

Health and Safety Aspects of the Construction Industry



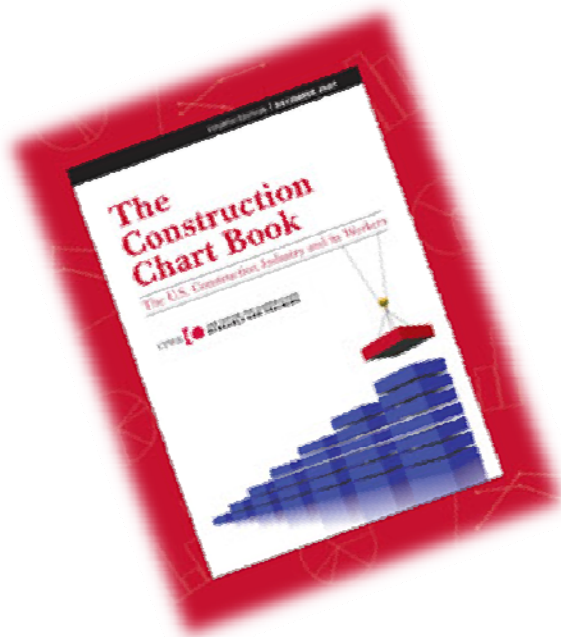
Occupational Health: The Anna Baetjer Course
Bruce Lippy, Ph.D., CIH, CSP
Director of Safety Research, CPWR
5/5/12

Topics we will cover:

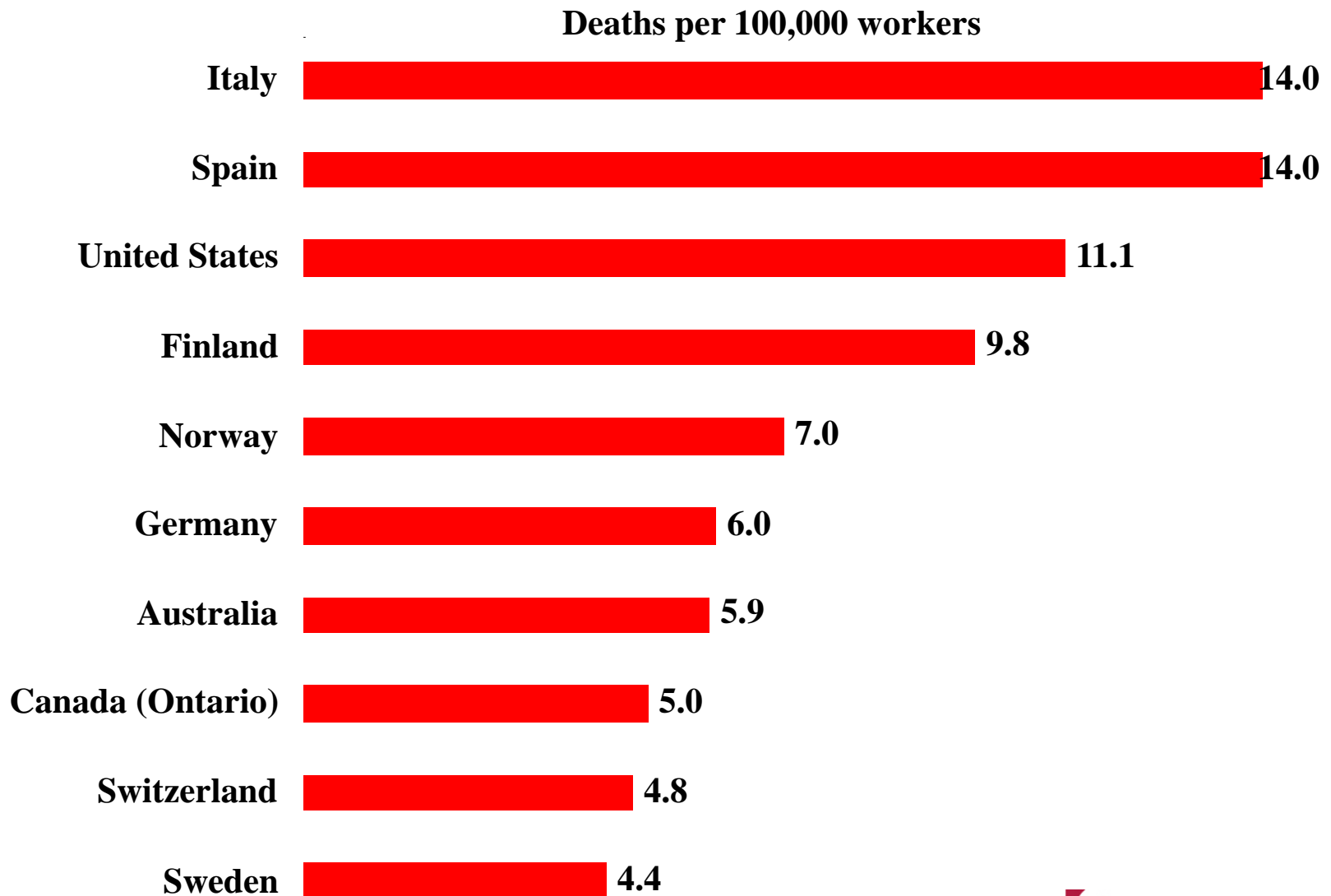
- 1. Fatality and injury data for the construction industry**
- 2. Major hazards on construction sites**
- 3. Managing and controlling construction exposures**
- 4. Safety of green construction**
- 5. Construction workers during disaster responses**

Topic One

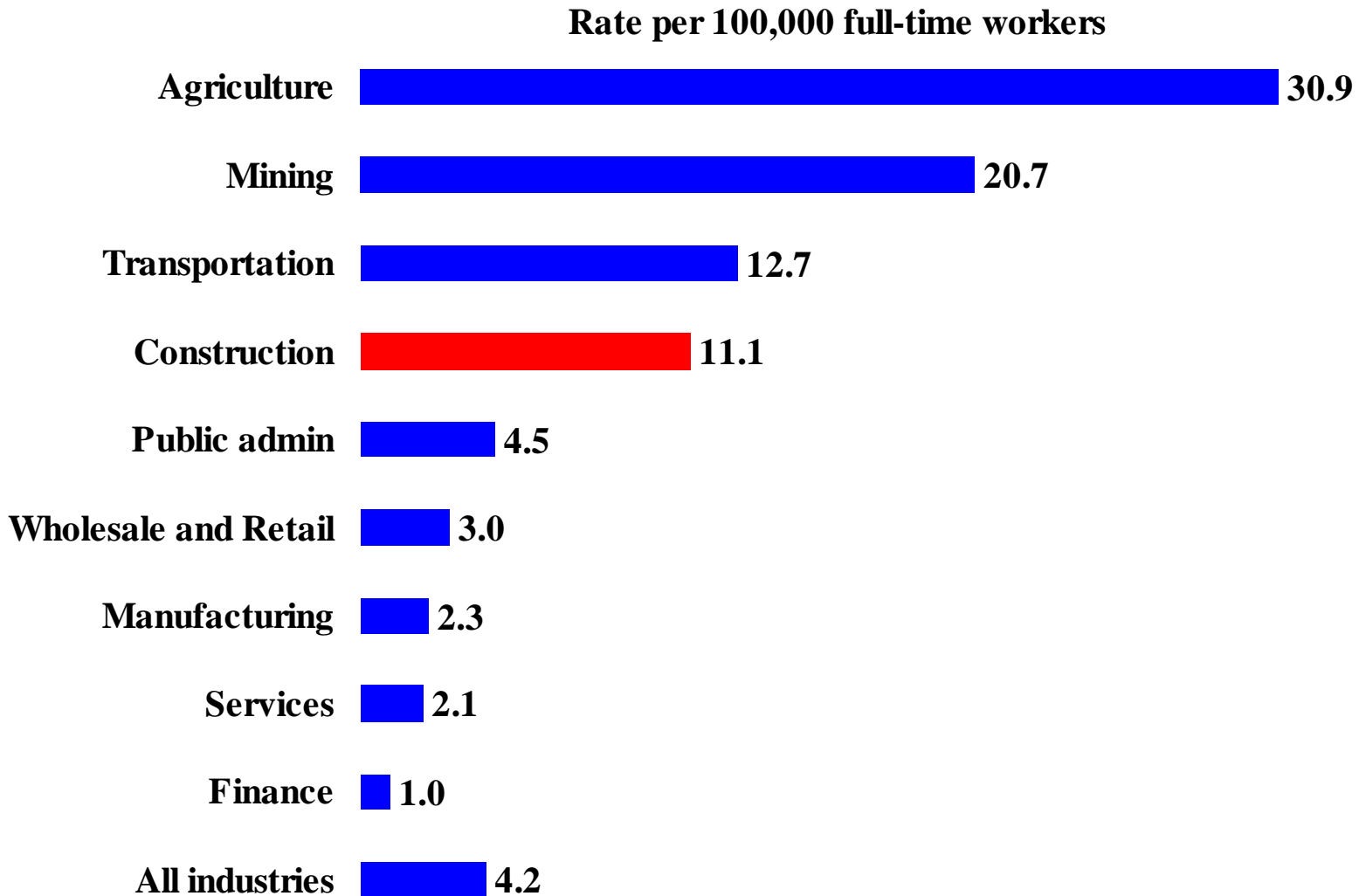
Fatality and injury data for the construction industry



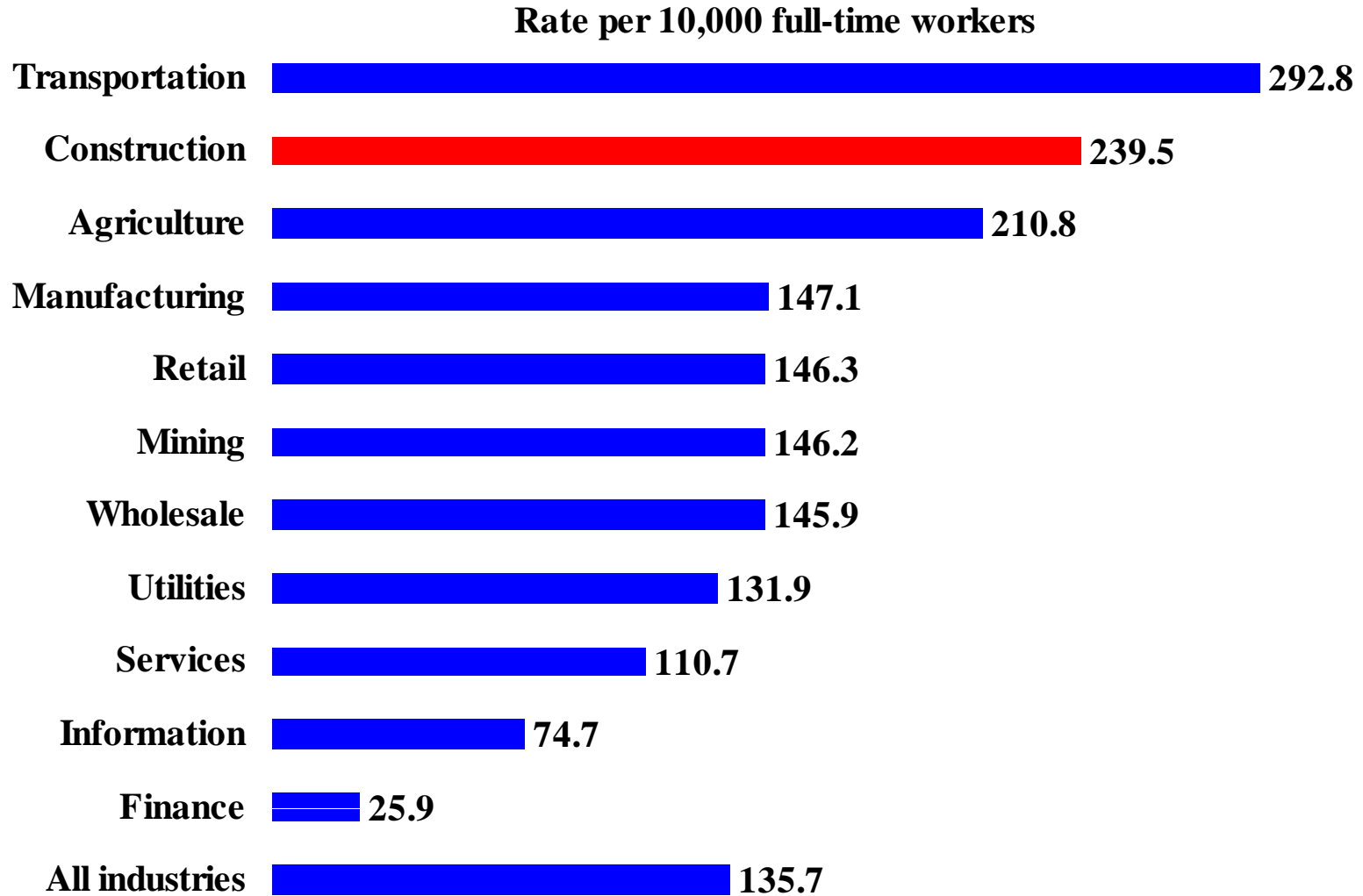
Rate of deaths from injuries in construction, selected countries, 2005



