

# Understanding Crane Accident Failures:

## A report on causes of deaths in crane-related accidents

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# Overview

- Analysis of crane related deaths and injuries in the U.S. construction industry
- Description of selected incidents
- Sources of data
  - Bureau of Labor statistics CFI Research File
  - CraneAccidents.com
  - OSHA Underground
  - Cranes Today
  - Weekly Toll
  - Google
  - News articles
- Descriptive statistics on deaths and injuries
- Recommendations/ Operation and Inspections
- Status of Regulation

# Background:

## Selected Fatal Crane Incidents 2008\*

**3/15/08** New York, NY. Tower crane collapsed while being jumped, damaging several buildings.

**6 construction workers and 1 bystander died**  
13 construction workers and 11 first responders injured

**3/25/08** Miami, FL. 20-foot section crane fell 30 stories while jumping the crane. Miami, FL.

**2 construction workers died**  
5 construction workers injured

\* Source: Google, newspaper reports

# Selected Fatal Crane Incidents (cont.)

- 5/30/08** New York, NY. Crane cab, boom and chain deck separate from tower mast and fell to street.  
**2 construction workers died**  
1 construction worker and 1 bystander injured
- 7/18/08** Houston, TX. Mobile crane fell on tent.  
**4 construction workers died**  
7 construction workers injured
- 7/24/08** Oklahoma City, OK. Mobile crane putting steeple on church collapses on car.  
**1 bystander died**  
1 bystander injured
- 10/10/08** China. Tower crane collapses on kindergarten.  
5 children dead, 3 injured

# Summary of Construction Crane-Related Deaths & Injuries, January to December, 2008\*

	Deaths	Injuries
Construction workers	54	100
Bystanders	4	15
Rescue workers	--	11
<b>Total</b>	<b>58</b>	<b>126</b>

**\*Involves incidents involving 88 mobile cranes, 7 tower cranes, 1 gantry crane and 1 crawler crane.**

**Sources: CraneAccidents.com, Google, News articles, OSHA Underground, Cranes Today, The Weekly Toll**

# Causes of Construction Worker Crane-Related Deaths & Injuries, Jan. 1–Dec. 31, 2008\*

Cause	# Incidents (%)	Deaths	Injuries
Crane collapses	34 (39%)	25	59
Overhead power line contacts	12 (14%)	10	8
Struck by crane load	12 (14%)	6	10
Struck by other crane parts	10 (11%)	6	7
Other causes*	20 (23%)	7	16
<b>Total</b>	<b>88</b>	<b>54</b>	<b>100</b>

**\* Includes 7 highway incidents, 6 falls, 3 caught in/between, 3 struck by non-crane falling objects, and 1 struck by lightning incident**

# Causes of Bystander and Other Crane-Related Deaths & Injuries, Jan.1 to Dec. 31, 2008

Cause	Incidents	Deaths	Injuries
Highway collisions	6 (40%)	1	6
Crane collapses	4 (27%)	3	14*
Other causes**	5 (33%)	-	6
<b>Total</b>	<b>15</b>	<b>4</b>	<b>26</b>

**\* Includes 11 first responder injuries in 3/15 New York tower crane collapse**

**\*\* Includes 2 work zone intrusions, 1 struck by crane load, 1 struck by falling crane boom, and 1 overhead power line contact.**

# Crane-Related Deaths & Injuries by State, Jan. 1 to Dec. 31, 2008

- **Summary:**

- 35 states had 97 crane incidents involving 57 deaths and 127 injuries

- **States with the most incidents:**

- FL: 13 (13%) with 3 deaths and 19 injuries
- TX: 9 (9%) with 9 deaths and 20 injuries
- NY: 7 (7%) with 11 deaths and 35 injuries

