area  
Report Apparent Cause Of Alarm On Emergency Telephone Ext: 2222

**SITE PLAN**      **BUILDING 24-FAB LEVEL**



# IFC – CHAPTER 14

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## Fire Safety During Construction, Alteration or Demolition of a Building

- Access Roads
- Fire Protection
- Stand Pipes – 4 Stories
- Heating Devices



## San Jose Mercury News

A fire broke out Monday afternoon, August 19, at Santana Row, a \$750,000,000 retail and residential complex under construction in west San Jose. Flying embers set several homes and apartments to the south on fire, displacing over a hundred residents. A total of 11 alarms responded to all related fires. More than a dozen neighboring fire departments assisted San Jose in controlling the blaze...



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## IFC – CHAPTER 22

### Repair Garages

- Flammable Gas Requirements
  - H<sub>2</sub>, CH<sub>4</sub>
- Ventilation
- Gas Detection
- Detector Annunciation

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## IFC – CHAPTER 26

- Welding & Hot Work
  - Cutting, Welding, Open Torch, Brazing, Glass Blowing & Similar Operations
  - 30 Minute fire watch when combustibles are present
  - Permit required
  - Hot Work Inspector
    - Report / Signoff



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## IFC – CHAPTER 26

- 20 ft. separation + 15 psi limit
- Arc Welding Safety
  - Emergency Disconnect
- Fixed Hot Work
  - Fire Protection
- Signs posted

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# FUEL DISPENSING

## • STATIC CHARGE IGNITION



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# UFC – ARTICLE 32

- Cryogenic Fluids
  - Foundation & Support
  - Temperature Effects
  - Pressure Relief Devices
    - Accessibility
    - Shutoffs
  - ANSI A13.1

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Pickup truck on which the cylinder was being transported



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Cylinder exploded at 12:40 PM while transport vehicle was parked on busy Interstate highway



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## IFC – CHAPTER 34

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- Flammable & Combustible Liquids
  - Special Fire Protection
  - Maintenance to Current Code
  - Spill Control – All Quantities
  - Secondary Containment – All Quantities



## IFC – CHAPTER 34

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- Flammable & Combustible Liquids  
(cont.)
  - Backflow Valves into Tanks
  - Manual Control Valve at Approved Location
  - Welded Concealed Joints
  - Support for Tanks and Pipe – 2hrs.



# EXPLOSIVE LIMITS

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Chemical	LEL	UEL	Optimal
Acetone	2.5%	15%	5.0%
Acetylene	2.5%	83%	8.0%
Ammonia	15%	28%	17%
Gasoline	1.4%	7.6%	1.6%
Hydrogen	4.0%	75%	8.0%
Methane	5.0%	15%	9.0%
Toluene	1.2%	7.1%	2.5%



# PRESSURE/VACUUM RELIEF VENTS

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# PROTECTED ABOVEGROUND TANKS

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# PROTECTED ABOVEGROUND TANKS

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# FLAMMABLE LIQUID CABINET

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# FLAMMABLE LIQUID CABINET after FIRE

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# IFC – CHAPTER 27

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- Hazardous Materials
  - Applies to all materials at any quantity
  - Approved Designs
  - Road Map...



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## IFC – CHAPTER 27

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- Hazardous Materials (cont.)
  - Equipment and Machinery Listed or Approved
  - Defective Equipment Removed from Service



## IFC – CHAPTER 27

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- Design and Construction
  - Piping , tubing, valves, fittings and related components used for hazardous materials shall be in accordance with the following:
    - Piping, tubing, valves, fittings and related components shall be designed and fabricated from materials compatible with the material and...
    - Seismic



# PIPING EXPANSION LOOP

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# SPECIAL ALLOYS

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- Monel
- Nickel
- Hastelloy
  - B
  - C
  - D



# EMERGENCY CONTROLS



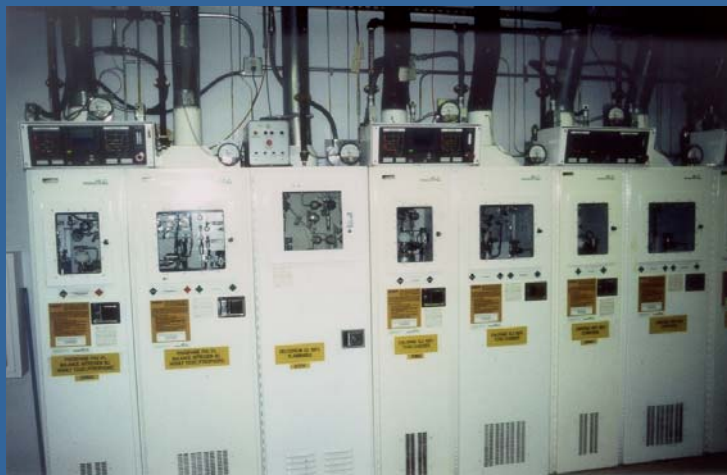
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# GAS CABINETS



