



Putting it all together: An analysis of oil and gas extraction worker fatalities, severe injuries, and illnesses

Alejandra Ramirez-Cardenas, MPH

Emily R.T. Schmick, MSPH, CIH

Sophia Ridl

National Institute for Occupational Safety and Health

Disclaimer

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Who we are

National Institute for Occupational Safety and Health (NIOSH)



Conduct occupational safety and health research

NIOSH Oil and Gas Program

Established in 2007

Four Components

- Epidemiology and surveillance
- Exposure assessment
- Engineering controls
- Communications

Partner-focused

- NORA council
- OSHA Alliance
- National STEPS Network

Outline

Introduction

Fatalities from FOG

Hospitalizations and Amputations
from OSHA Severe Injury Reporting

Putting it all together: trends and
recommendations



Outline

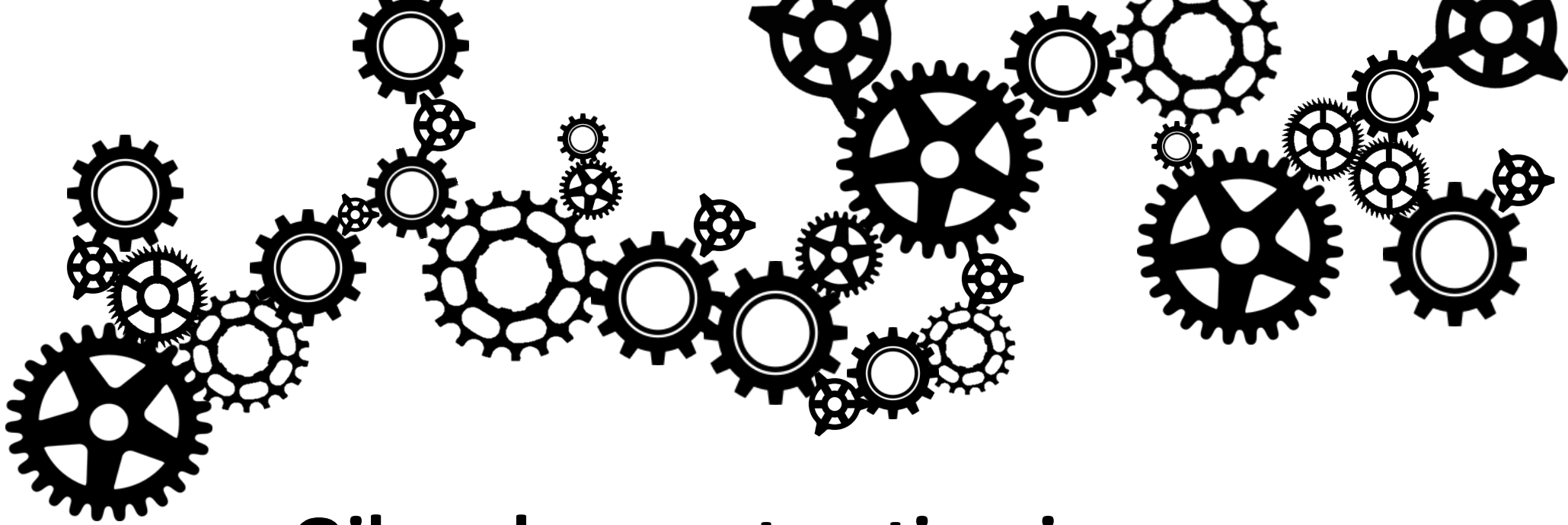
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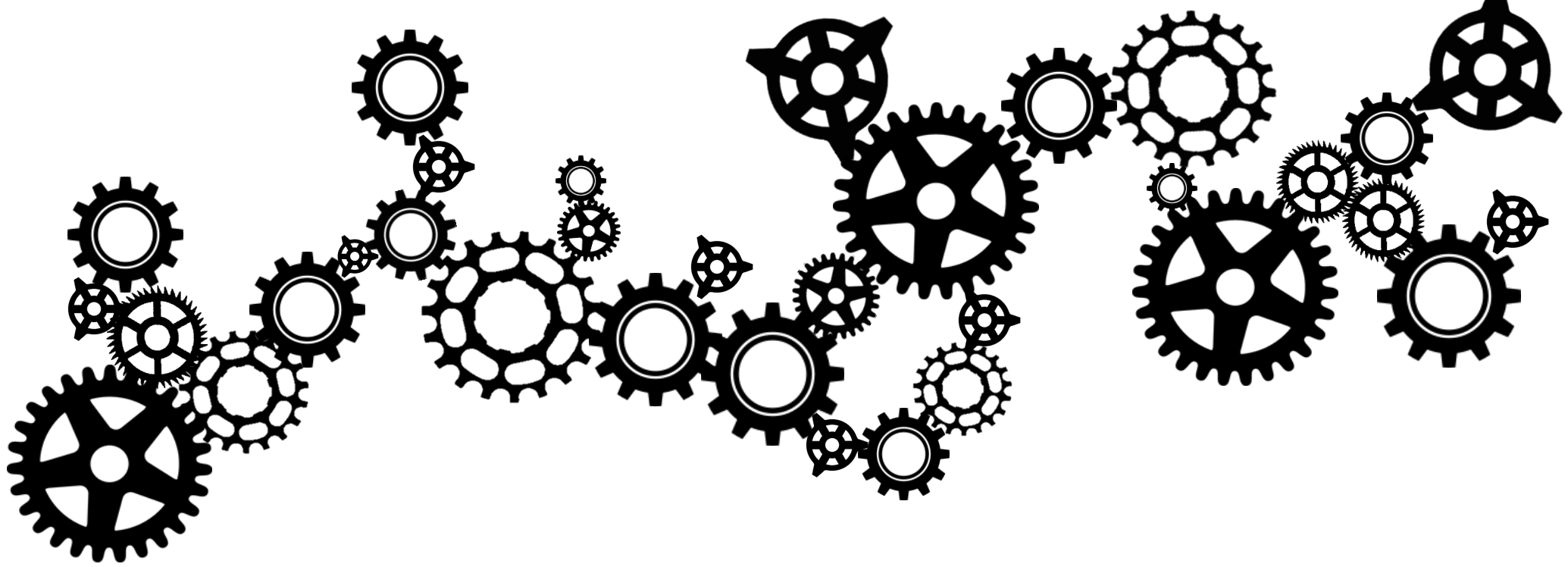
Putting it all together: trends and
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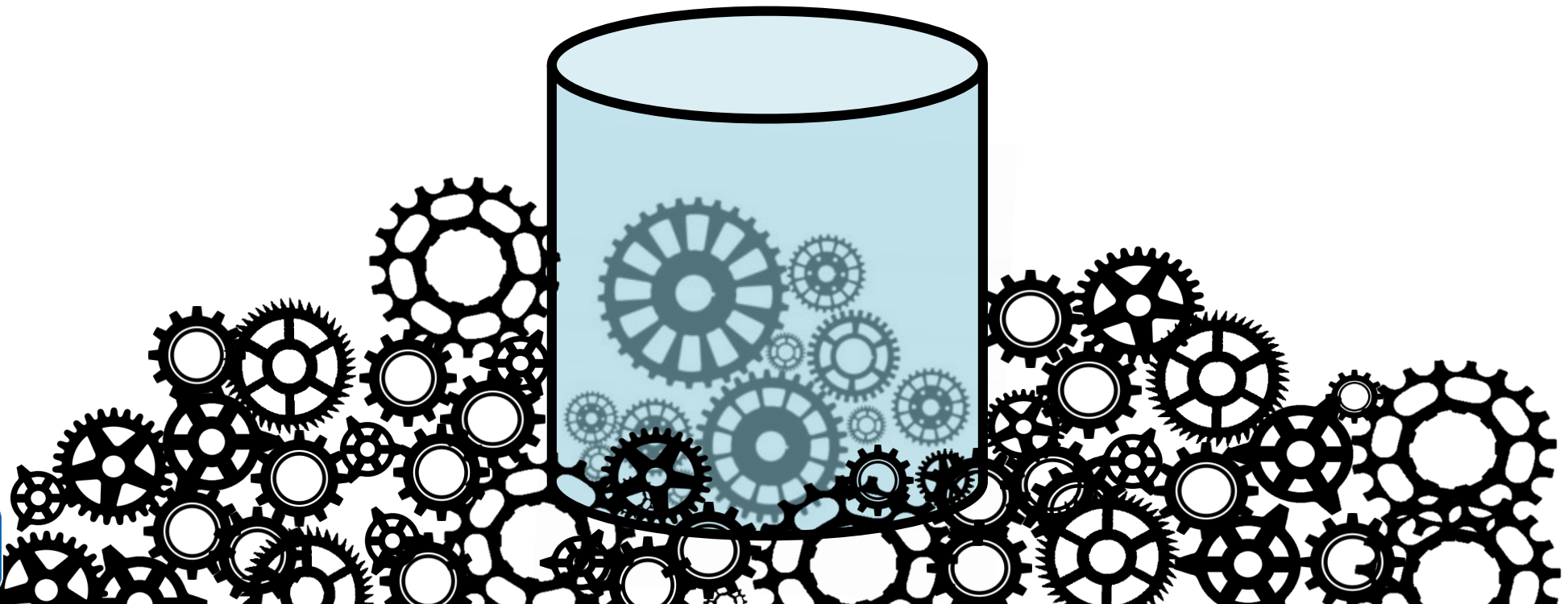
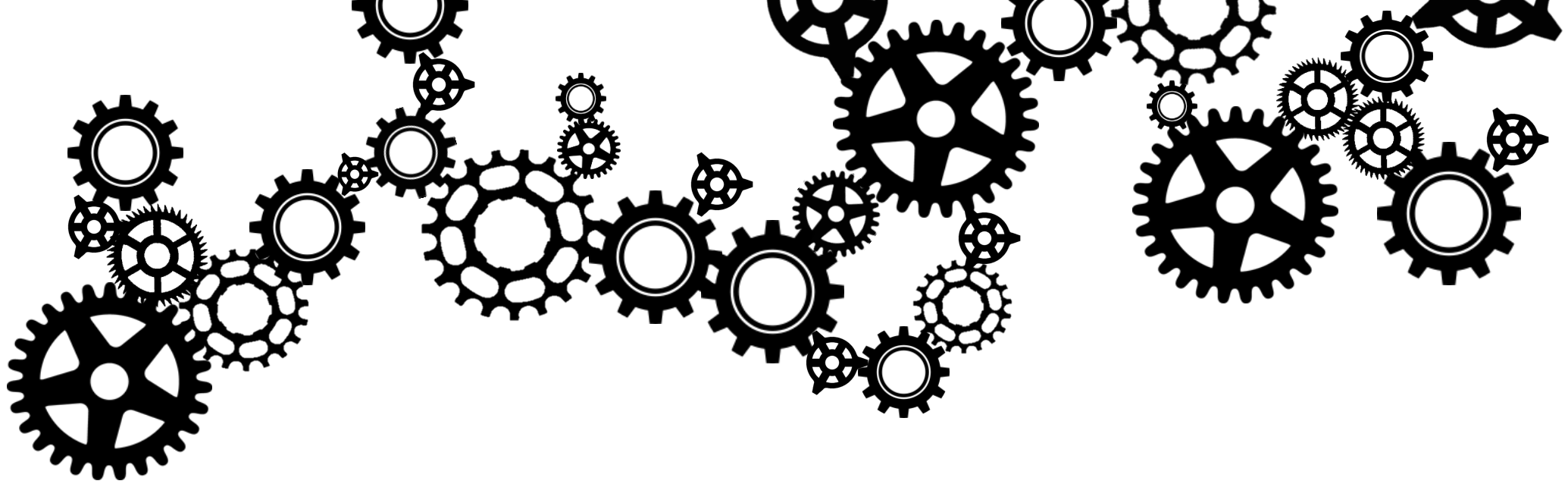