*These 3 states had 40% of deaths and 58% of injuries*



# Crane-Related Deaths in Construction, 1992-2006

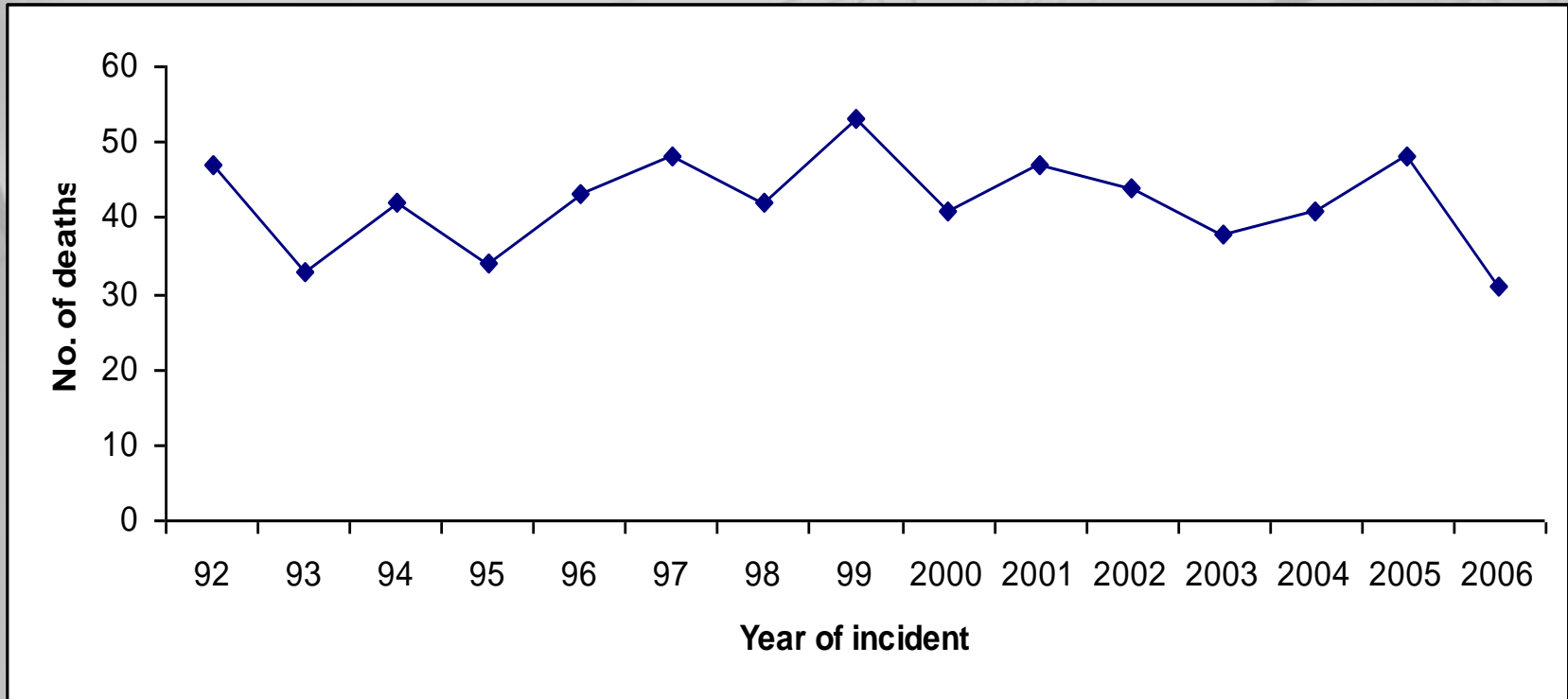
**632 crane-related deaths** from 610 incidents in construction from 1992-2006

