



# FIRE SAFETY DURING CONSTRUCTION & DEMOLITION



## Sandia National Laboratories-NM Fire Protection Engineering

April 29, 2008

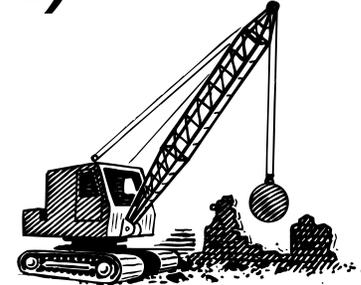
Julie V. Cordero, PE

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.





## Fire Statistics (1994-1998)



	<b>Construction</b>	<b>Demolition</b>
<b>Fires</b>	~ 4800/yr	~ 1100/yr
<b>Injuries</b>	~ 30	~ 12
<b>Fatalities</b>	~ 10	0
<b>Property Damage/Losses</b>	\$ 35.2 M	\$ 19 M

*National estimates based on NFIRS and NFPA survey*



## Statistics - Fire Causes

<b>Leading Cause</b>	<b>Construction (%)</b>	<b>Demolition (%)</b>	<b>Renovation (%)</b>
Incendiary/ Suspicious	39.5	34.0	32.4
<b>Open Flame/ Torch Use</b>	<b>28.0</b>	<b>51.7</b>	<b>39.0</b>
Heating Equip.	10.0	3.2	6.1
Other Equip.	7.1	2.1	6.3
Smoking	5.3	6.5	6.9
Electrical Distribution	3.1	0.6	7.7
Other Areas, Exposing Site	7.0	1.9	2.7

National estimates based on NFIRS and NFPA survey



## Recent Incidents



Date	Location	Fatalities	Injuries	Site Type
Aug 2007	NYC	2 (firefighters)	0	Demolition
Jan 2008	NYC	1	2	Construction
Jan 2008	CA	1	2	Demolition
Jan 2008	NYC	1	1	Construction
Jan 2008	LV	0	0	Renovation





## ***Reported Incidents***

- Many fires and other incidents are ***NOT*** reported
- Rate of ***REPORTED*** and ***NOT REPORTED*** incidents are increasing nationwide
- ***Liabilities*** and ***litigation*** are increasing as the rate of incidents rises





# ***Why Does SNL-NM Follow Fire and Life Safety Codes?***

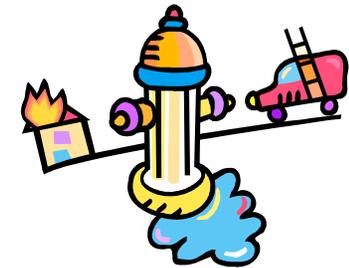
## **Protect the People**

- Prevent Injuries
- Prevent Death
- Allow the workers to return home safely



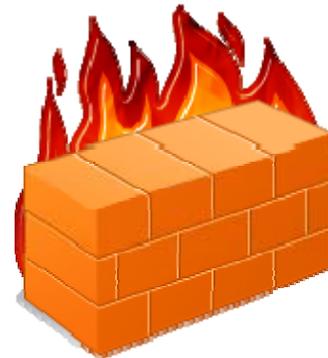
## **Protect the Property**

- Prevent dangerous fires at the site
- Prevent fires from spreading to exposures



## **Protect the Mission**

- Prevent lost time at work





## ***Codes In Use at SNL-NM***



- **DOE Order 420.1B** defines requirements for providing safety to life and property from fire
- **International Fire Code (IFC)**, 2006 Edition, Chapter 14, *“Fire Safety During Construction and Demolition”* (references NFPA 241/2000)
- **National Fire Protection Association (NFPA) 241**, 2000 Edition, *“Safeguarding Construction, Alteration and Demolition Operations”*
- **SNL-NM Fire Protection Engineering Document**, January 2008, *“Fire Protection Requirements Checklist for Maintaining Fire Safety During Construction and Demolition Operations”*



**SNL-NM**

***Fire Protection Requirements Checklist For  
Maintaining Fire Safety During Construction and  
Demolition Operations***

**Objective**

- General checklist to assist Project Managers and Contractors maintain Fire and Life Safety at Construction and Demolition Sites
- Highlights most important aspects from lessons learned
- Document is a guide, not a substitution, for following the applicable Codes (***IFC and NFPA 241***)





**SNL-NM**

***Fire Protection Requirements Checklist For  
Maintaining Fire Safety During Construction and  
Demolition Operations***

**What The Checklist Covers**

- ✓ Owner's Responsibility for Fire Protection
- ✓ Planning
- ✓ Limiting Combustible Materials
- ✓ Permitting
- ✓ Maintaining Egress and Emergency Vehicle Access
- ✓ Maintaining Operability of Required Fire Protection Systems



## **SNL-NM**

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***

### **Owner's Responsibility for Fire Protection**

SNL-NM; Project Manager is designated as the owner

- ✓ The owner shall designate an individual to be the Fire Prevention Program Superintendent
- ✓ The owner shall ensure that the Fire Prevention Program is carried out to completion of the project
- ✓ The owner shall have the authority to enforce the following provisions