Oil and gas extraction is...

- Diverse
- Dynamic
- Specialized
- Complicated
- High hazard

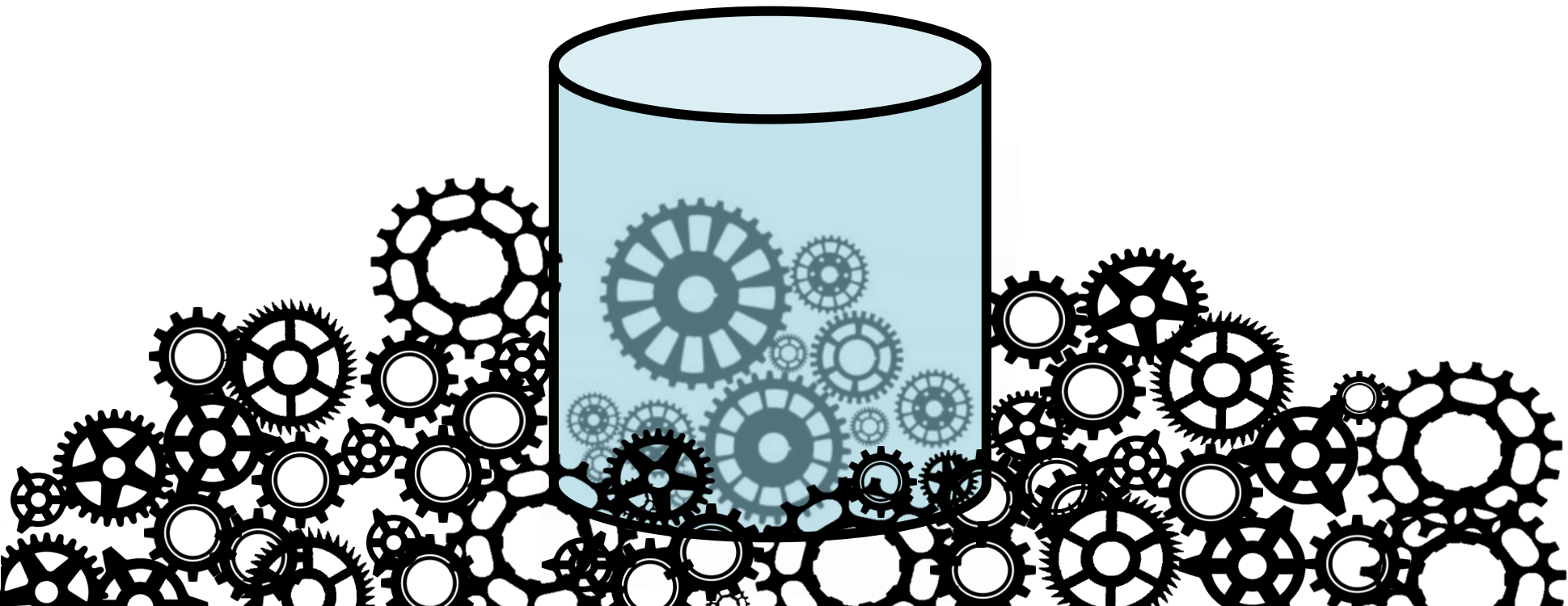


Oil and gas extraction is...
an intricate machine



The problem...

Important information was not captured in available databases.



The solution...

The Fatalities in Oil and Gas Extraction (FOG) database

A database specific to the oil and gas extraction industry.