- An average of 42 deaths/year

**Includes 18 multiple-death incidents** involving a total of 40 deaths

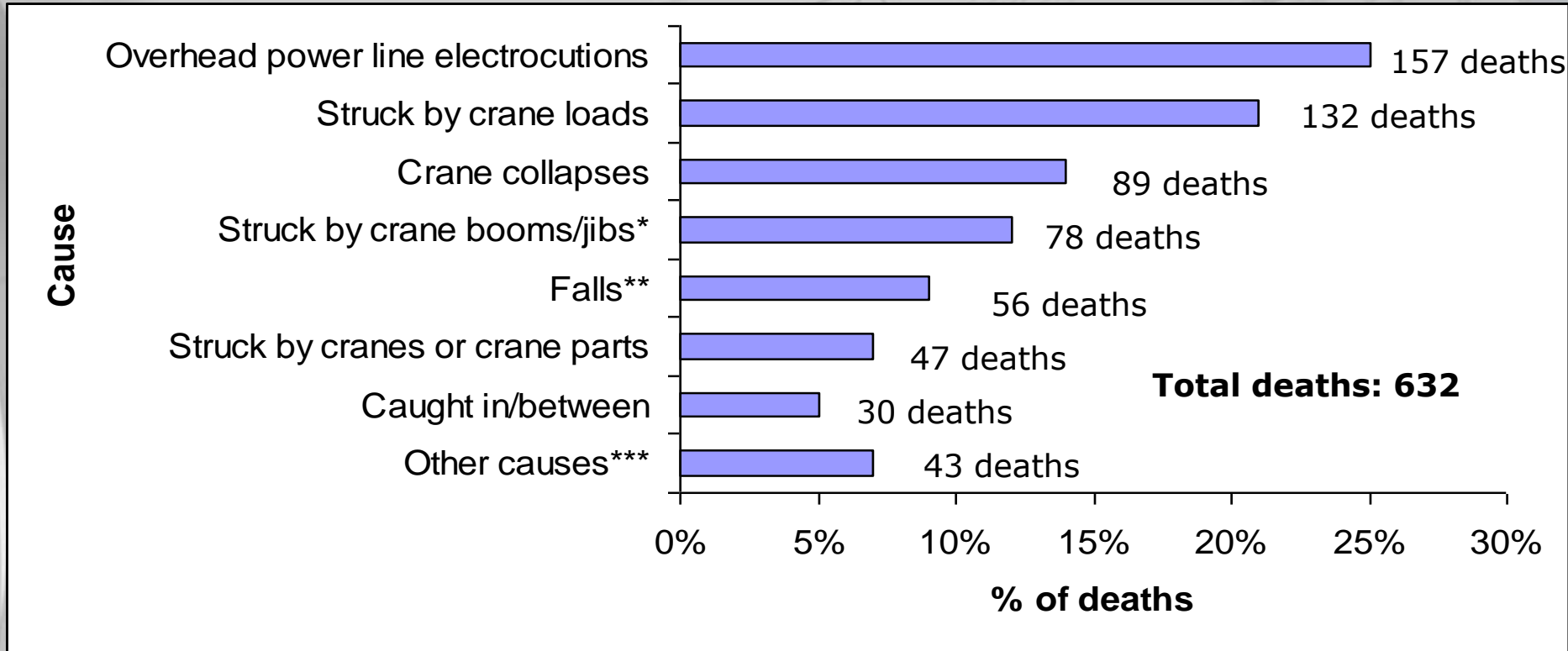
*Source: U.S. Bureau of Labor Statistics Census of Fatal Occupational Injuries Research File. Data identified by selecting CFOI Source and Secondary Source codes = "Cranes", and searching Narratives for key work "crane".*

# Crane-Related Deaths in Construction by Year, 1992-2006



*Source: U.S. Bureau of Labor Statistics Census of Fatal Occupational Injuries Research File*

# Causes of Crane-Related Deaths in Construction, 1992-2006



\* Included 64 struck by falling booms/jibs

\*\* Included 21 falls from cranes, 9 falls from crane baskets, 8 from crane loads.

\*\*\*Other causes included 9 highway incidents.