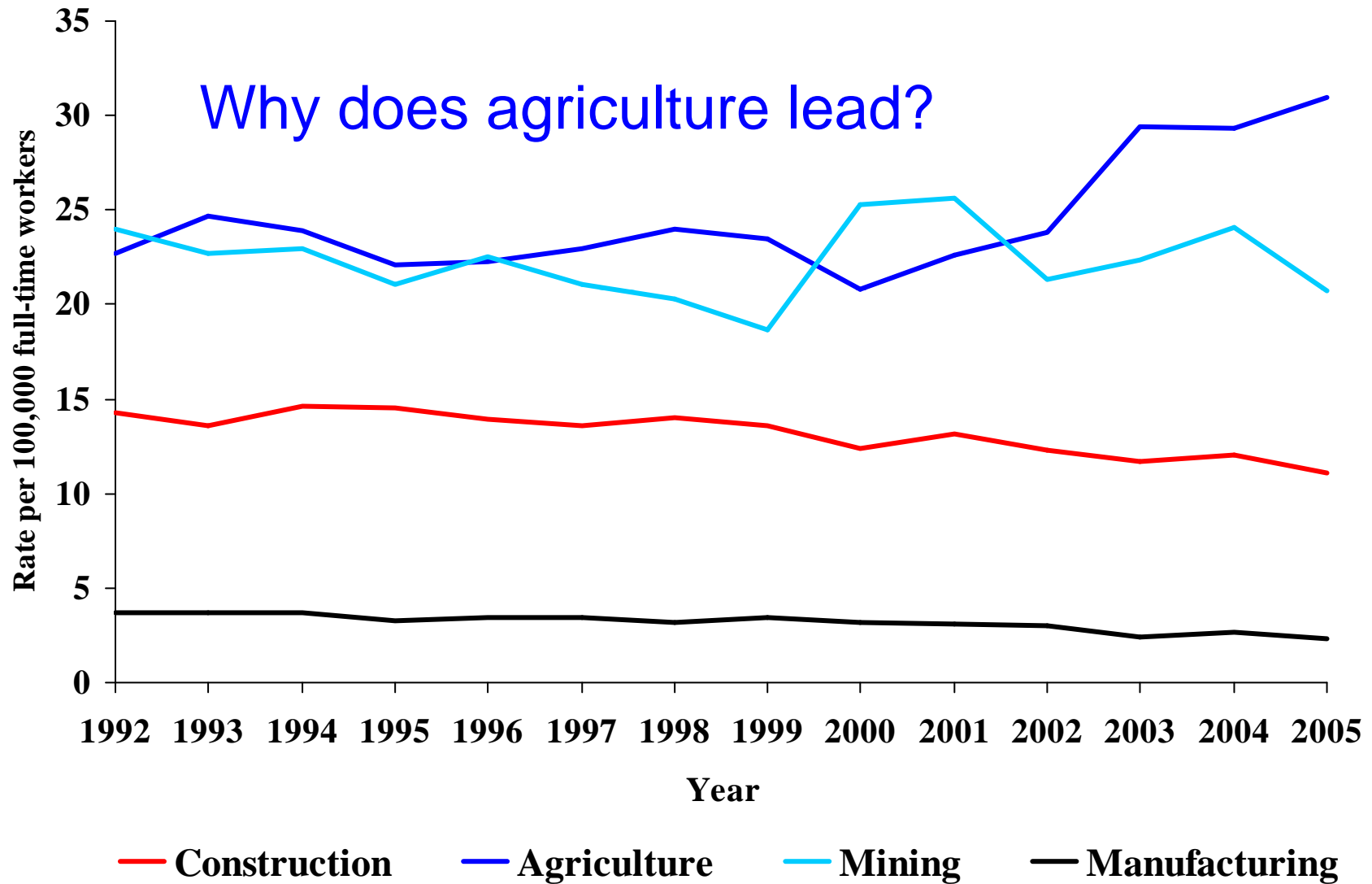
Rate of work-related deaths from injuries, by major industry, 2005 (All employment)



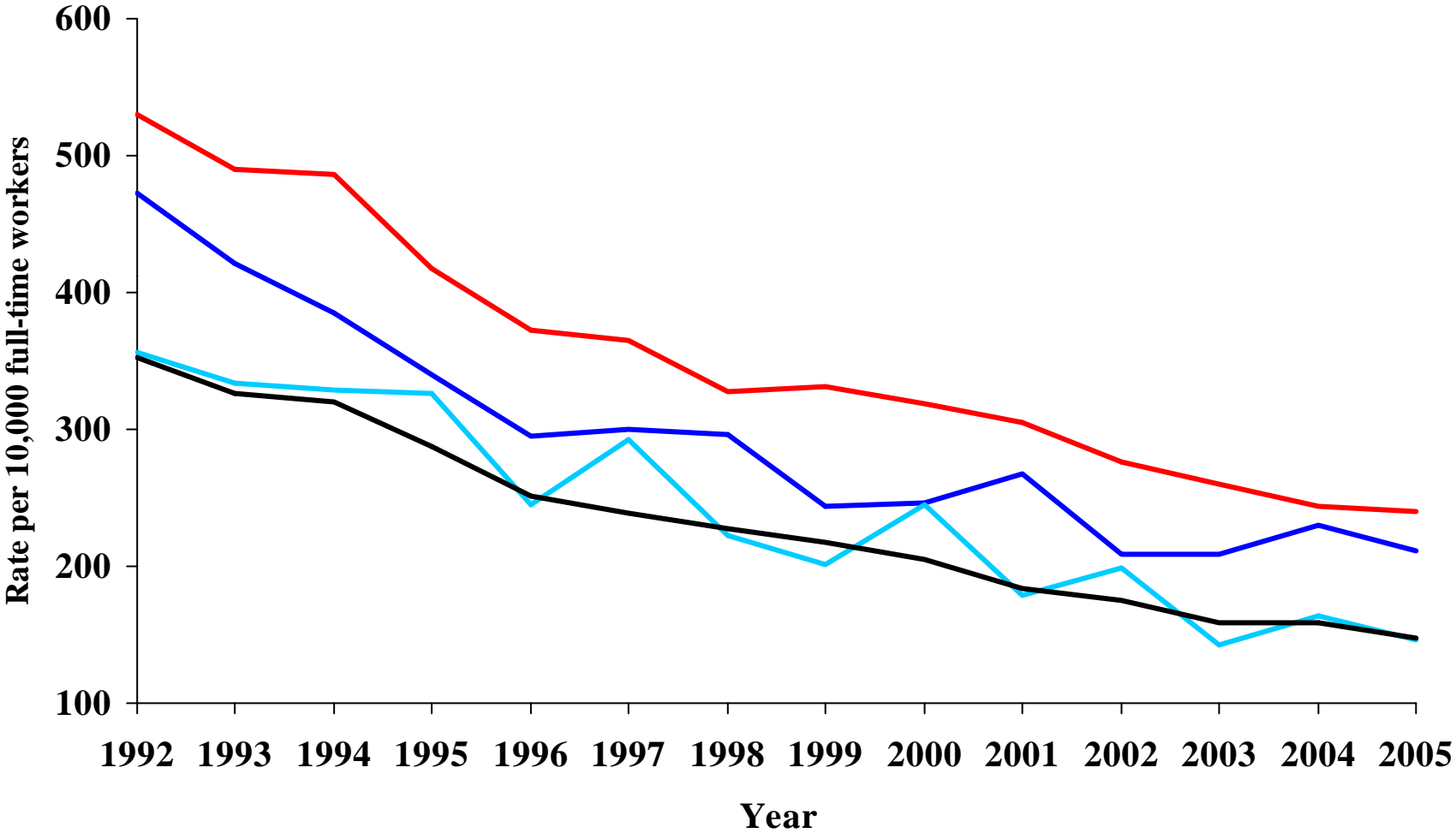
Rate of nonfatal injuries and illnesses with days away from work, by major industry, 2005 (Private wage-and-salary workers)



Rate of work-related deaths from injuries, selected industries, 1992-2005 (All employment)

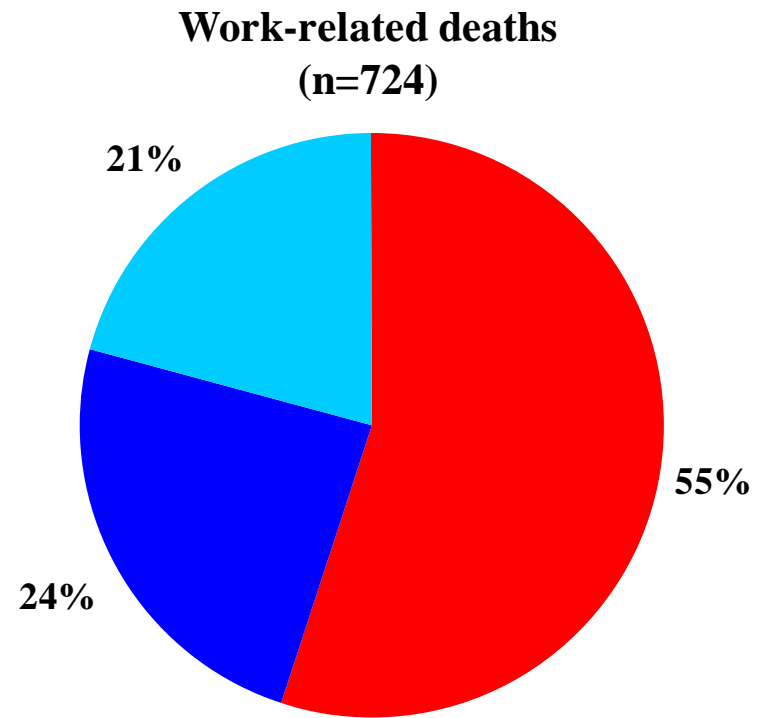
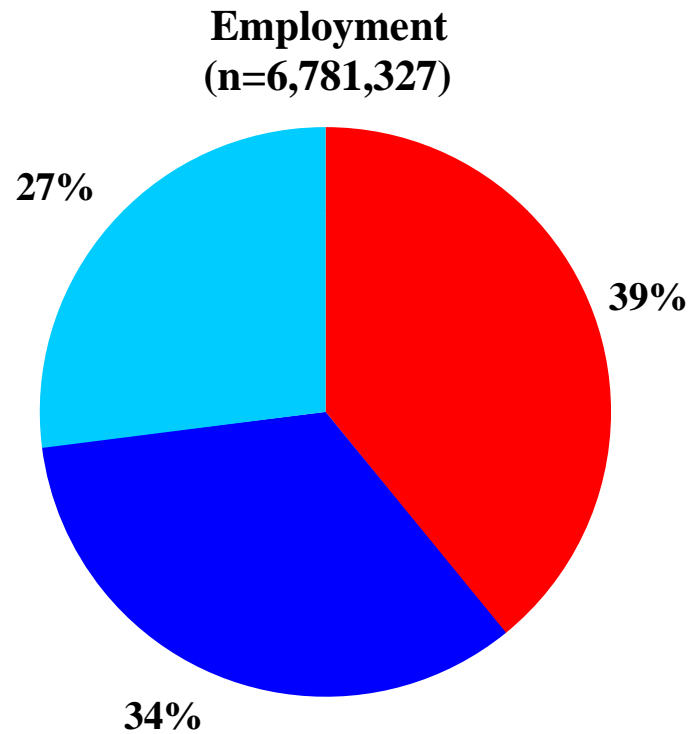


Rate of nonfatal injuries and illnesses with days away from work , selected industries, 1992-2005 (Private wage-and-salary workers)



— Construction — Agriculture — Mining — Manufacturing

Distribution of construction employment and work-related deaths from injuries, by establishment size, 2005

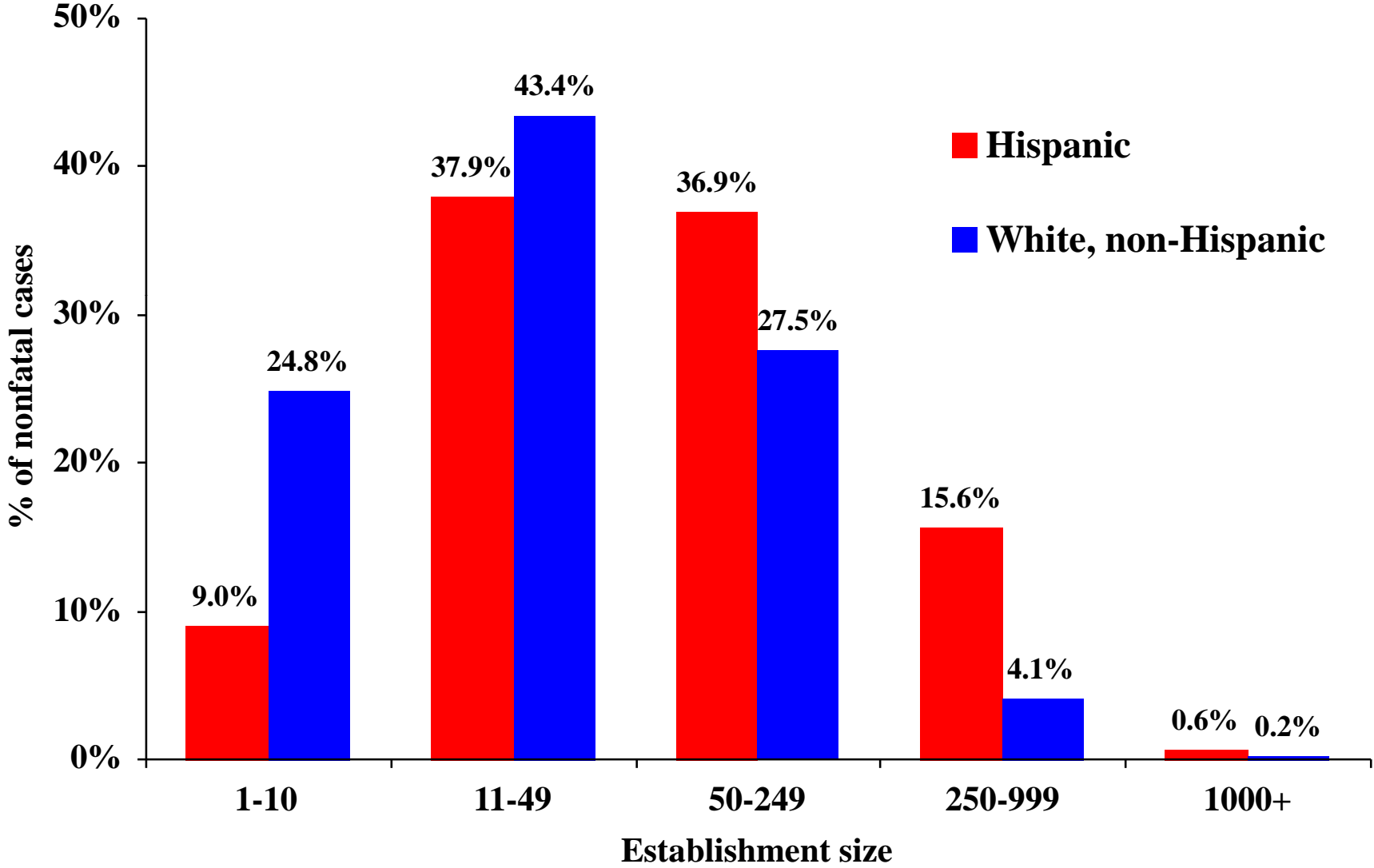


■ 1-19

■ 20-99

■ 100+

Percentage of injuries and illnesses resulting in days away from work, by ethnicity and establishment size, 2005