FOG captures what is
missing



FOG captures what is missing

FOG

≠

BLS CFOI



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Fatalities in Oil and Gas Database

NIOSH database that collects [detailed information](#) about oil and gas worker fatalities in the U.S.

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Includes

Fatal events to U.S. oil and gas extraction workers:

- Onshore
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- **All NAICS (O&G related)**
- Motor vehicle incidents
- **Non-traditional commuting**
- Cardiac events

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Midstream and downstream

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Data Sources

OSHA case files, media, crash reports, autopsy reports, industry partners, state health departments

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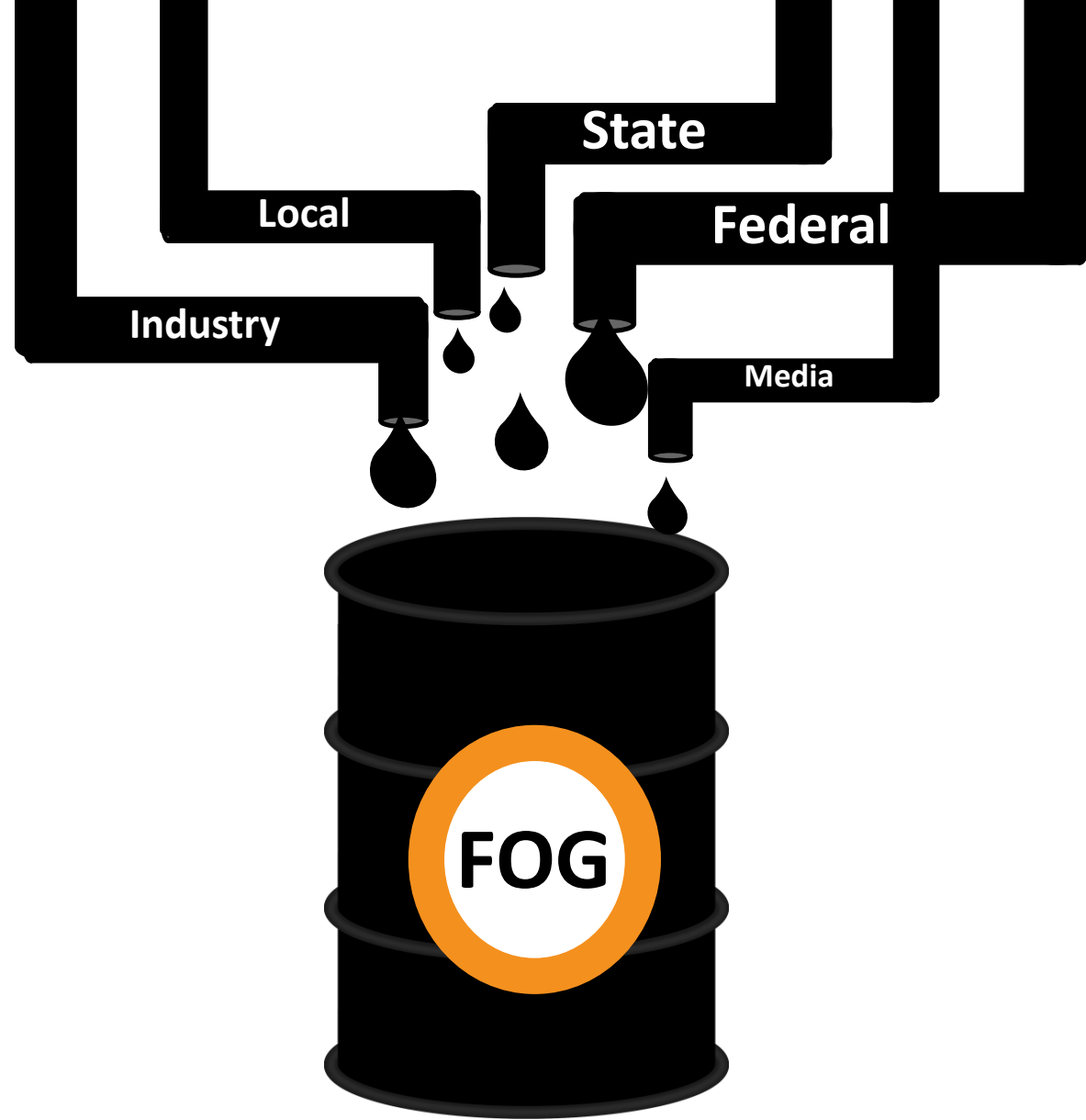
Midstream and downstream

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Limitations

Roadway motor vehicle fatalities, chronic illness



50

Variables per Incident

- ✓ Industry operations
- ✓ Industry activities
- ✓ Incident event type
- ✓ Contributing factors
(i.e. weather, equipment, etc.)