Source: U.S. Bureau of Labor Statistics Census of Fatal Occupational Injuries Research File

# Types of Cranes Involved in Fatalities

- Mobile cranes
- Tower cranes
- Floating or barge cranes
- Overhead cranes

## Types of Cranes Involved:

# Mobile Cranes

At least 71% of all crane-related incidents involved mobile cranes

Mobile cranes were involved in:

- 80 of 95 (84%) of overhead power line incidents
- 37 of 59 (63%) of crane collapses
- 35 of 59 (60%) of struck by boom/jib incidents



## Types of Cranes Involved:

# Tower Cranes

Tower cranes were involved in:

- 16 of 306 (5%) of all crane related incidents
- 5 of 24 (21%) of struck by crane load incidents
- 5 of 59 (8%) of struck by boom/jib deaths

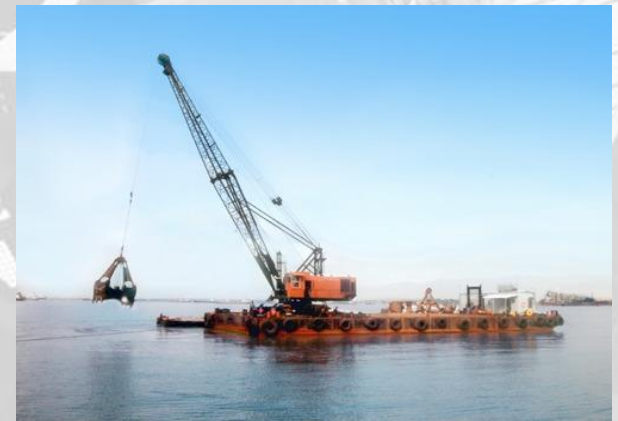


## Types of Cranes Involved:

# Other/unspecified cranes

Other/unspecified cranes were involved in 24% of all crane related incidents, including:

- 13 floating or barge crane incidents
- 12 overhead crane incidents
- 49 unspecified cranes (16% of incidents)



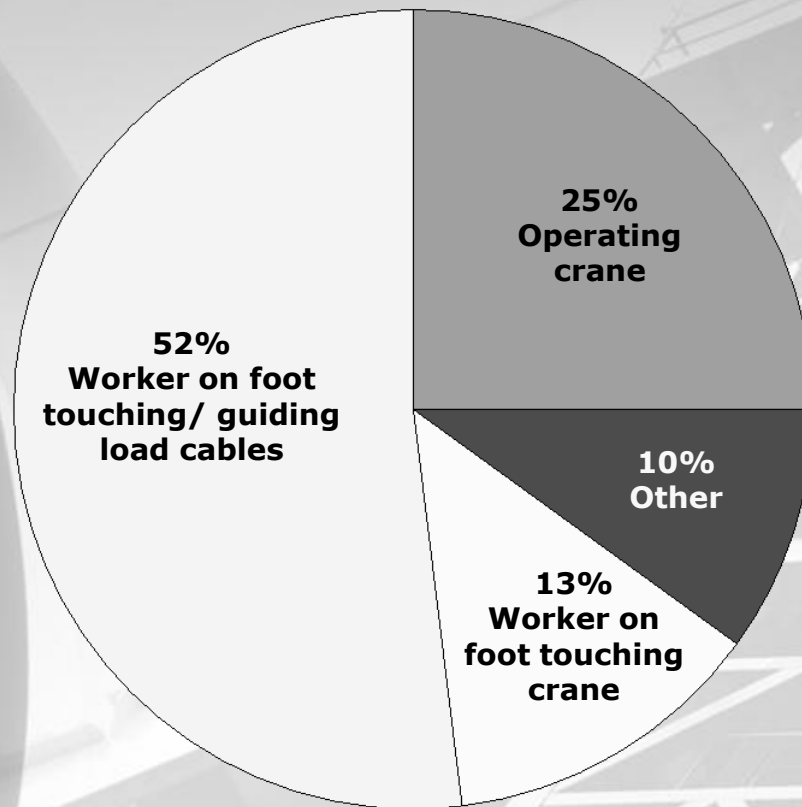
# Main Causes of Worker Deaths, by Frequency

- Electrocutions – from overhead power lines
- Struck by crane load
- Crane collapse
- Struck by falling boom/jib