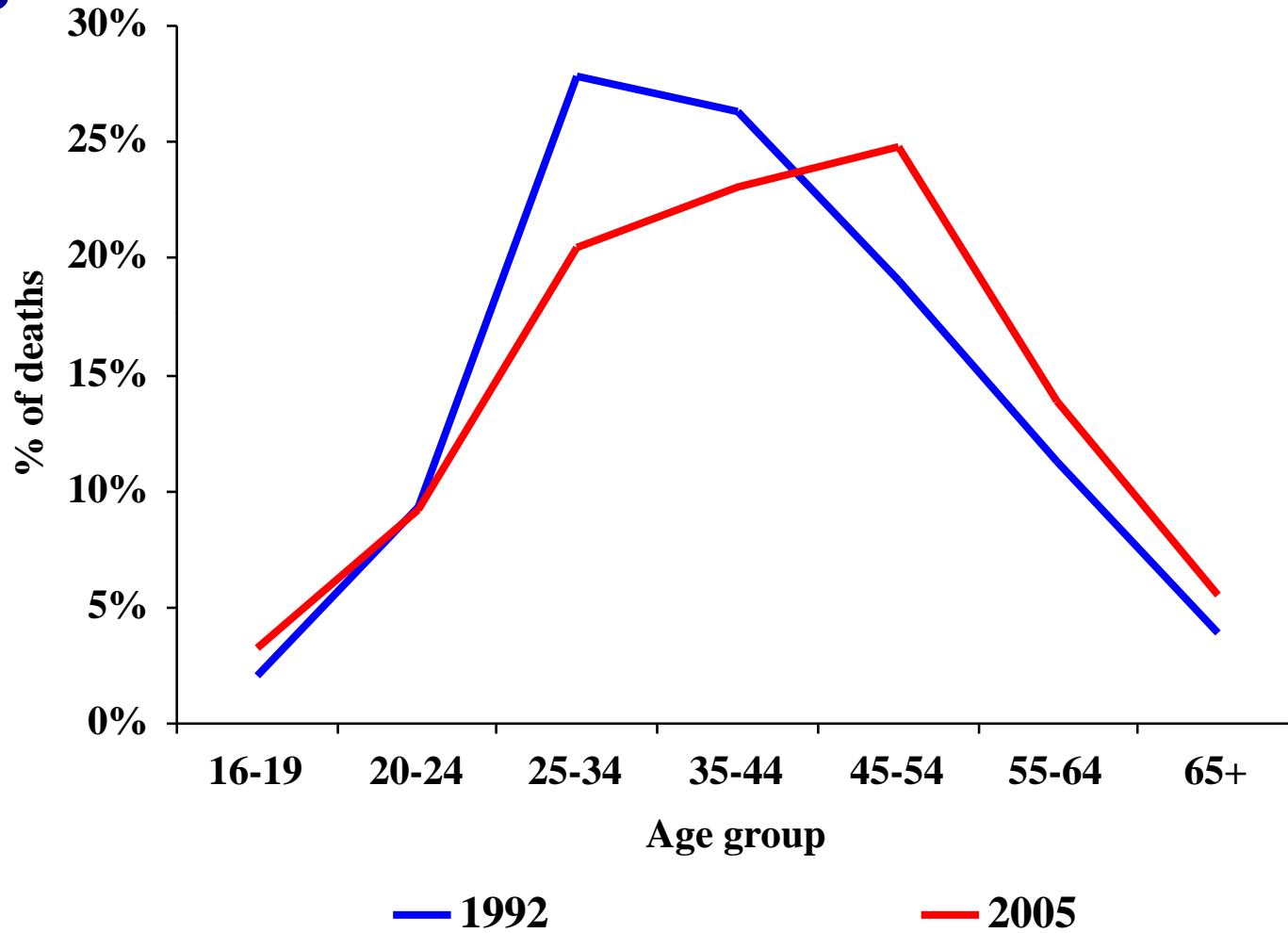


Latino crew at the leading edge

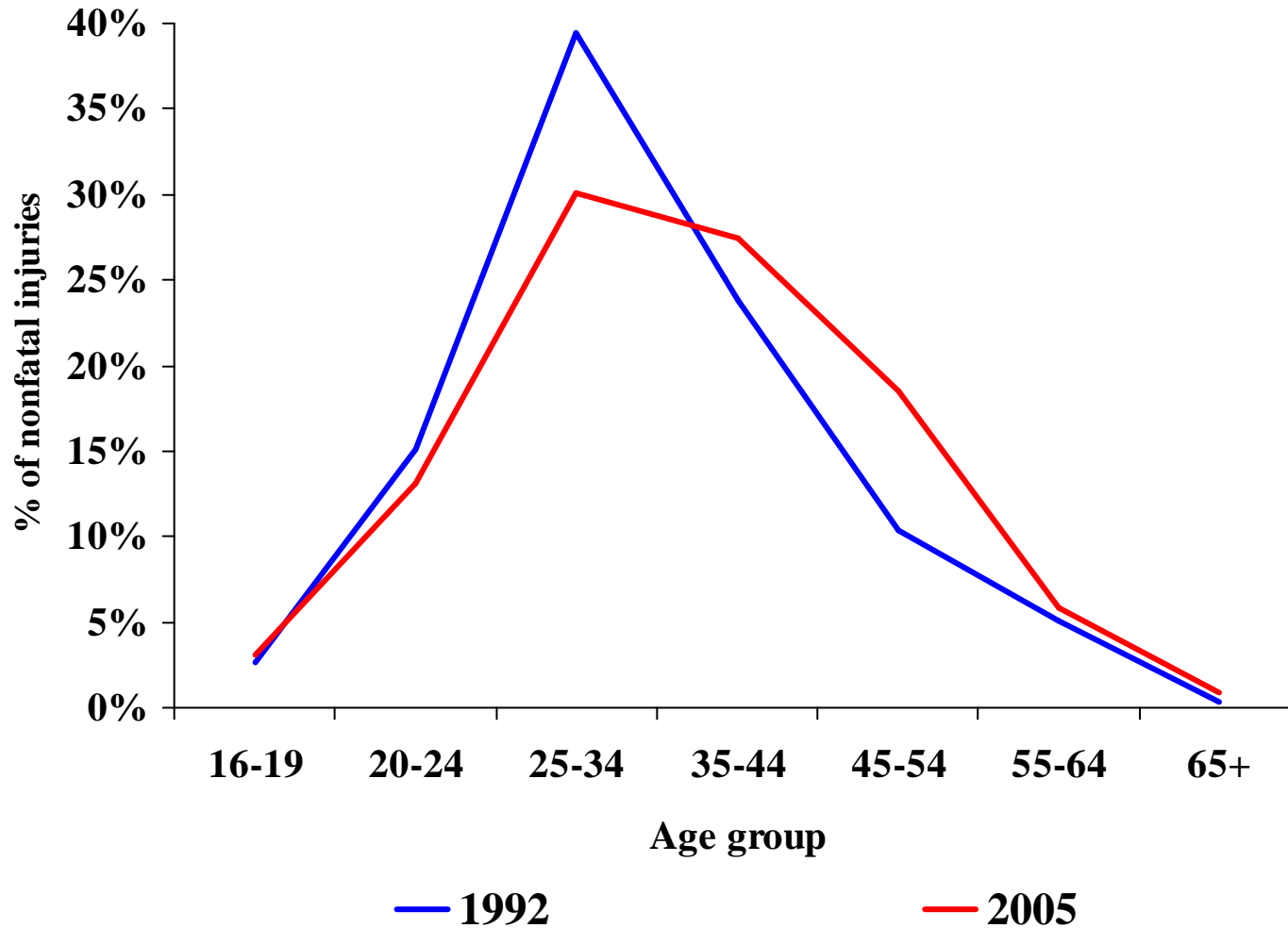


Photos courtesy of Robert Carr

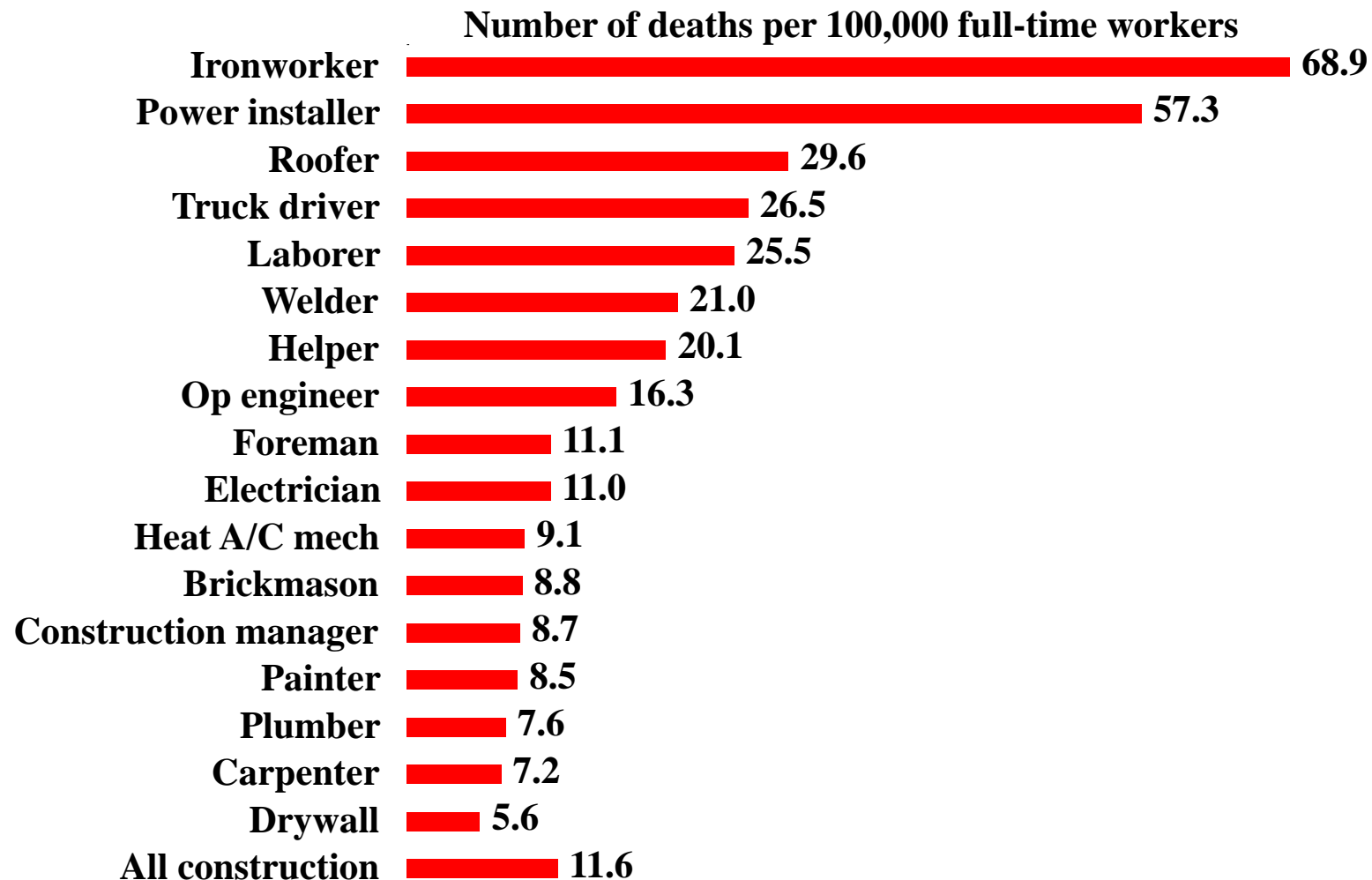
Distribution of deaths from injuries in construction, by age group, 1992 versus 2005



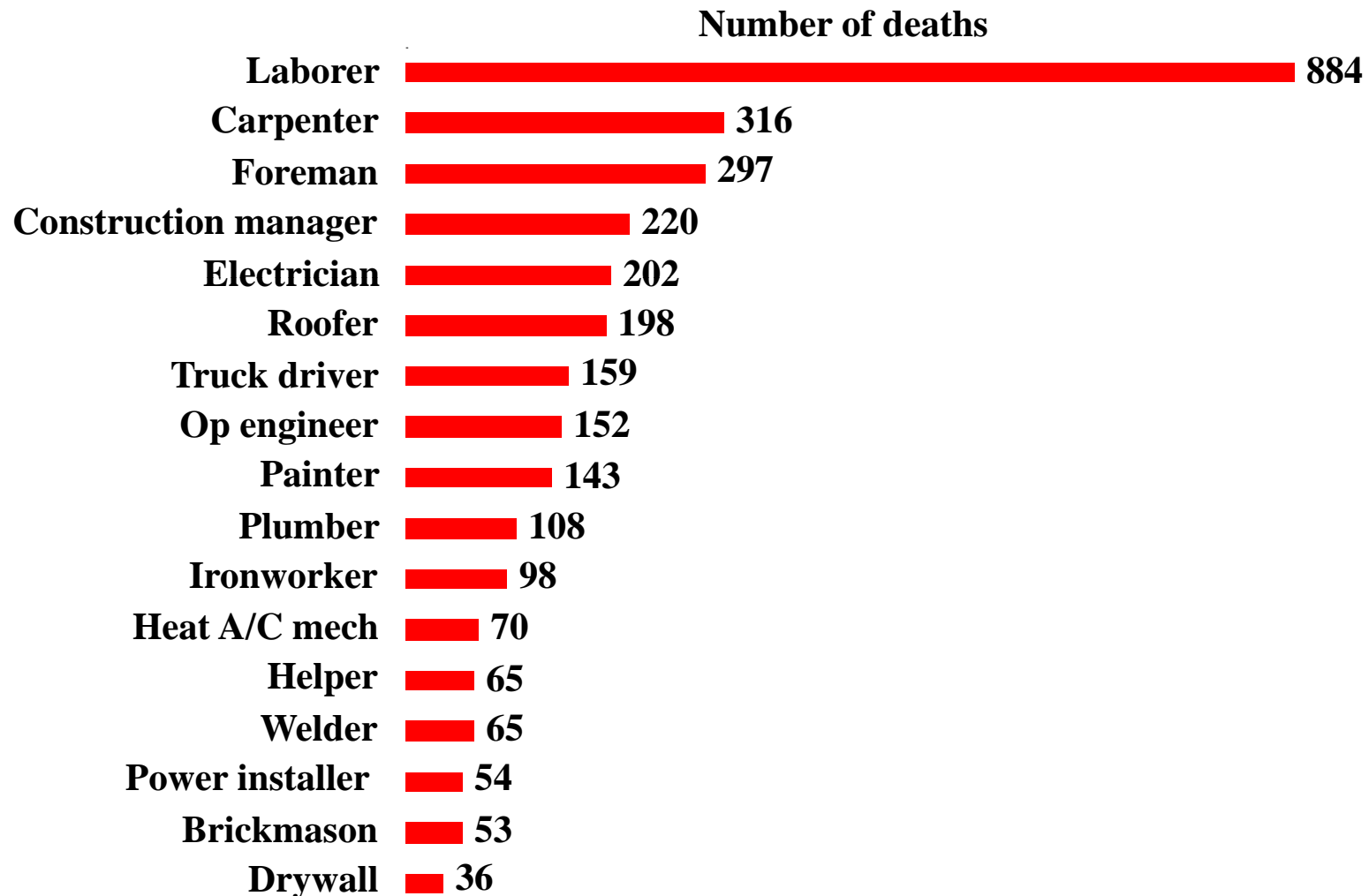
Distribution of nonfatal injuries and illnesses resulting in days away from work in construction, by age group, 1992 versus 2005