41

Variables per Worker

- ✓ Industry-specific occupations
- ✓ Years in Oilfield
- ✓ Fatigue

2015

Fatalities

63

Incidents

53

Fatalities in FOG 2015-2016

FOG

2015

2016

Fatalities

63

29

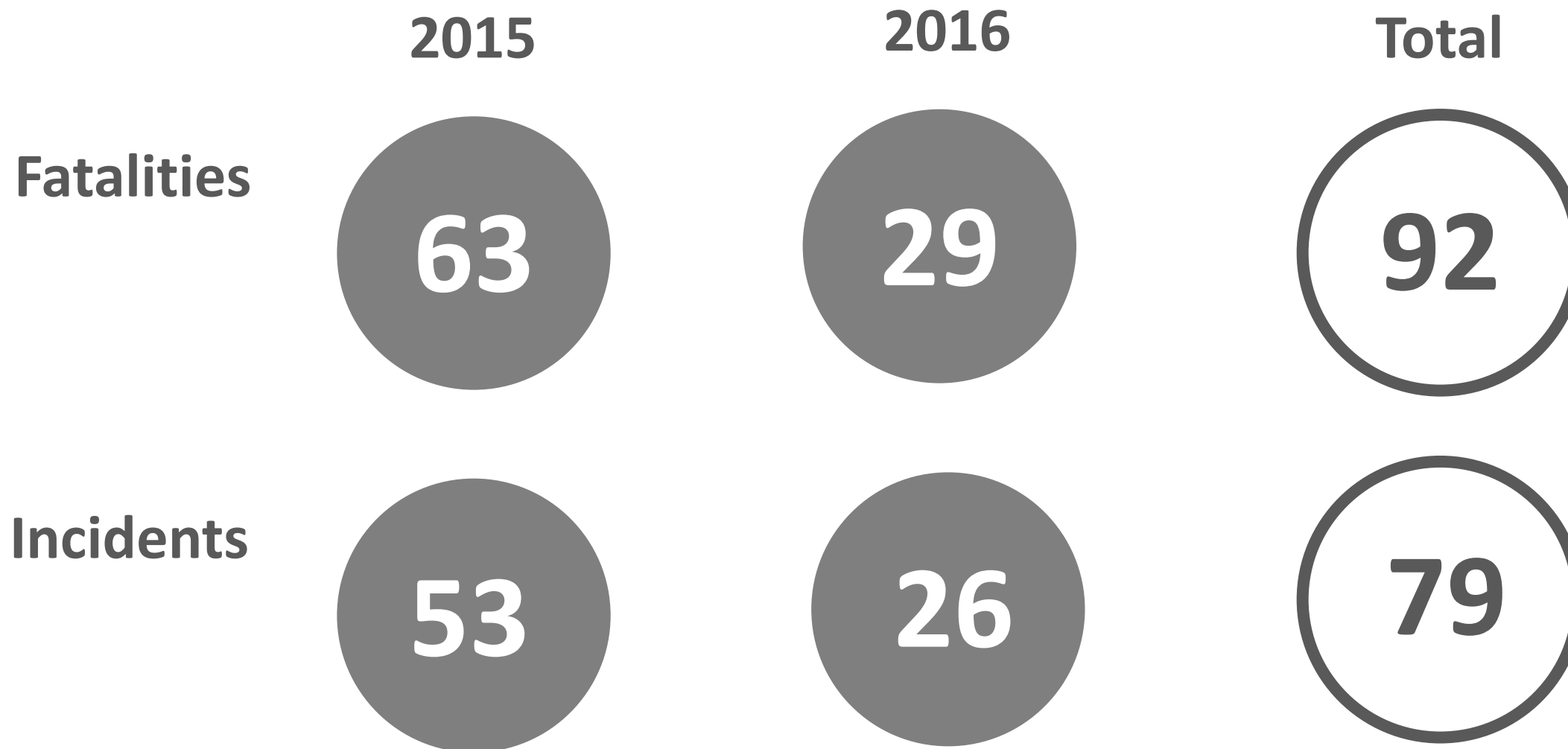
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53