## Why Workers Died:

# Overhead Power Line Electrocutions



1992 - 2006  
Number of Deaths: 157

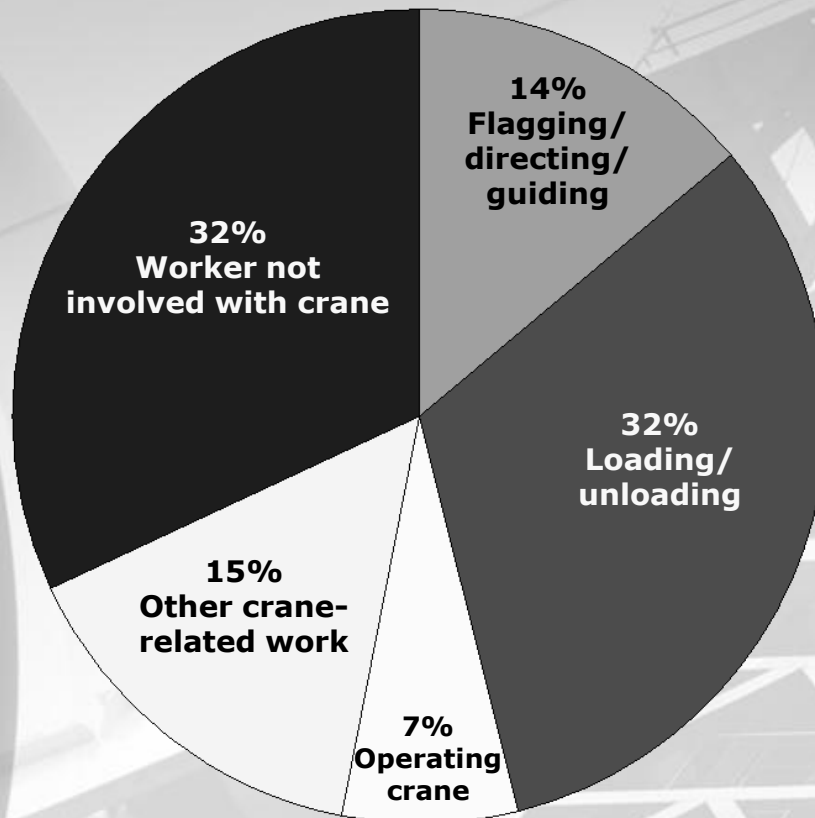
Source: U.S. Bureau of Labor Statistics  
Census of Fatal Occupational  
Injuries Research File

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# Why Workers Died: Struck By Crane Loads

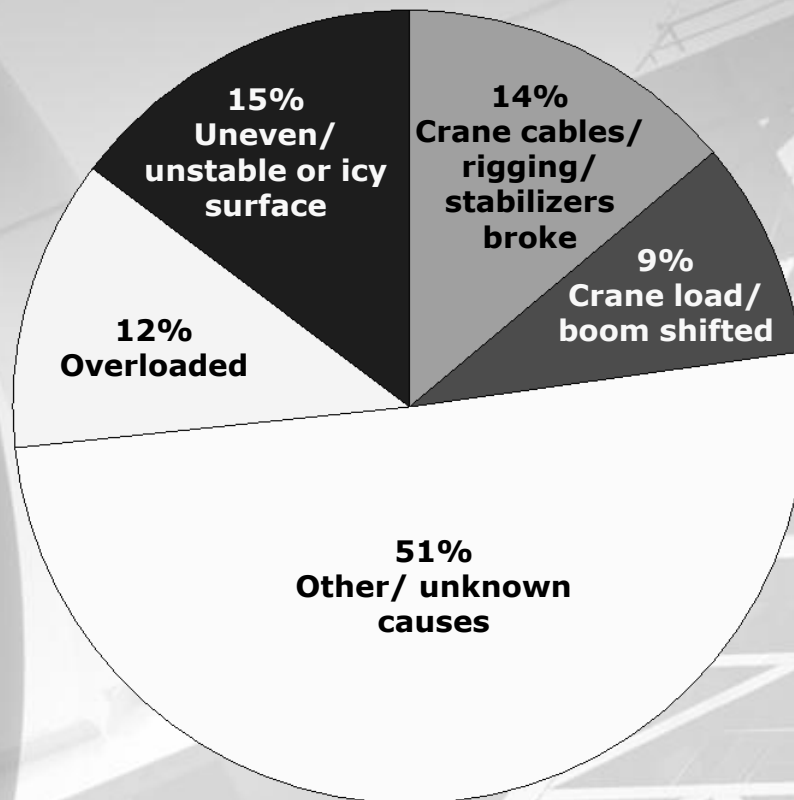


1992 - 2006

Number of Deaths: 132

Source: U.S. Bureau of Labor Statistics  
Census of Fatal Occupational  
Injuries Research File