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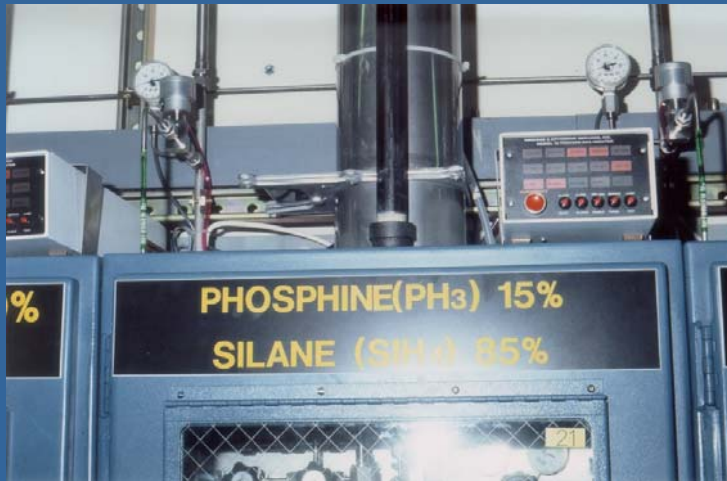


# GAS CABINET PYROPHORIC

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## IFC – CHAPTER 27, 37

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- Storage
  - Liquid Cabinet Construction
  - Seismic Shelves
  - Retail Systems
  - Treatment System Exceptions
    - Gas Tight Valve Caps
    - Secured Handles
    - Coffins – Training Req.



# LEAKER CABINET



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# CYLINDER COFFIN

- "Containment Vessel" added to definitions



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# LEAKER CAP

A gas-tight recovery system

?



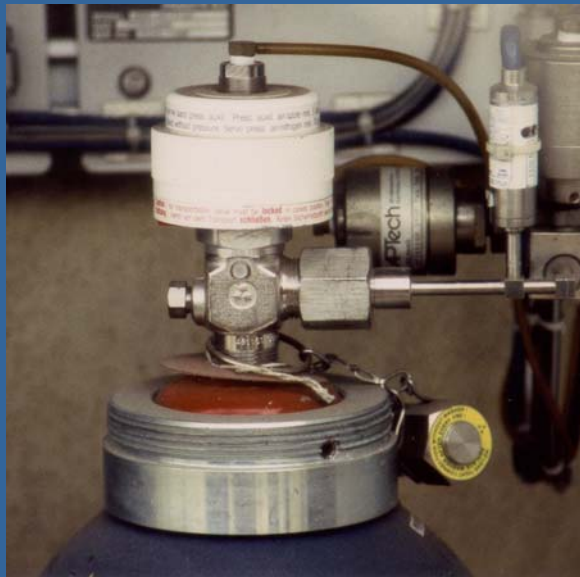
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# PNEUMATIC CYLINDER VALVE



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# IFC – CHAPTER 41

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- Pyrophoric Gases
- Secondary Containment Provisions
- Unstable Reactives 2= Flammable
- Highly Toxic – 10 lbs.
- Exempt Amount Outdoor Cont. Area



## DENTIST OFFICE FIRE CYLINDER STORAGE LOCATION



## CYLINDER REMNANTS



## IFC

- Appendix
  - Ozone Generation
  - Fire Flow
  - Classification
    - LC 50 for Mixtures
  - Hazard Ranking
  - Relief for Above Ground
  - Cryogenics Weight & Volume
  - Refrigerants

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# FUME HOODS



Laboratory fume hoods may be closed systems.

Bio-Safety hoods may also be closed systems when exhausted outside the building.



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# BIOTECH

- Biosafety in Microbiological and Biomedical Laboratories
- “B” - Occupancy
- “H” - Occupancy
- Biosafety Levels – 1,2,3,4



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# CONCERNS

- Industry shift away from biology based research towards more chemical intensive research
  - Small Molecules
  - Combinatorial Chemistry
  - Medicinal Chemistry



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# CONCERNS

- GLPc
- Increase in HPLC use
- High throughput HPLC's



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# REGULATORY CONCERNS

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## Blast, fire injures three at UC Irvine science lab

IRVINE, Calif. (AP) -- Three people were injured, years of research were lost and as much as \$10 million in damage was inflicted by a fire in the University of California, Irvine's physical science building. The fire erupted Monday afternoon on the second floor of the six-story building, said Orange County Fire Authority spokesman Dennis Shell. Authorities told the Orange County Register the disaster began about 3:45 p.m. as graduate student Cy Fujimoto purified benzene under a hooded ventilation system on a second floor lab...