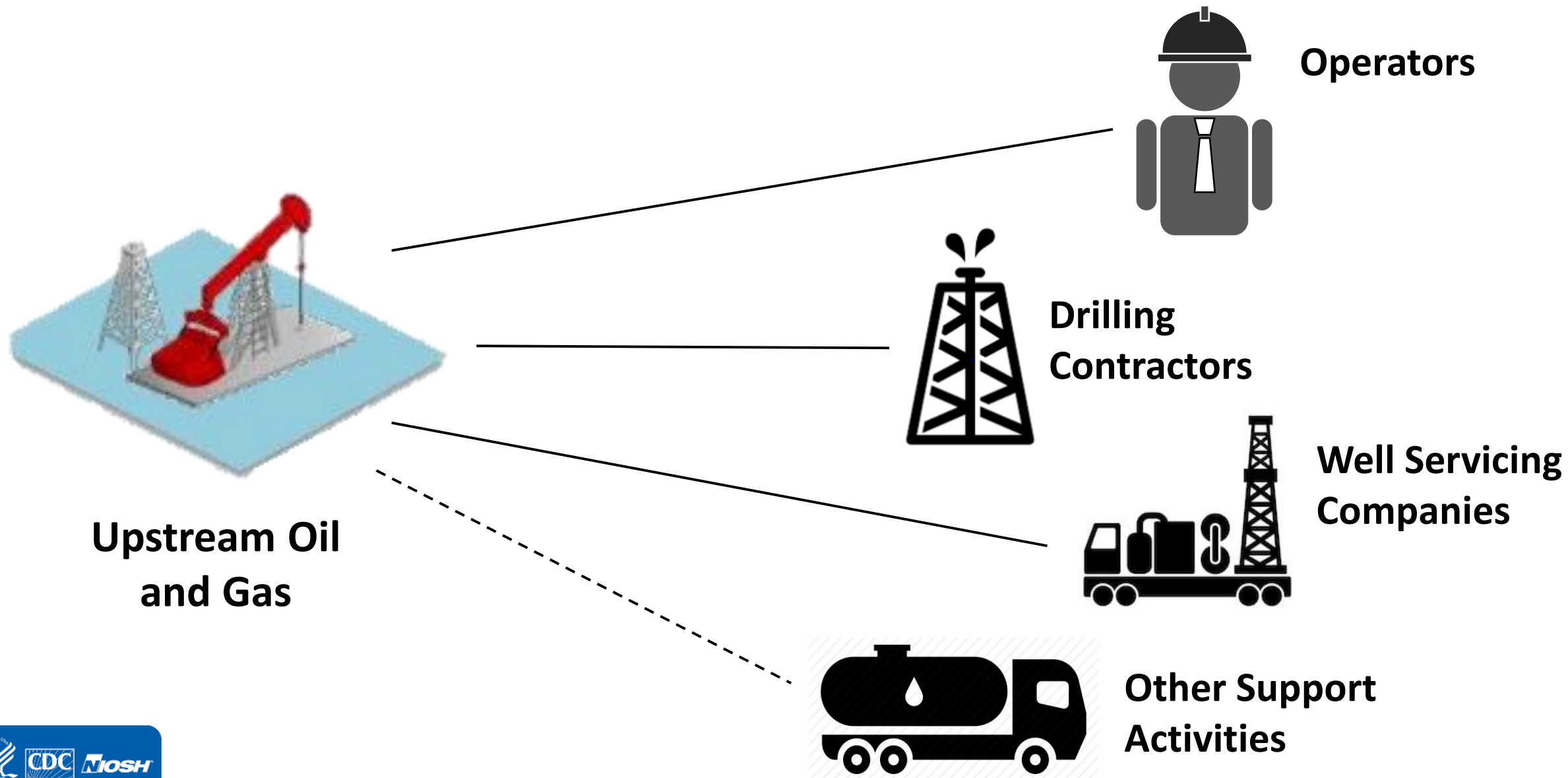
26

Fatalities in FOG 2015-2016

FOG



Upstream Oil and Gas



Fatalities in FOG by Industry Group, 2015-2016

FOG

Industry group

- NAICS codes
- Primary business
- One per fatality

Oil and gas extraction NAICS

- 211- operators
- 213111- drilling
- 213112- support activities
- 4842- specialized freight

- ★ FOG includes all fatalities related to oil and gas extraction regardless of NAICS

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Support activities

54

Drilling

18

Specialized Freight

6

Operator

<5*

Other industry

<5*

Unknown

10

n=92

*Values <5 are suppressed in this dataset

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Support activities

59% of FOG identified fatalities

54

Drilling

18

Specialized Freight

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Operator

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Other industry

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Unknown

10

n=92

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Operation

- Stages or distinct processes
- One per incident

Operations that Occur throughout Oil and Gas Extraction

- Vehicle repair or maintenance: <5*
- Waste fluid treatment or disposal: <5*
- Unspecified (Off-wellsite): 26
- Unspecified (Wellsite): <5*
- Offshore: 5