Rate of work-related deaths from injuries, selected construction occupations, 2003-2005 average



Number of work-related deaths from injuries, selected construction occupations, 2003-2005



Topic Two

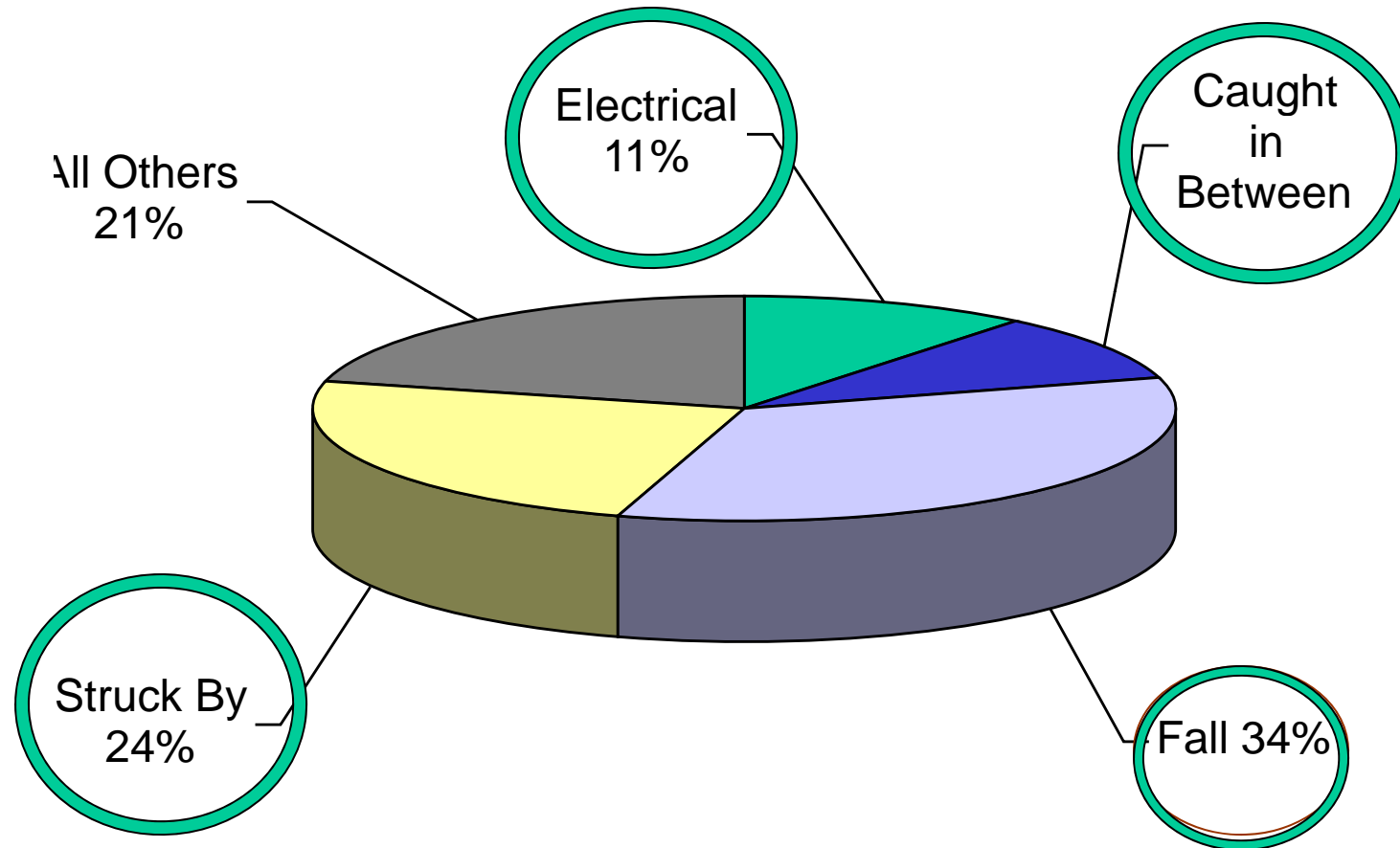
Major Hazards on Construction Jobs



Have you heard of the Focus Four hazards? Why does OSHA single them out?

- 1. Falls**
- 2. Struck By**
- 3. Caught in Between**
- 4. Electrical**

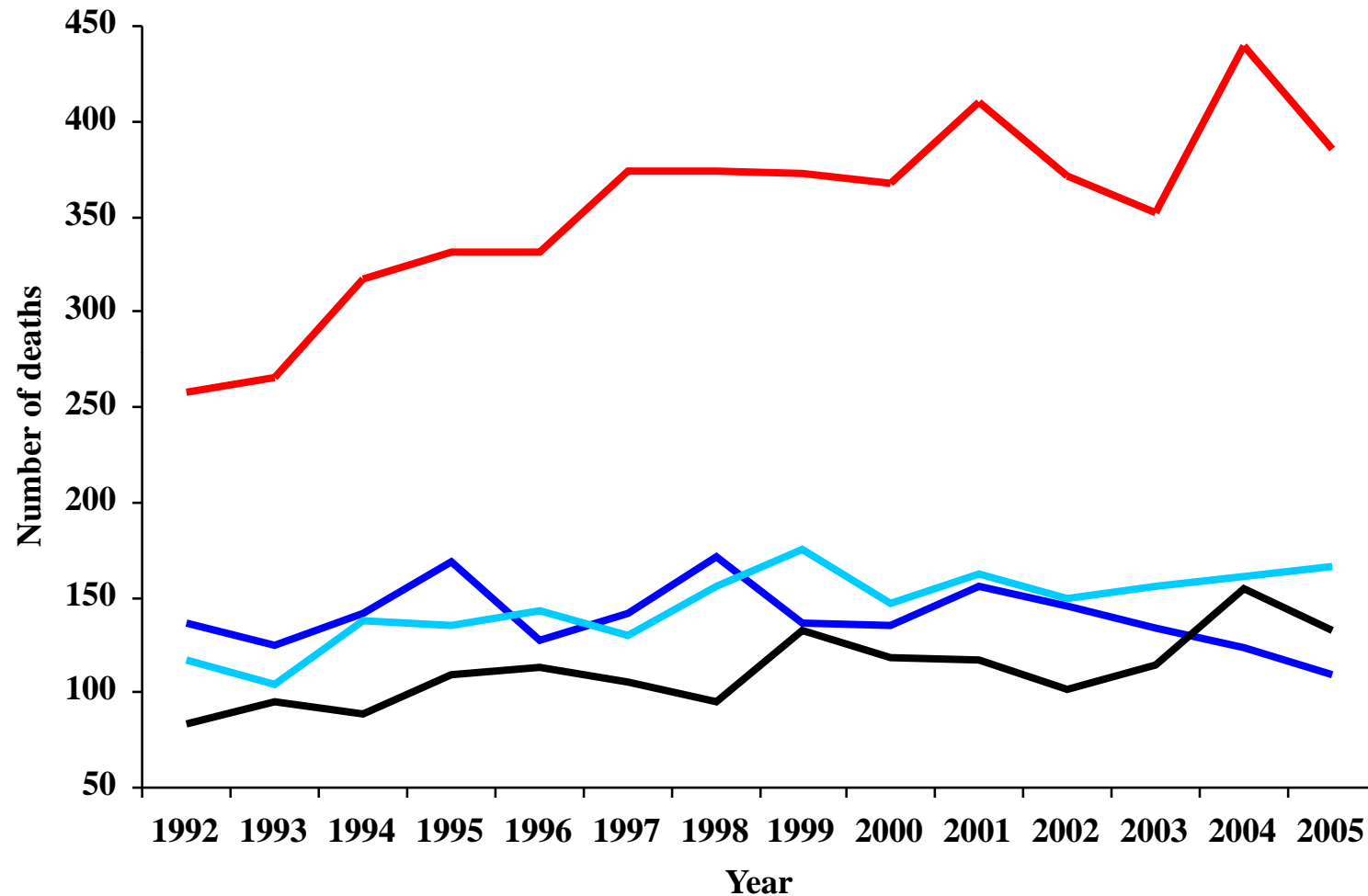
Out of 2,355 total construction fatalities, 79% were Focus Four hazards!



1,856 Focus Four fatalities in 2003/2004 (BLS)

IUOE National Training
Fund

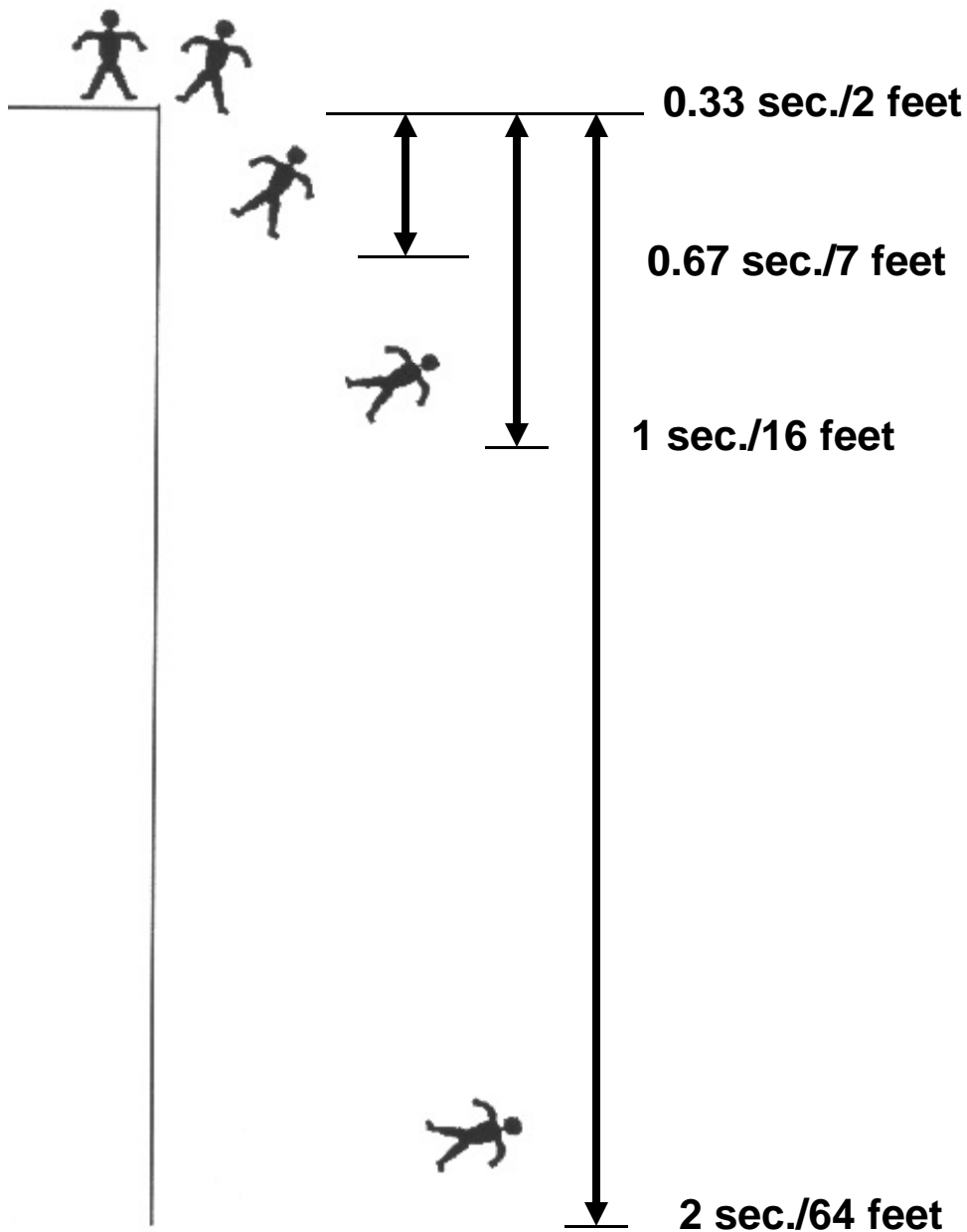
Leading causes of work-related deaths, construction, 1992-2005



- Fall to lower level**
- Contact with electric current**
- Highway accident**
- Struck by object**