# GRAVITY DRAIN SYSTEMS

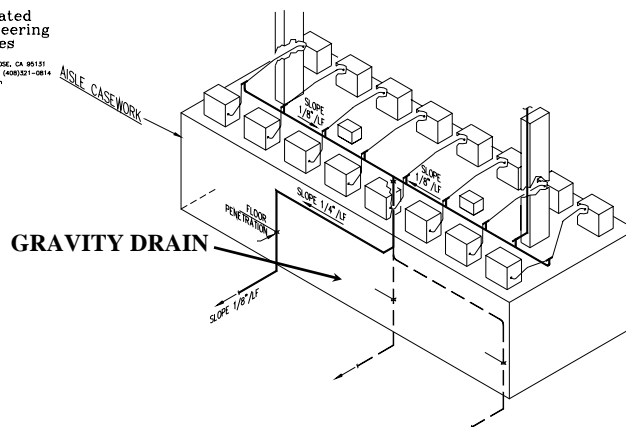
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## ADDITIONAL REGULATORY CONCERNS

- Fire Sprinklers in Hoods
- Fire Sprinklers in Ducts.
- Cold Room Storage
- Biohazards

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## FUME HOODS SPRINKLERS

- Laboratory fume hoods where flammable materials are dispensed shall be protected by an automatic fire-extinguishing system.
- NFPA 45-6.10 Exception 2  
“If a hazard assessment shows that an automatic extinguishing system is required, then the applicable system shall be provided.”
- S.C. County local Fire Code amendments requires fire protection for all workstations containing hazardous materials.

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## FUME HOOD FIRE



## FLAMMABLE CONCERNS

- Provide sufficient ventilation to maintain concentration  $< 25\%$  LEL
- Limit volume of solvent to maintain concentration  $< 25\%$  LEL

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# FLAMMABLE CONCENTRATION

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- Example: 4' Fume Hood with 18" Sash Height
  - Area: 2.5' X 4' = 10 sq.ft.
  - Exhaust Rate: 1.5' X 4' X 100 fpm = 600 cfm

Solvent	Evaporation Rate (g/min)	Min. Exhaust (cfm)	Max. Volume (ml)
Acetone	260	544	NL
Diethyl Ether	508	1140	489
Isopropyl Alcohol	46	120	NL

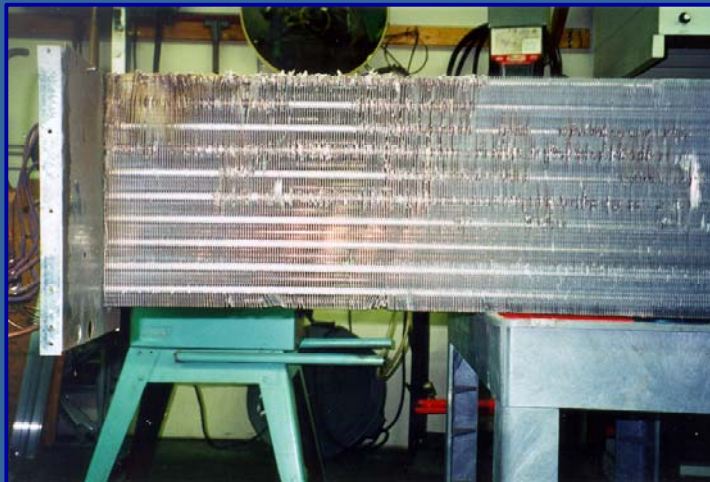


# COLD ROOM HAZARDS

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# Bio-Safety Controls

- LABORATORY PRACTICES & TECHNIQUES
  - Personnel Training
  - Personal Protection Equipment
- SAFETY EQUIPMENT (PRIMARY BARRIERS)
  - Biological Safety Cabinets (BSCs)
  - Enclosed Containers & Hoods
  - Centrifuge Cups
- FACILITY DESIGN (SECONDARY BARRIERS)
  - Separation of Laboratory Work Area
    - Isolation
    - Treatment
    - Airlocks

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# Pharmacies [CA]

- A pharmacy shall have a designated area for preparation of sterile products which is ventilated in a manner so as not to interfere with laminar air flow
- Bio-hood required for preparing parenteral cytotoxic agents
  - Class II, Type A or B laminar hood
  - Bag in – Bag out filter
  - Plenums must be negative pressure and leak tight

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# HISTORY OF T.G.O

- 1986
  - Based on Experience
  - Finished HMSO
  - Hazard classification
    - MHI Concept
    - IDLH ⇒ IFC
  - Consensus Guidelines



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# .HISTORY OF T.G.O. (CONT)

- 1995 – Blending in of CHAPTER 80
  - Milpitas, San Jose & Santa Clara
- 1997 – Laboratory Standards
  - Stanford University
- 1998 – Modernization
  - LC 50
- 2002 – Re-Adoption
- 2006 – Re-confirmation

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# CONCLUSION

- My conclusion is My beginning.
- A rational and balanced approach to safety issues based on Current Data.
- “The greatest barrier to learning the truth is to be convinced that you already know it.”

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