## **SNL-NM**

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***

### **Planning**

- ✓ Facility specific information on the demolition site shall be provided to the Fire Department to support their pre-fire planning
- ✓ Electrical service shall be reduced to a minimum, and the identity of energized circuits shall be ensured to avoid any uncertainty
- ✓ Prior to demolition, gas supplies shall be turned off and capped at a point outside the building. Purge gas lines inside the building
- ✓ A written Fire Prevention, Fire Suppression, and Emergency Evacuation Plan shall be developed and maintained current



## SNL-NM

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***

### **Limiting Combustible Materials**

- ✓ Combustible debris, rubbish, and waste material shall be removed from the building at the end of each shift of work, or more frequently as necessary for safe operations
- ✓ Materials susceptible to spontaneous ignition (e.g., oily rags) shall be stored in a listed disposal container
- ✓ Storage of flammable and combustible liquids shall be in accordance with IFC, Section 3404
  - Approved cabinets and signs, locations, quantity, leaks, spills, and protection



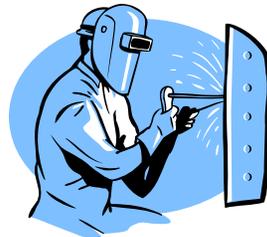


## **SNL-NM**

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***

### **Permitting**

- ✓ Cutting and welding operations shall require a hot work permit
- ✓ Impairments to the fire protection systems or fire alarm systems shall be authorized by Fire Protection Engineering





## **SNL-NM**

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***

### **Maintaining Egress and Emergency Vehicle Access**

- ✓ Required means of egress shall be maintained for duration of demolition
- ✓ Vehicle access shall be maintained for fire fighting apparatus
- ✓ Free access from street to fire hydrants, to fire department connections, to outside connections for standpipes, to sprinklers and to other fire extinguishing equipment shall be provided and maintained at all times





## SNL-NM

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***



### **Maintaining Operability of Required Fire Protection Systems**

- ✓ Operation of the existing fire alarm and fire protection systems shall be preserved as much as possible during the demolition
  - Fire alarm reporting capability (e.g., manual pull station, telephone) shall be readily available
  - Sprinkler protection shall be retained in service as long as the condition (e.g., combustibles, energy sources) requiring the use of sprinklers exists
    - Fire alarm water flow detection devices shall remain in service to send signals to an operable fire alarm control panel capable of reporting alarms to emergency responders. Tamper switches can be removed from service as long as the control valves are locked in the normal operating position by Facilities Maintenance
  - Standpipes shall be maintained in conformity with the progress of demolition activity in such a manner that they are always ready for fire department use

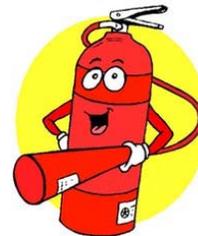


## SNL-NM

# ***Fire Protection Requirements Checklist For Maintaining Fire Safety During Construction and Demolition Operations***

### **Maintaining Operability of Required Fire Protection Systems**

- ✓ During cold-weather demolition operations, building heat shall be maintained to allow the operation of sprinklers in areas not in the process of demolition. The minimum temperature at the extremities of such areas equipped with wet sprinkler systems shall be 40F
- ✓ Fire doors shall be closed at the end of each working day
- ✓ A fire extinguisher shall be provided in plain sight on each floor at each usable stairwell and exit when combustible material is present





# **SNL-NM**

## ***Fire Safety During Construction and Demolition Operations***

### **Fire Protection Engineering Department Responsibilities**

- Communicate requirements → Checklist
- Enforce requirements → Site Visits





## ***IFC and NFPA 241 Brief Highlights***

- ***Unlawful to occupy*** any portion of a building or structure until the sprinkler system has been tested and approved
- Fire protection device ***coverings*** used during construction and demolition shall be immediately removed upon completion of the work
- Temporary wiring for ***electrical*** power and lighting installations shall comply with the ICC Electrical Code (NEC at SNL-NM)
- ***Smoking*** prohibited except in approved areas



## Summary

- *NFIRS and NFPA statistics - growing number of fire and life safety incidents occurring across the nation*
- *Need for enforcement of applicable fire and life safety codes!*
- *The lives lost, injured people, cost in property damage, and the litigation involved is **NOT** worth it!!!*

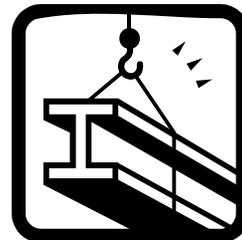
***Follow the Codes → prevent a fire incident → return home safely to your family each day!***





## ***Publications Referenced***

- **IFC**, 2006 Edition, Chapter 14, “*Fire Safety During Construction and Demolition*”
- **NFPA 241**, 2000 Edition, “*Safeguarding Construction, Alteration and Demolition Operations*”
- **SNL-NM**, January 2008, “*Fire Protection Requirements Checklist for Maintaining Fire Safety During Construction and Demolition Operations*”
- **U.S. Fire Administration**, Topical Research Series, Vol. 2, Issue 14, November 2001 “*Construction, Demolition and Renovation Site Fires*”





QUESTIONS  
???