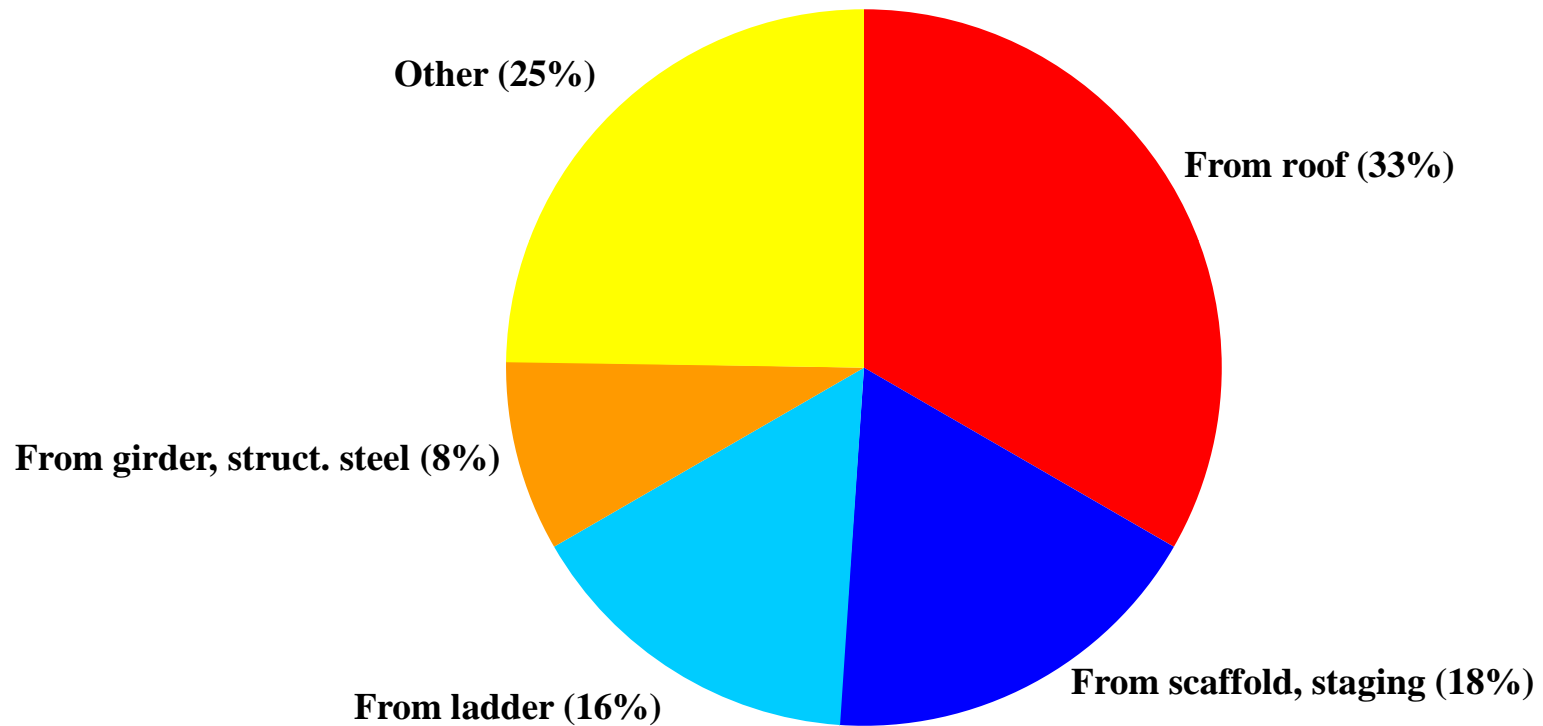
Falls



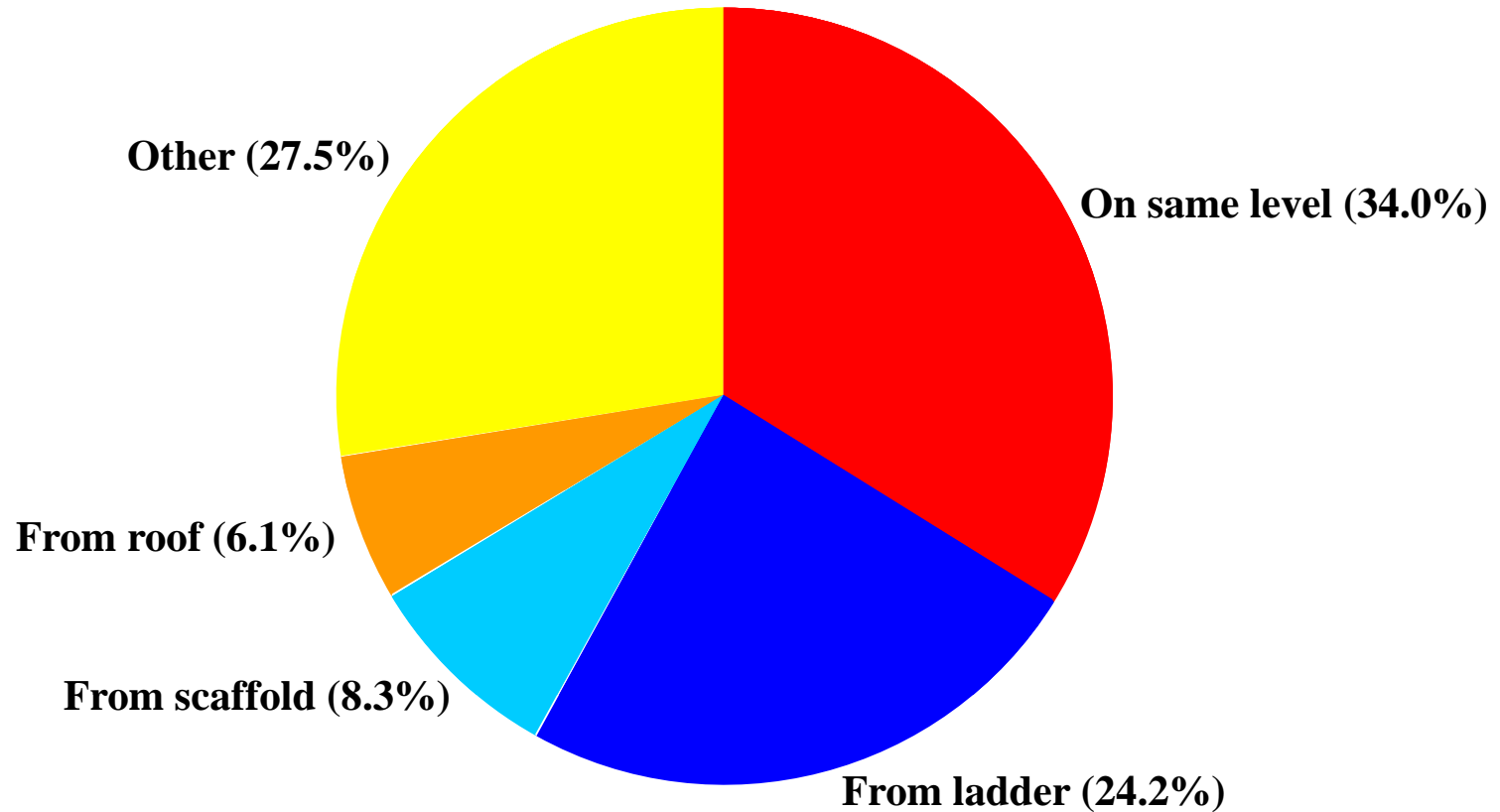
What happens when you fall?

- It takes most people about 1/3 of a second to become aware
- It takes another 1/3 of a second for the body to react
- A body can fall up to 7 feet in 2/3 of a second

Distribution of causes of deaths from falls in construction, 1992-2005 average



Distribution of causes of injuries from falls involving days away from work, construction, 2005



What are “struck-by” hazards?



Powder-actuated hand tools

What are the hazards?

- **37,000 people go to emergency rooms from nail gun injuries every year**
- **The hazards are similar to those of firearms**
- **Sequential-trip triggers could prevent 65 percent of injuries**

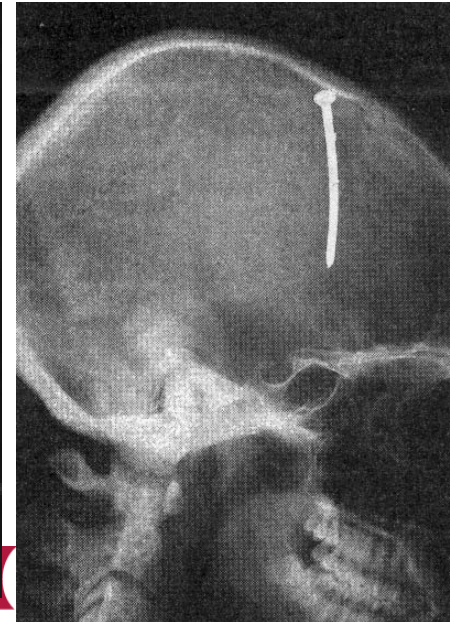
What is wrong with this picture?



Photo courtesy Laborers-AGC

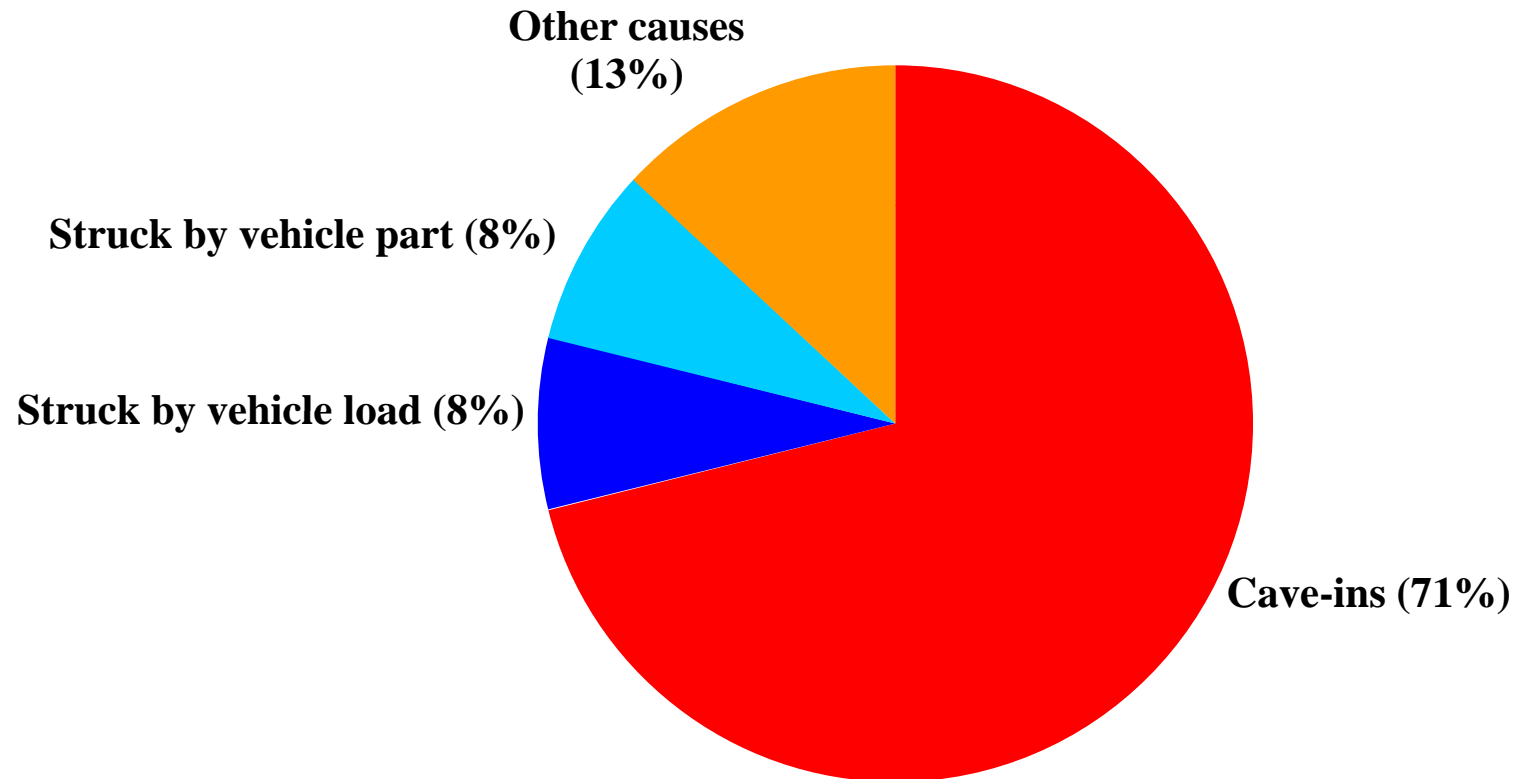
Pneumatic nailers have been made safer

- Penetration checks *must* be made
- All proper PPE must be worn



Distribution of causes of trenching-related deaths in construction, 2003-2005

Total = 159 deaths



Dedicated to Patrick Walters



**One of over 50 workers who
needlessly die in trenching and
excavation each year**

What do we know about the 542 “Patricks” who died in excavations from 1992 to 2001?

- Average age was 38
- Nearly half of their companies had less than 10 employees
- Nearly all were employed by private companies
- Cave-ins accounted for 76% of the deaths



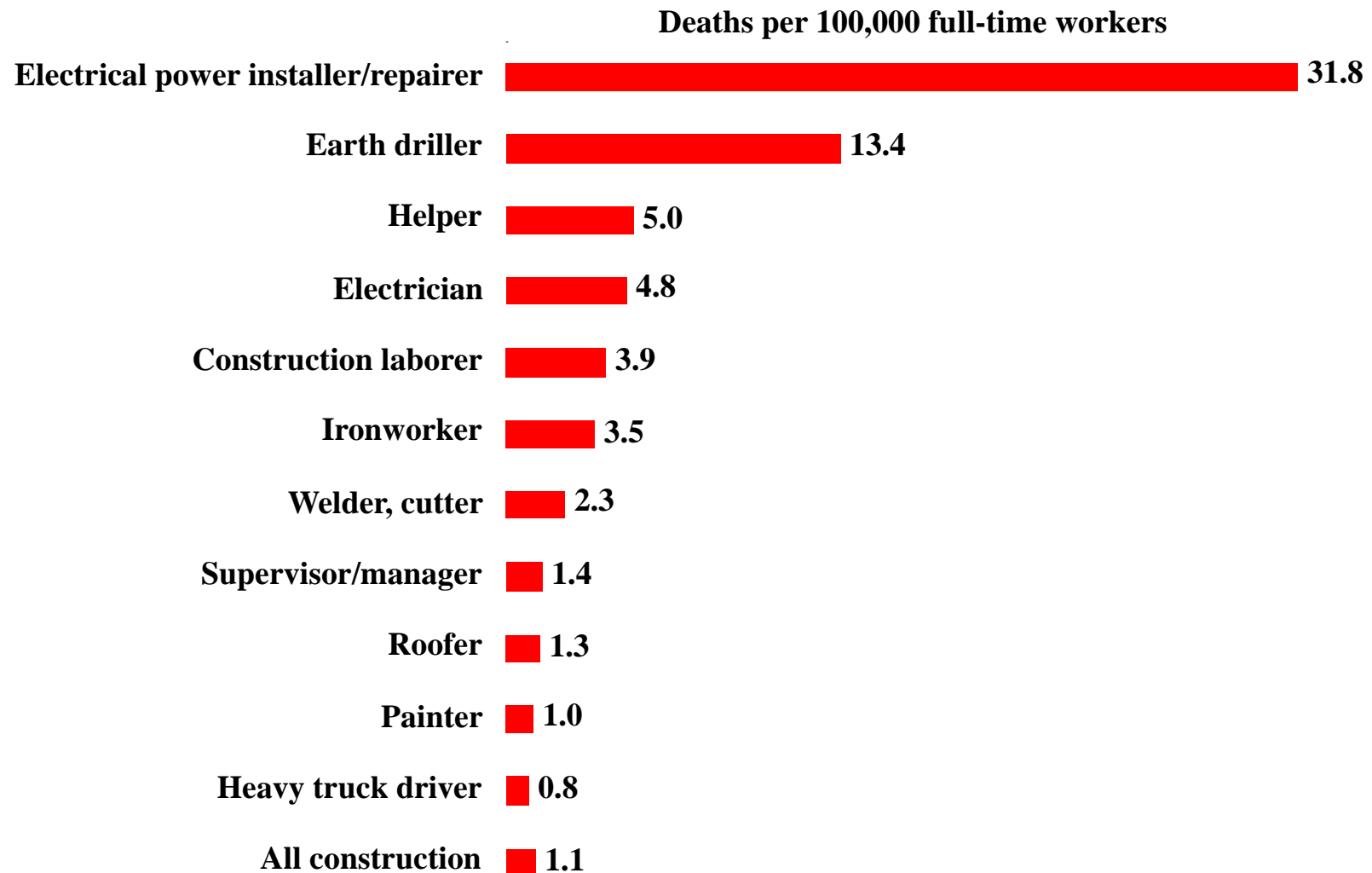
Recovery of Patrick Walters' body

Is this a death trap?