# Why Workers Died: Crane Collapses



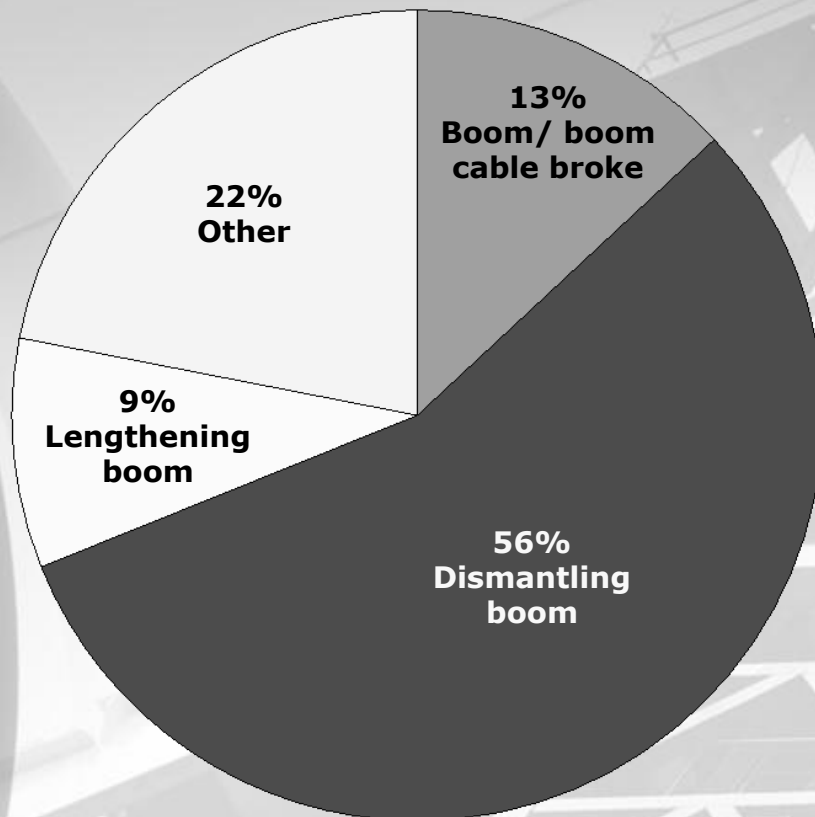
1992 - 2006

Number of Collapses: 81

Number of Deaths: 89

Source: U.S. Bureau of Labor Statistics  
Census of Fatal Occupational  
Injuries Research File

# Why Workers Died: Struck by Falling Booms/Jibs



1992 - 2006

Number of Deaths: 64

Source: U.S. Bureau of Labor Statistics  
Census of Fatal Occupational  
Injuries Research File