Fatalities in FOG by Operation, 2015-2016

FOG

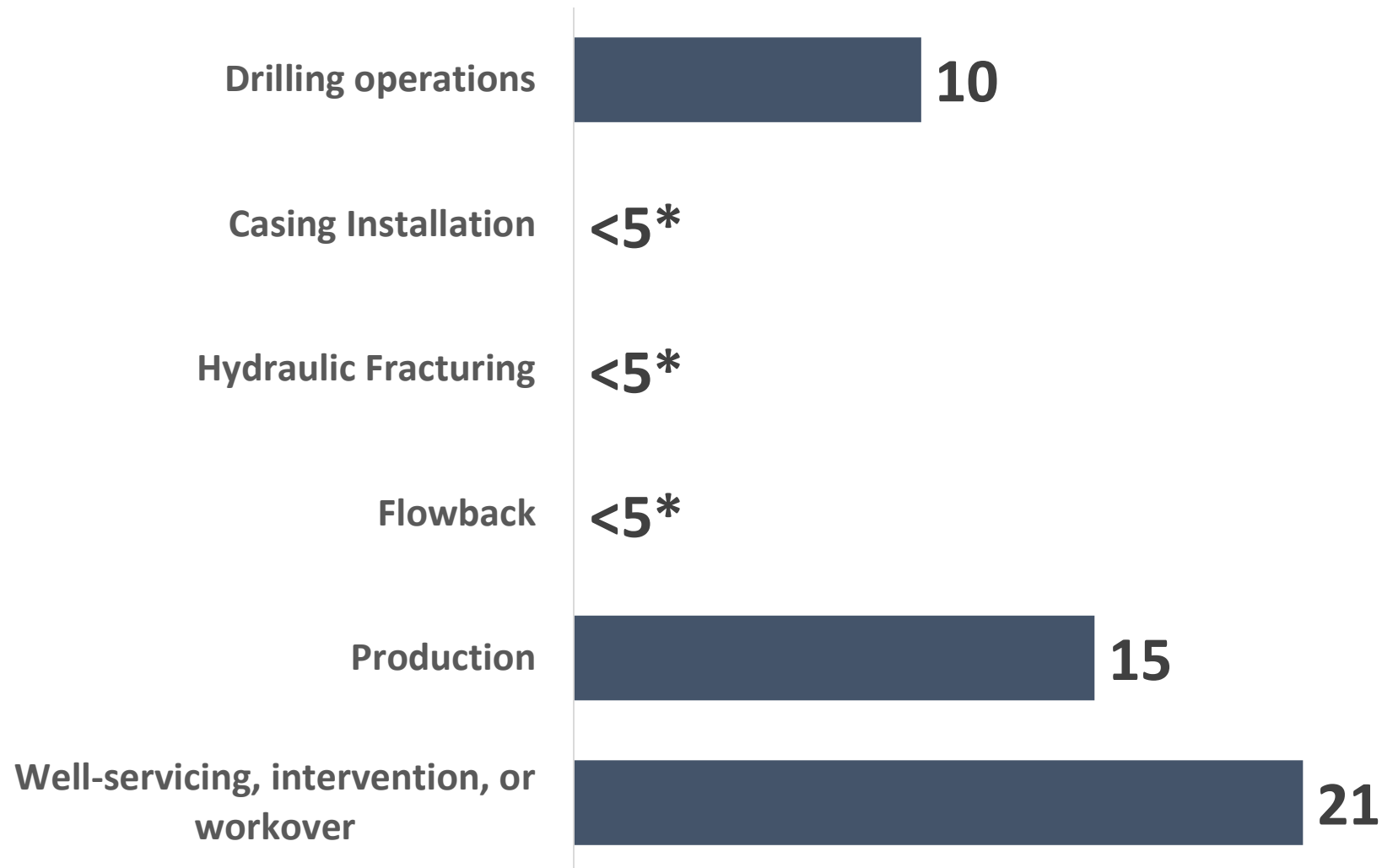
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Operations by Stages of Well Development



*Values <5 are suppressed in this dataset n=92

Fatalities in FOG by Event Type, 2015-2016

FOG

Event type

- How fatality occurred
- FOG has its own event types
- Initial event
- One per fatality

★ 5 cardiac events with no identified work exposure are not included in these data