YES!!

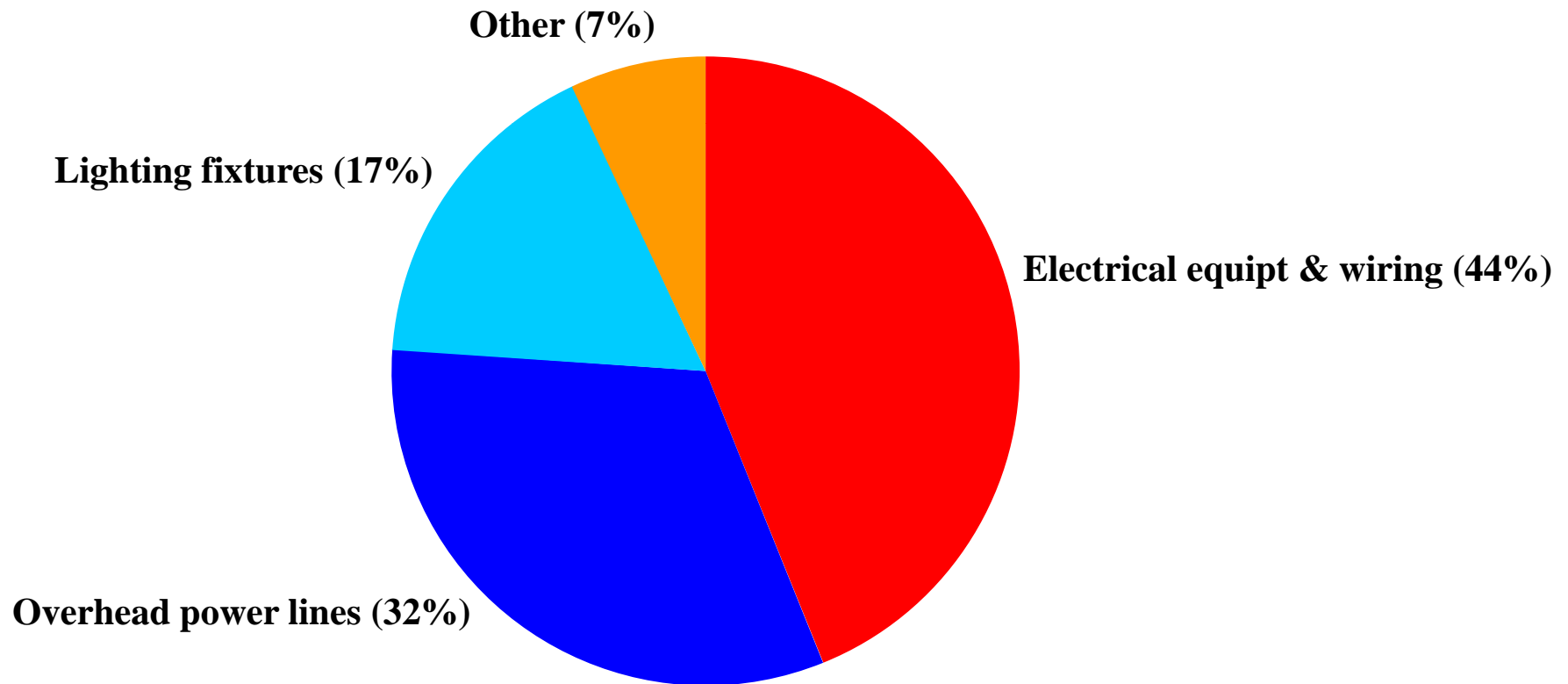


Rate of deaths from electrocutions, selected construction occupations, 2003-2005 average



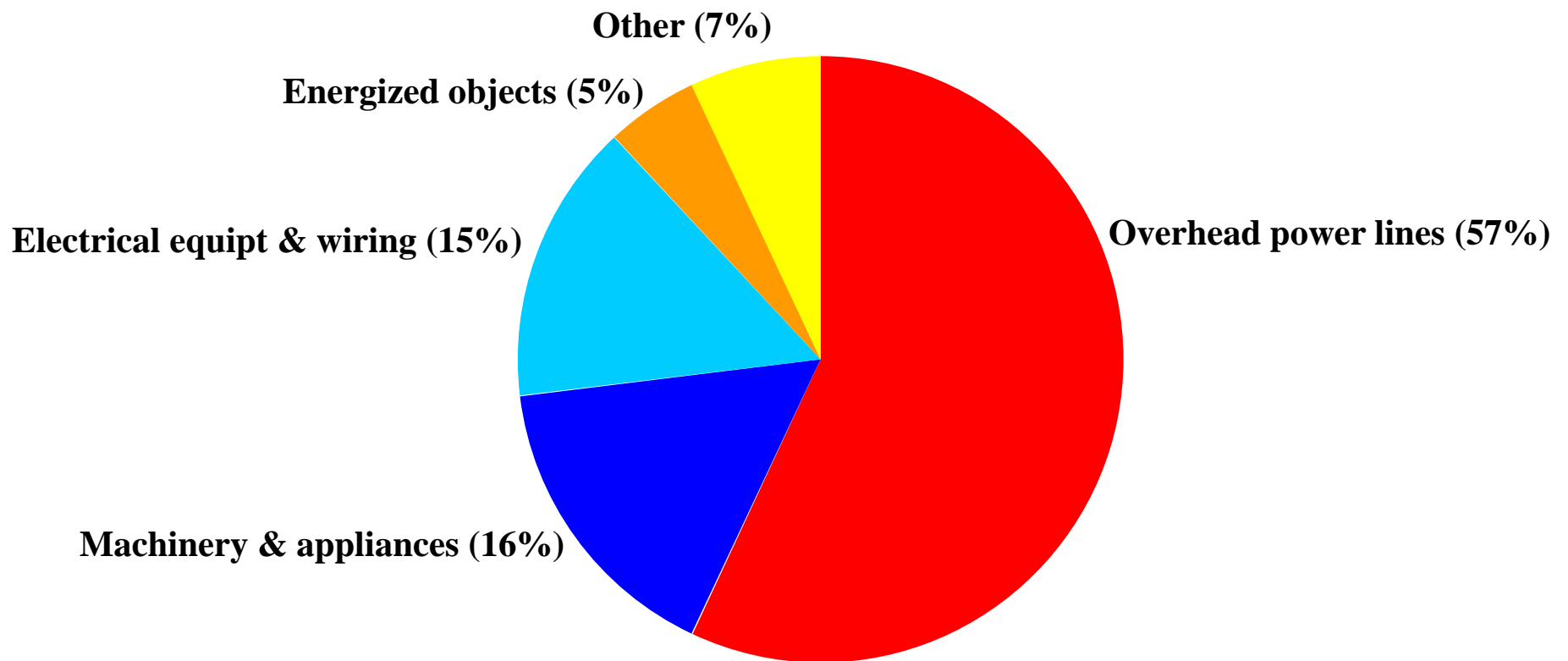
Deaths caused by contact with electricity among electrical workers in construction, 2003-2005 average

Total = 124 deaths



Deaths caused by contact with electricity among non-electrical workers in construction, 2003-2005 average

Total = 238 deaths



Topic Three

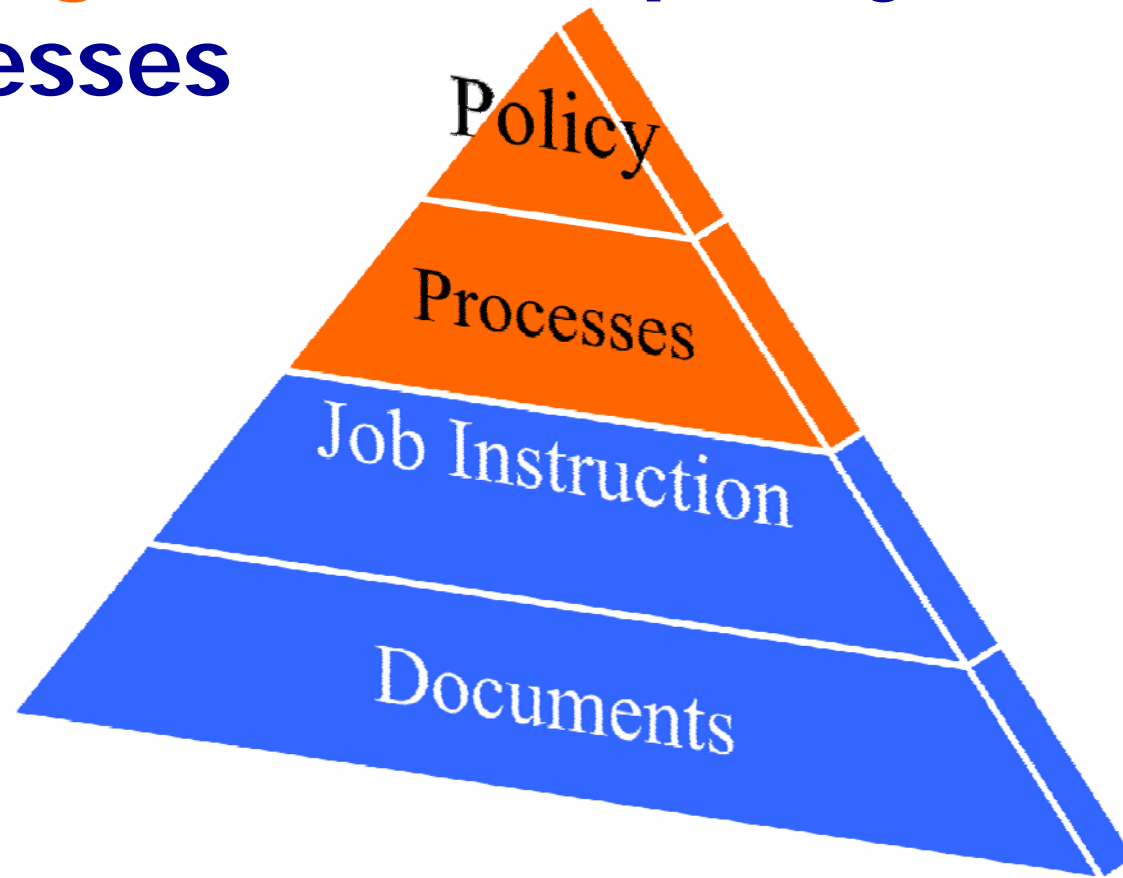
Managing and Controlling Exposures on Construction Jobs

**American National Standards
Institute has a standard called,
“Occupational Health and Safety
Management Systems”**

ANSI/AIHA Z10-2005



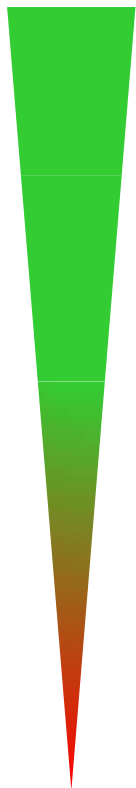
ANSI Z10 focuses on the **strategic** levels of policy and processes



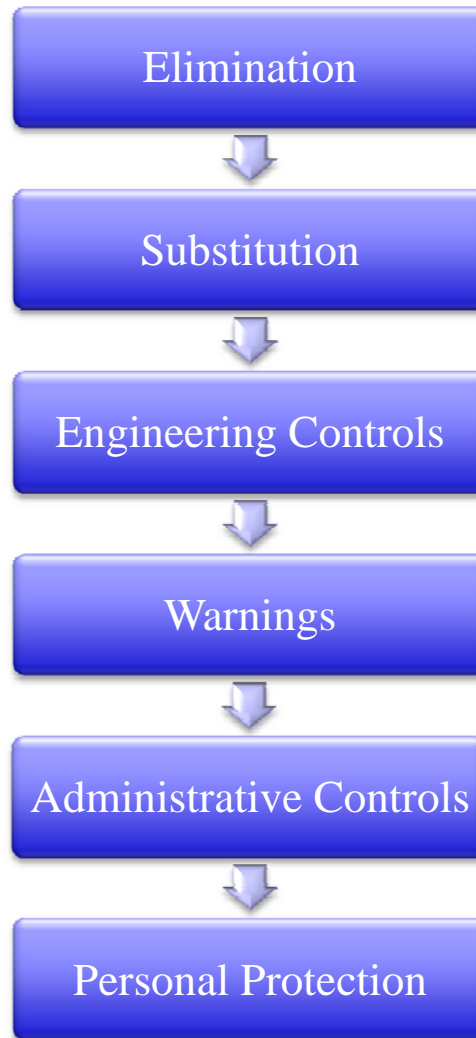
Layers of Management System Implementation

Z-10 specifically uses the hierarchy of controls (Section 5.1.1)