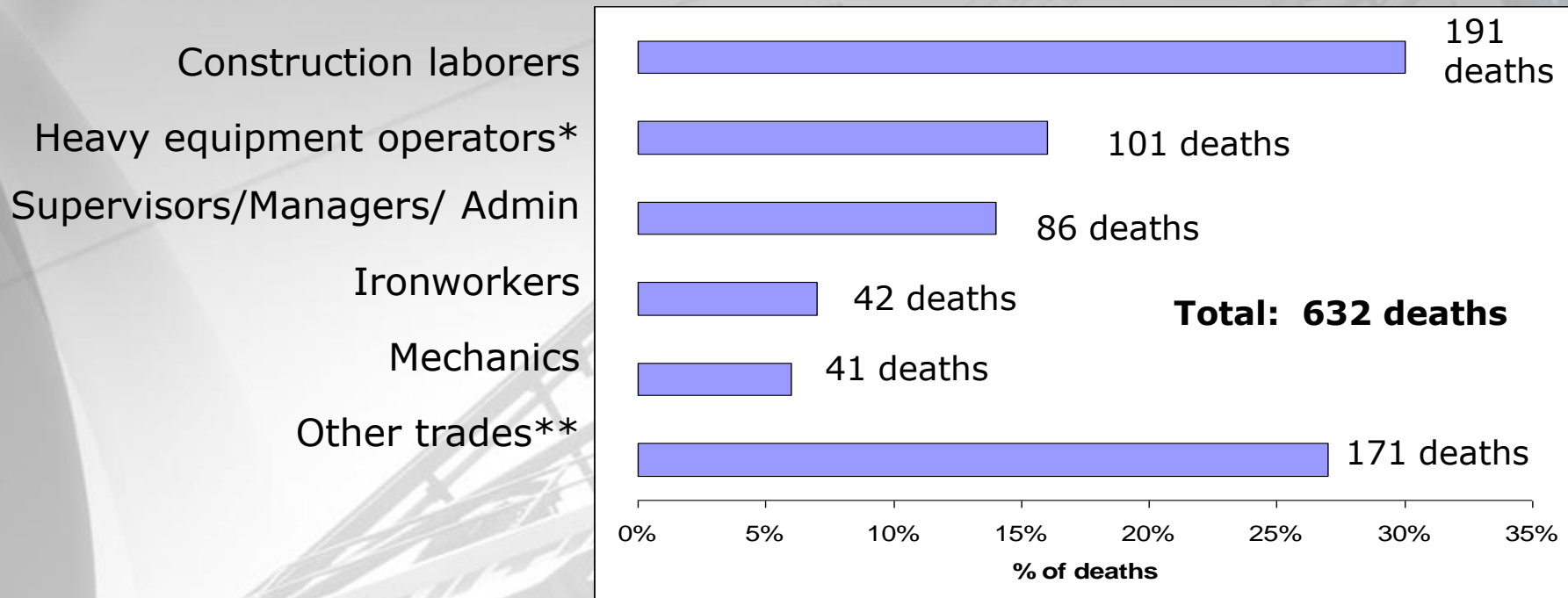
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# Trades of Workers Who Died

## Crane-Related Deaths in Construction, 1992-2006



\* Includes 62 crane and tower operators, 21 operating engineers and other construction equipment operators, and 7 hoist and winch operators.

\*\* Includes 24 welders and cutters, 22 electrical workers, 21 mechanics, 17 sheet metal workers, 14 truck drivers, and 73 others.

Source: U.S. Bureau of Labor Statistics Census of Fatal Occupational Injuries Research File

# Recommendations

- Crane operators should be certified.
  - Presently only 15 states and a few cities (including New York City and Chicago) require certification.
- Crane riggers and signalpersons should be adequately trained.
- Crane inspectors should be qualified persons.
  - OSHA only requires that they be competent persons

# Recommendations (cont.)

- Cranes should be inspected before being assembled or modified.
- Only trained workers under the supervision of a qualified person and competent person should assemble, modify or disassemble cranes.
- Crane loads should not be allowed to pass over street traffic.

# Recommendations (cont.)

- OSHA should conduct more thorough investigations of crane-related fatalities and capture more complete data in its reporting system.
- OSHA should take immediately action on the proposed consensus crane and derrick standard for construction.



# Regulatory Overview

**On July 9, 2004**, the Federal Advisory Committee on cranes and derricks (C-DAC) reached a consensus for a new crane and derricks standard.

**On October 9, 2008**, OSHA published a proposed rule on **Cranes and Derricks in Construction** in the Federal Register.

The deadline for comments was January 22, 2009 and a hearing held March 17. Final rule is due in July, 2010

# For Further Information

- Mike McCann: [mmccann@cpwr.com](mailto:mmccann@cpwr.com)
- Electronic Library of Construction Safety and Health (eLCOSH): [www.elcosh.org](http://www.elcosh.org)
- CPWR – The Center for Construction Research and Training: [www.cpwr.com](http://www.cpwr.com)

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