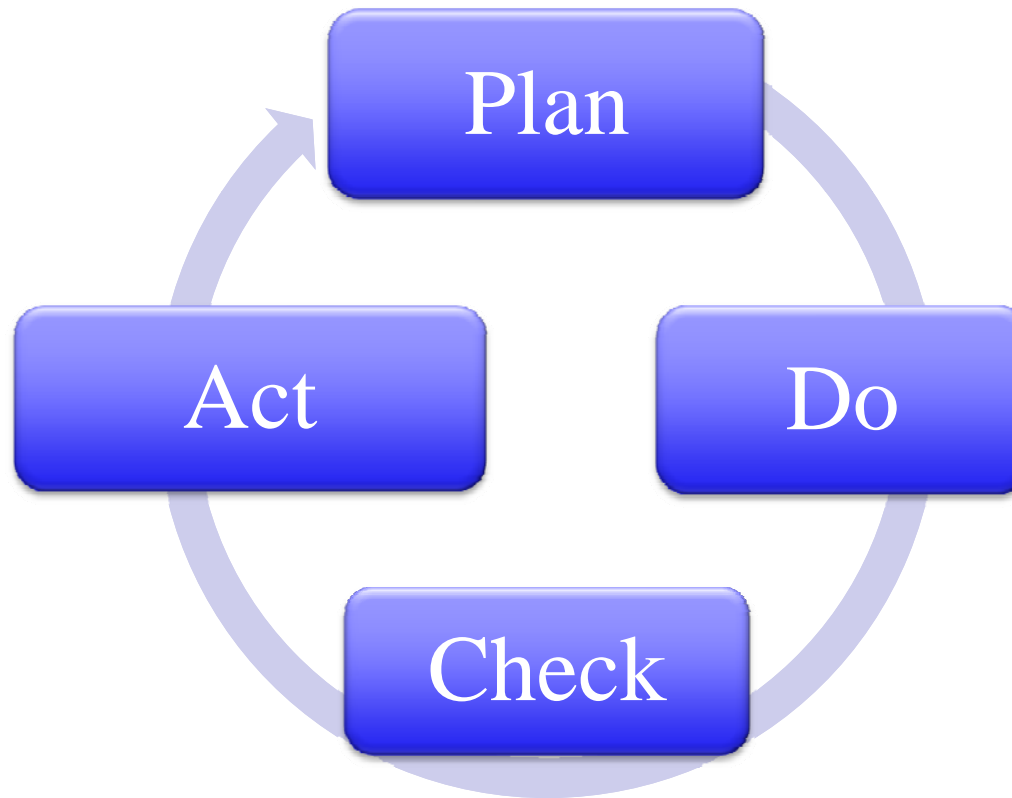
Most Effective



Least Effective



ANSI Z-10 provides a framework built on a quality control model from business



What key elements does ANSI, OSHA VPP and DOE ISM have in common?

- 1. Management leadership**
- 2. Employee involvement**
- 3. Hazard assessment**
- 4. Hazard control**
- 5. Worker training**



Involving workers pays off!

(Raines, 2011)

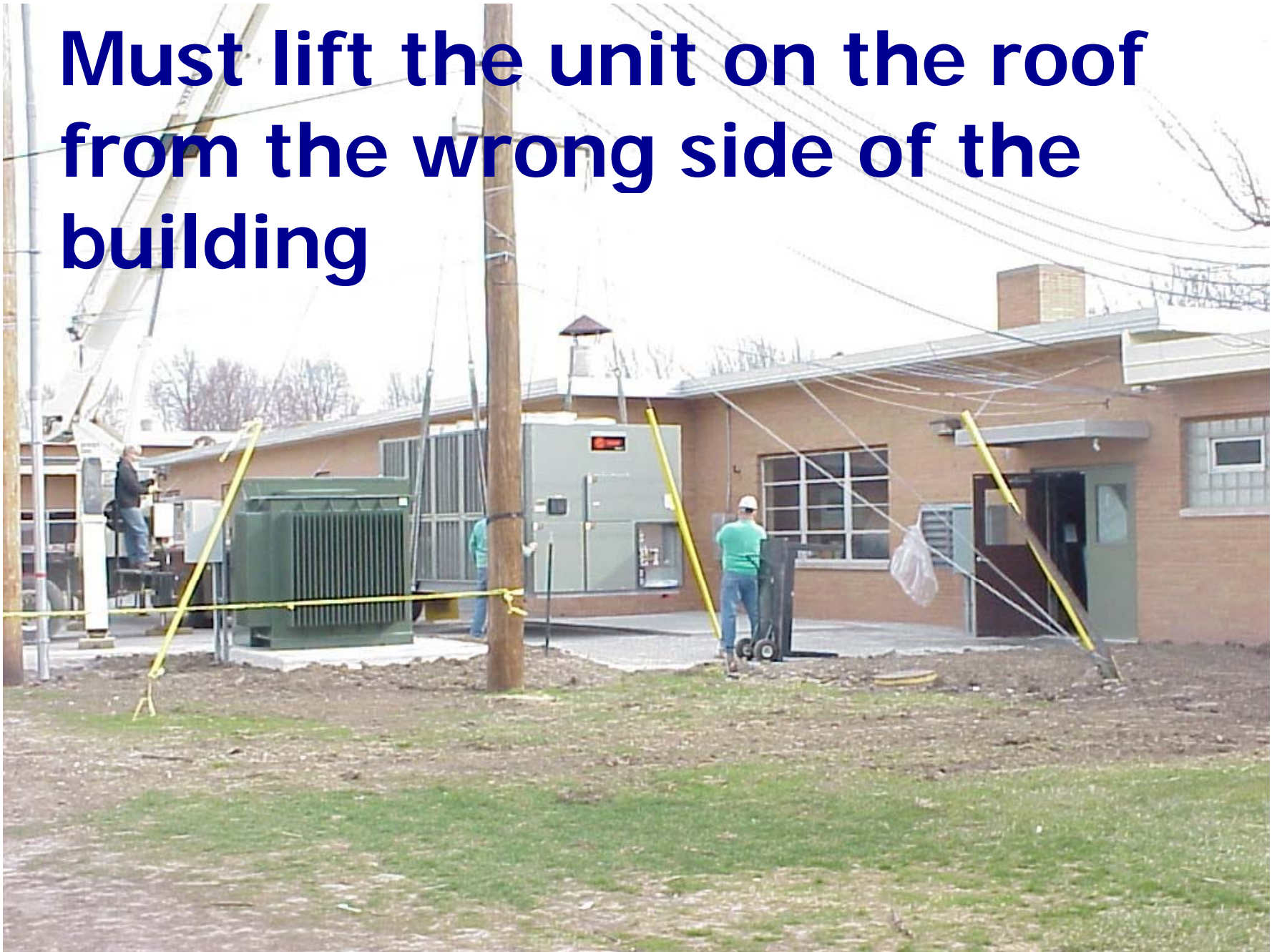
- Gallup (2006) surveyed 125 organizations and found top fourth of the companies scoring on **worker involvement** had **62%** less accidents than the bottom fourth
- Molson Coors saved \$1.7 million in safety costs in 2002 by strengthening employee involvement. Engaged employees were **5X less likely** to have a safety incident and **7X less likely** to have a loss-time incident

Let's face a real supervisor's choice

Commercial building HVAC / energy upgrades



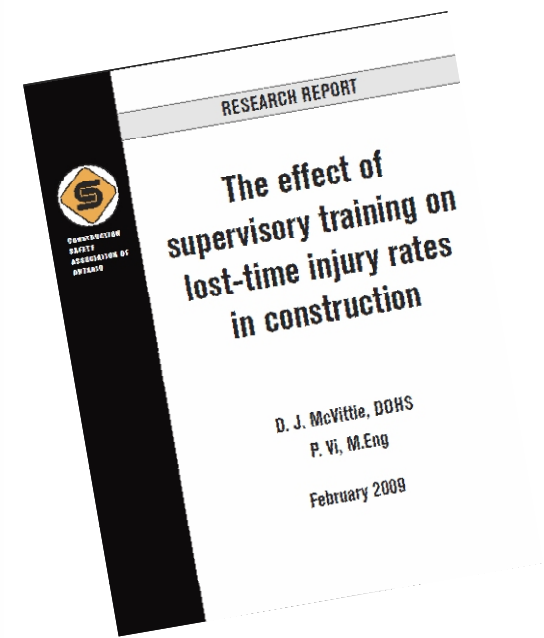
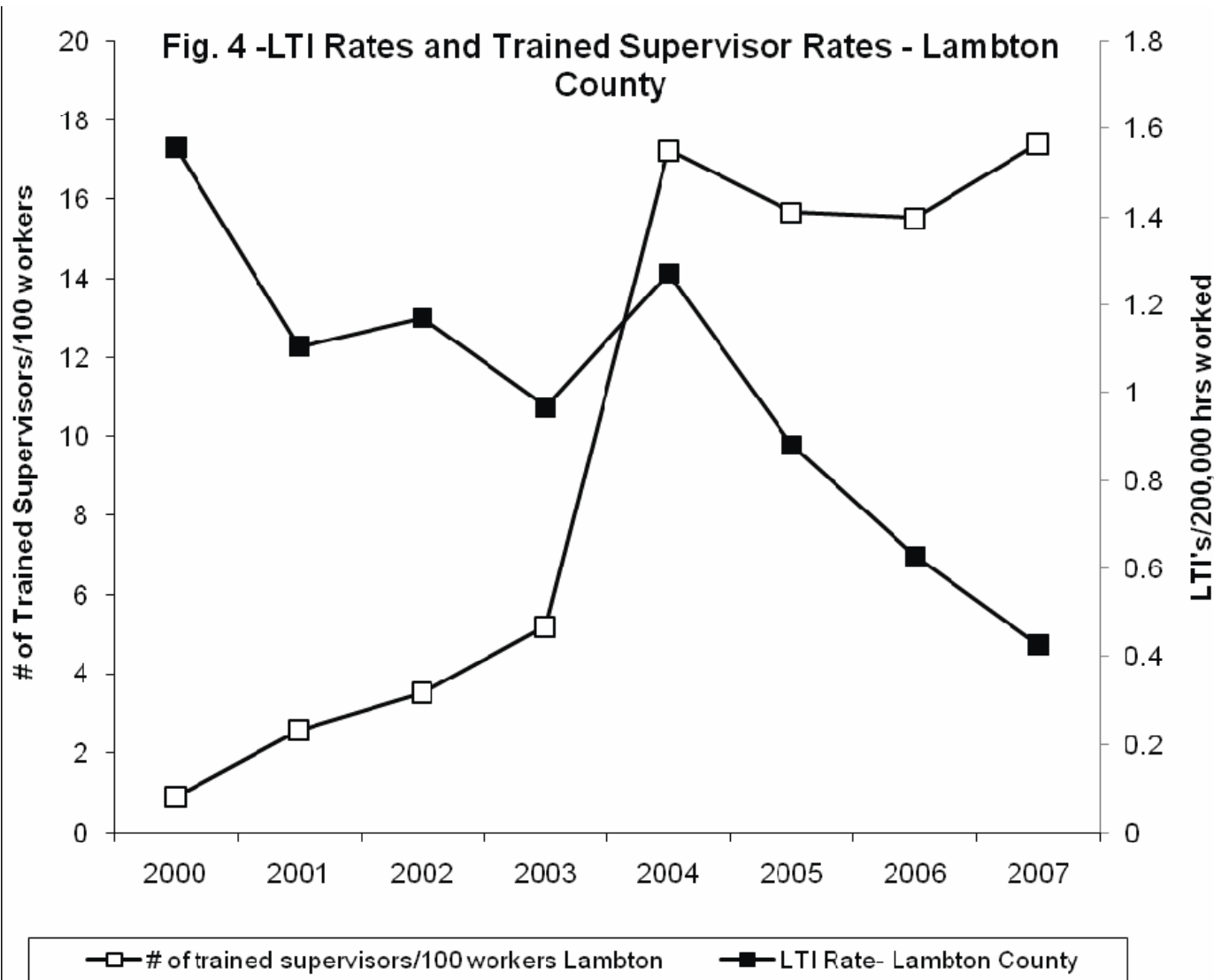
**Must lift the unit on the roof
from the wrong side of the
building**



**This could be the result.
What do you do?**



Training supervisors reduces lost-time injuries (Constr Safety Assoc of Ontario)

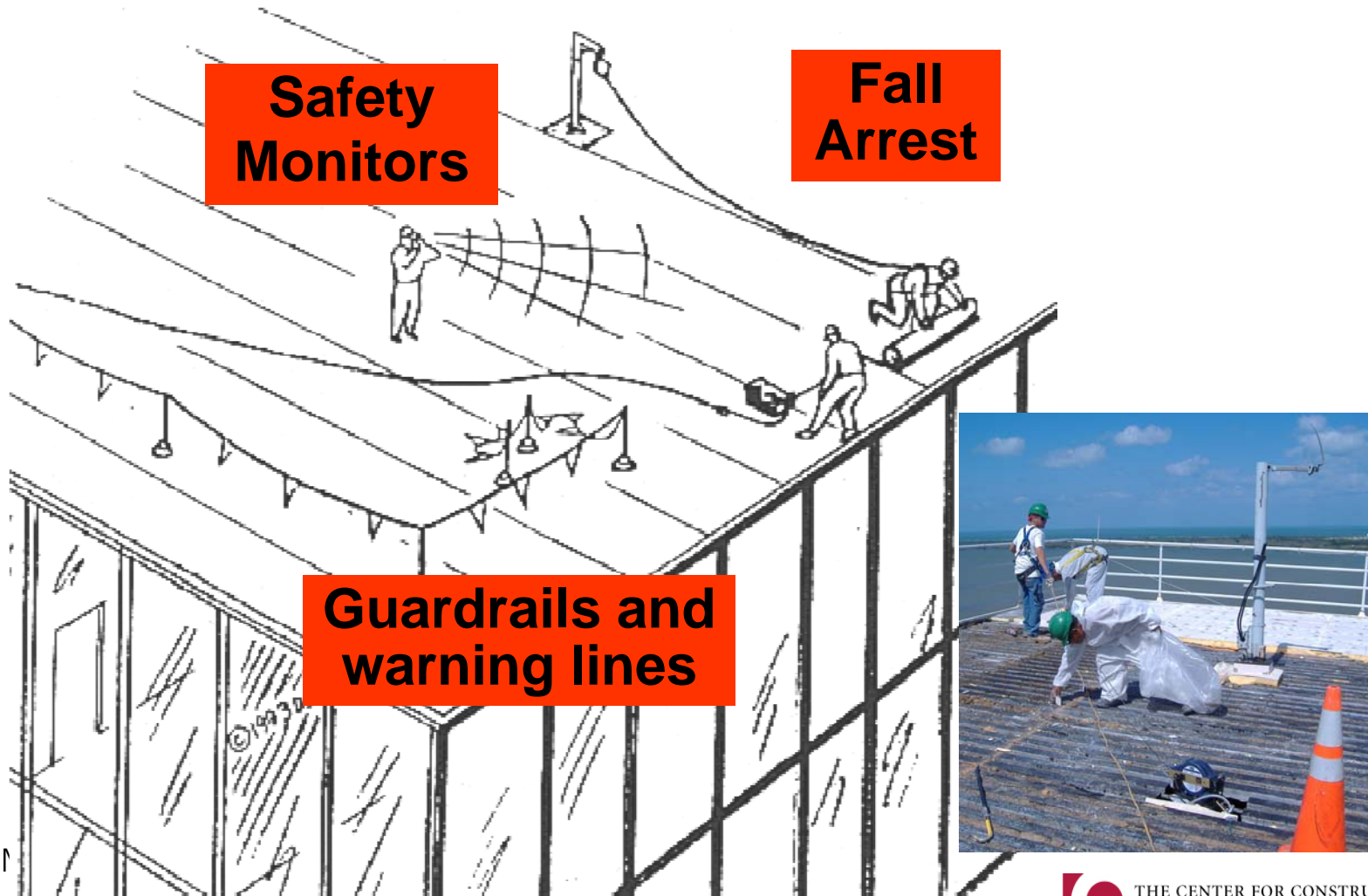


**Getting to root causes isn't easy.
Go beyond blaming the workers.**



Scrubbing tower dropped 10 feet from large tanks of acid

Here are the main systems for working safely on roofs. Any preferences?



What practices are needed when working around holes?

- Cover holes with materials of adequate strength and ensure they are secured
- Mark covers so workers know there are holes underneath
- Use guardrails



IU

How can we apply the hierarchy to skylights?



Trench shields or trench boxes are intended to shield workers from cave-ins



Photo courtesy Trench Shoring Services

Topic Four

Safety of Green Construction

Our current building costs are unsustainable

- **40% of raw materials consumed globally are used by the building construction industry**
- **U.S. building construction:**
 - **Uses 68% of total electricity consumption**
 - **Creates 38% of carbon dioxide emissions**
 - **Uses 12% of potable water**
 - **Creates 272 million tons of construction and demolition waste annually**

Source: The Guide to Green Buildings

Examples of green construction projects



Wind turbine

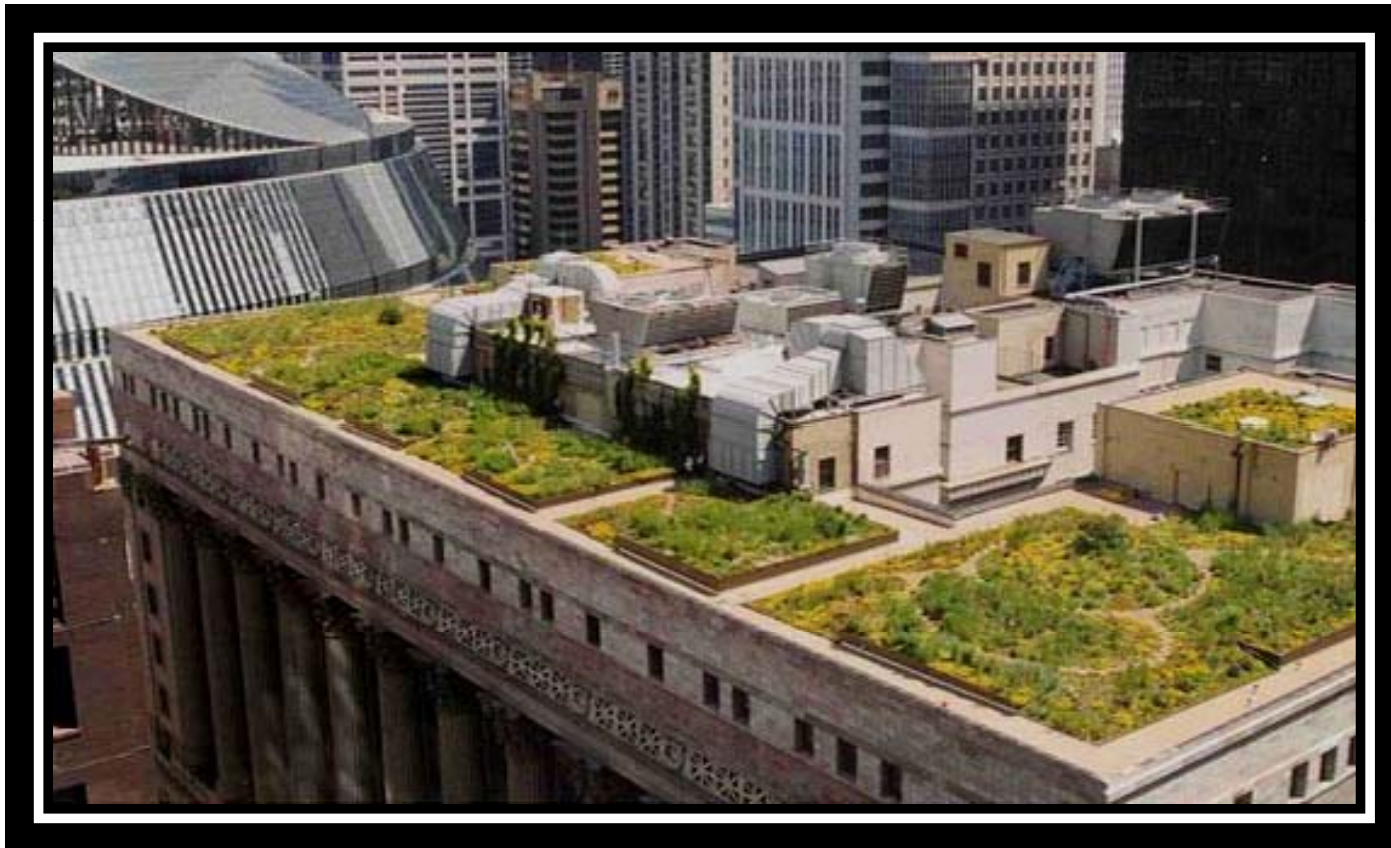


Modular, insulated wall units



Rooftop rain garden

Green roofs have many advantages



A green roof in Chicago, courtesy of the City of Chicago

Can you think of any disadvantages?



This 2,300sf high-rise green roof is part of a modern building construct. A crane was used to lift the soil and gravel onto three floors, courtesy DCGreenworks.org and the IUOE

Weatherization is an important part of green construction. What risks from spray insulation?





City Center, Las Vegas

“How many construction site deaths should there be to make a building **not green regardless of the environmental benefits?”**

Topic Five

Construction workers during disaster responses

**Why do disaster sites
present greater risks?**

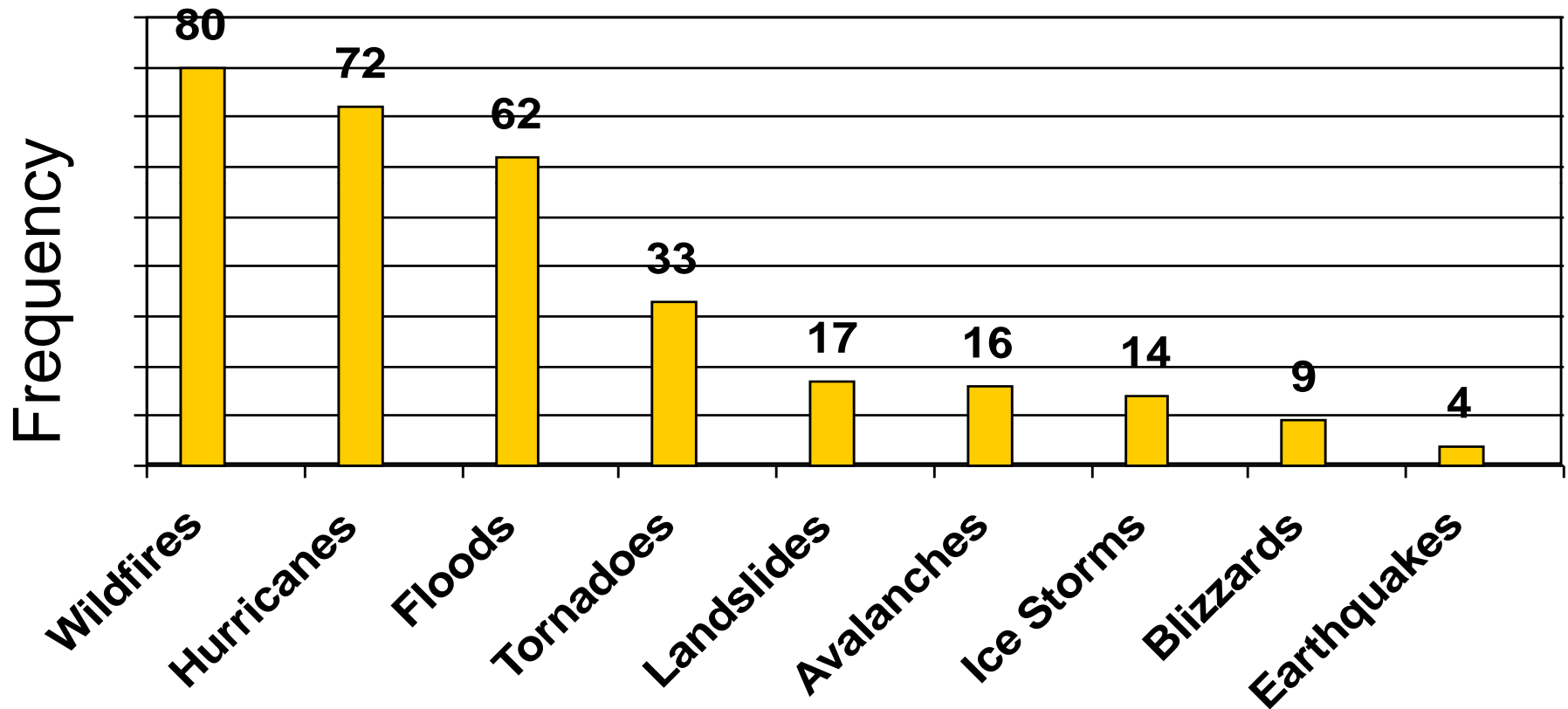




Greater chances are taken, like at the World Trade Center.

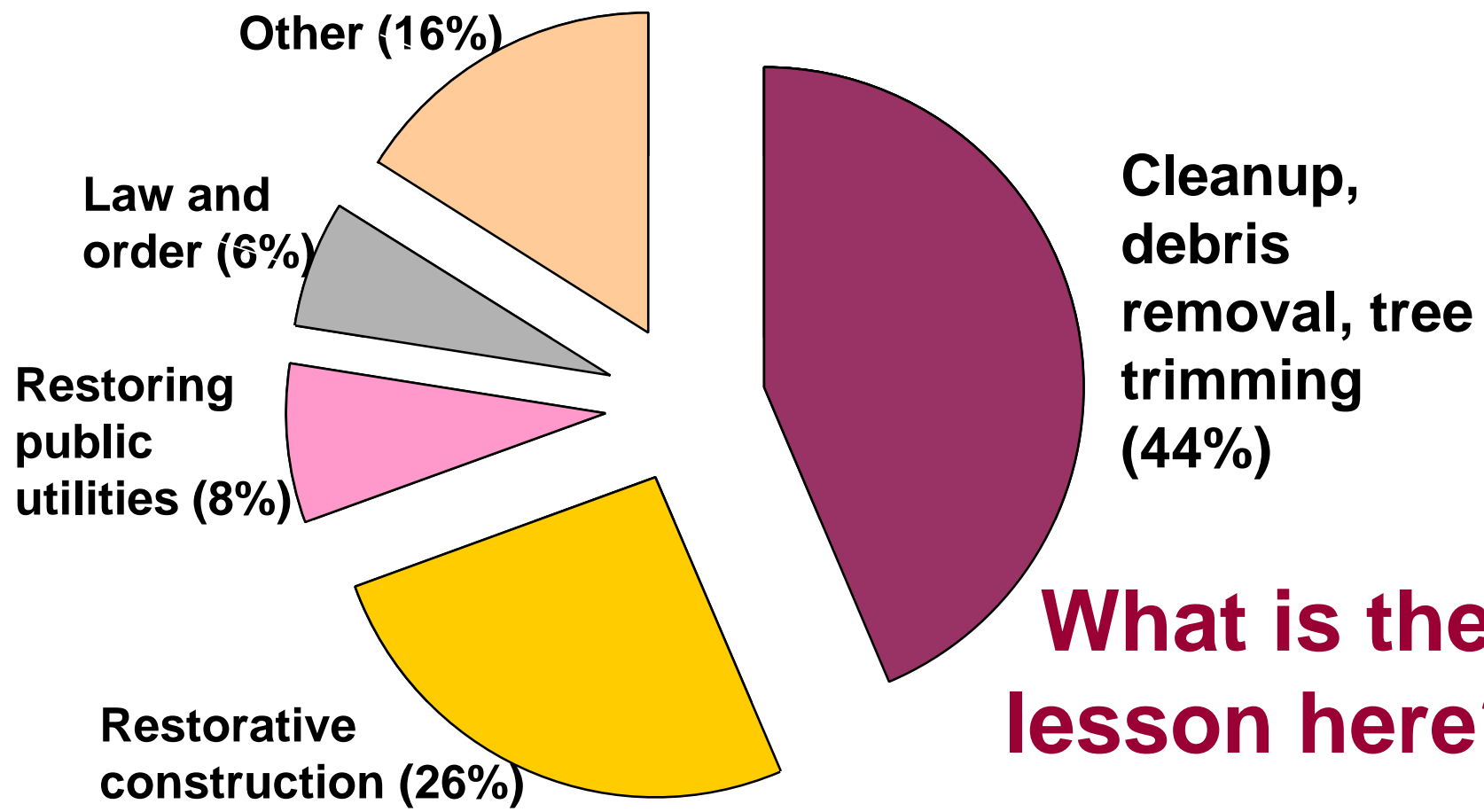
What is the violation here?

What were the most deadly disasters from 1992-2006?



Bureau of Labor Statistics

Activities during hurricane-related fatalities (Fayard, APHA, 2006)



What is the lesson here?

Tornado destruction poses serious risks for cleanup *and* disposal

Check OSHA's website for guidance



Clean-up of F5 tornado in Greenburg, KS, May 07



Disposal and burning of debris at the Greenburg dump, nearly entire town needed to be burned

Photos by Greg Henshall, FEMA.

Ice storms pose particular falling debris hazards for responders



Republic, MO, 2-27-07. A loader on debris pile after an ice storm created two million cubic yards of debris.

FEMA Photo/Michael Raphael