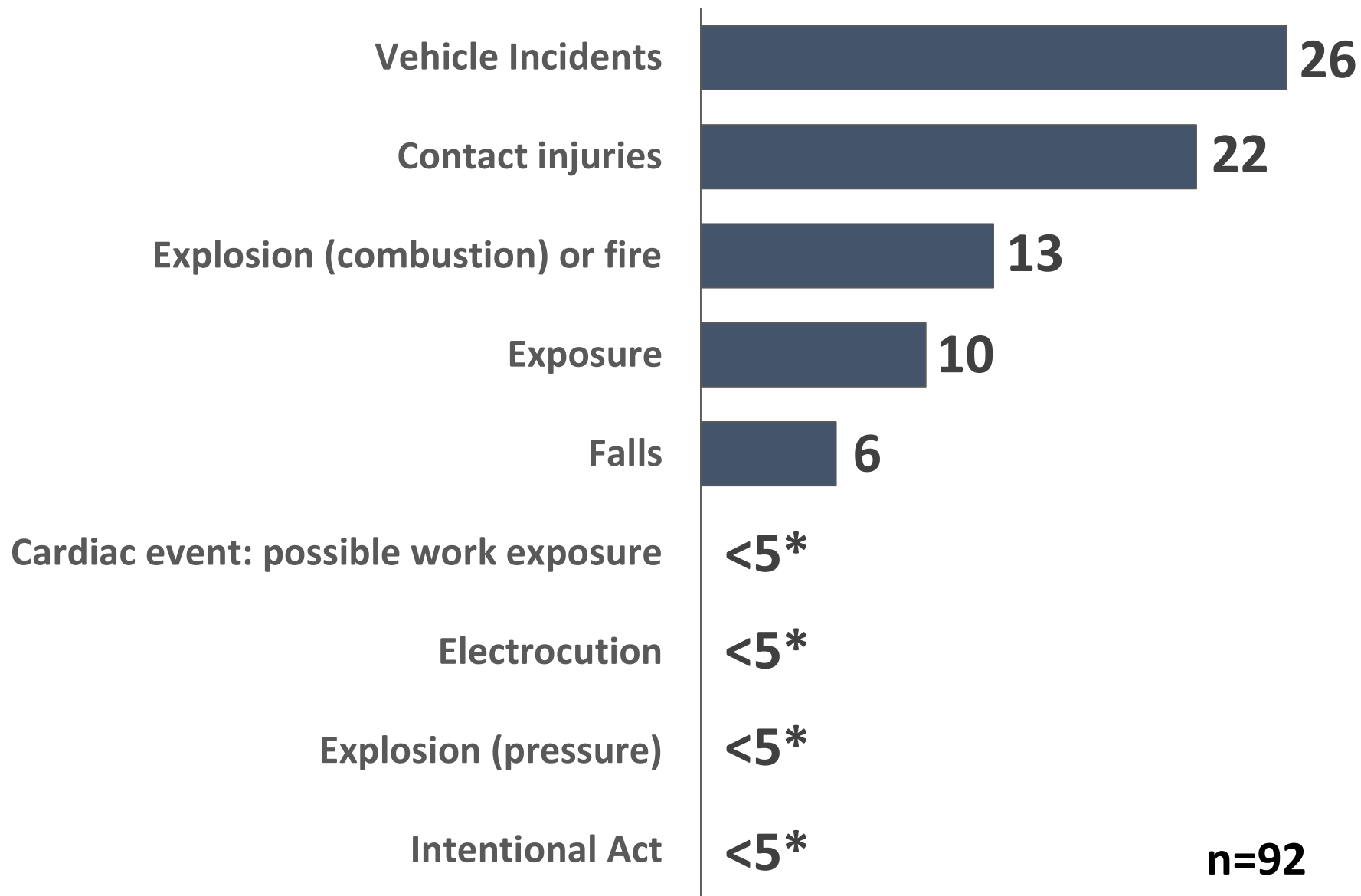
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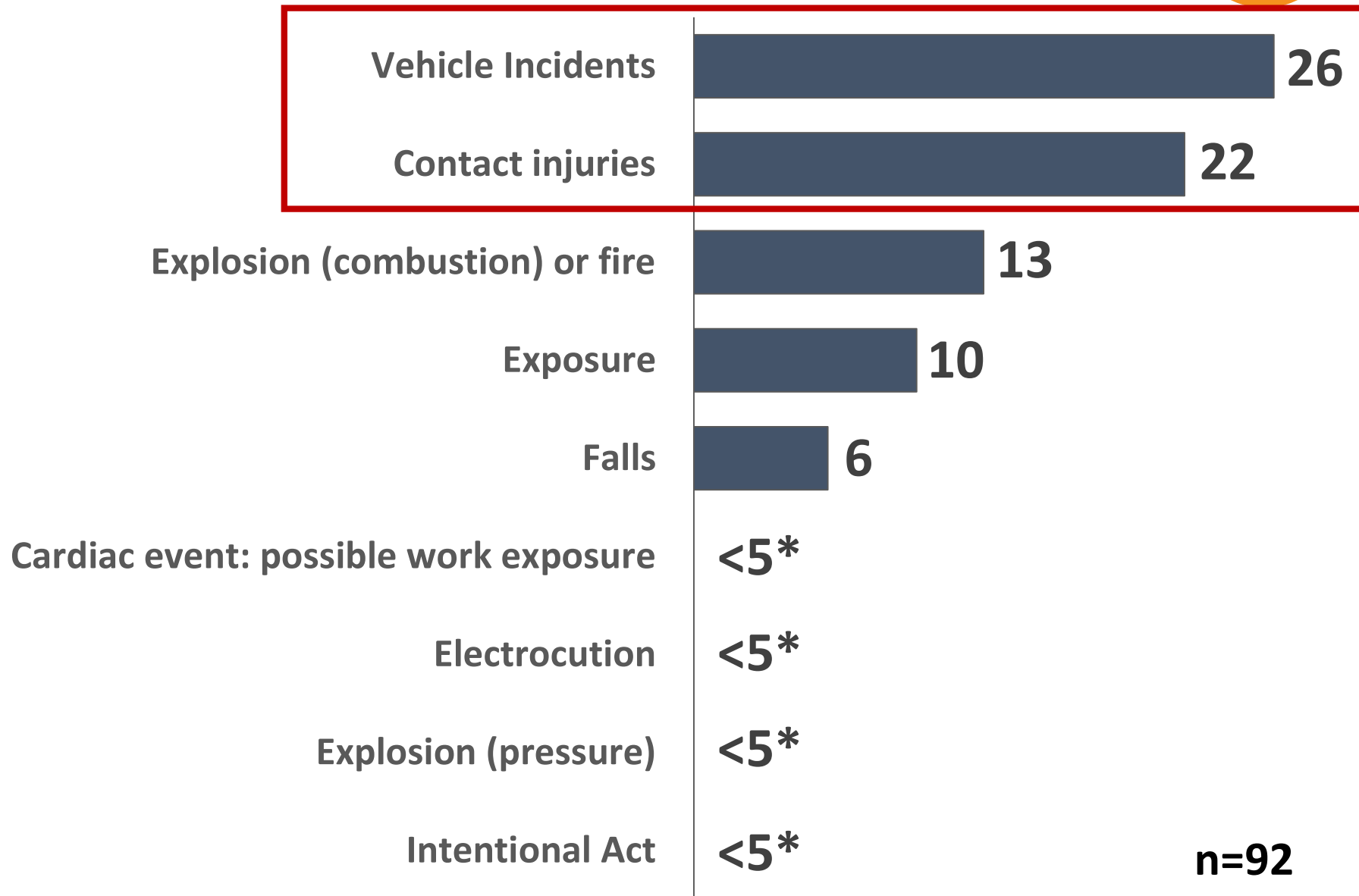
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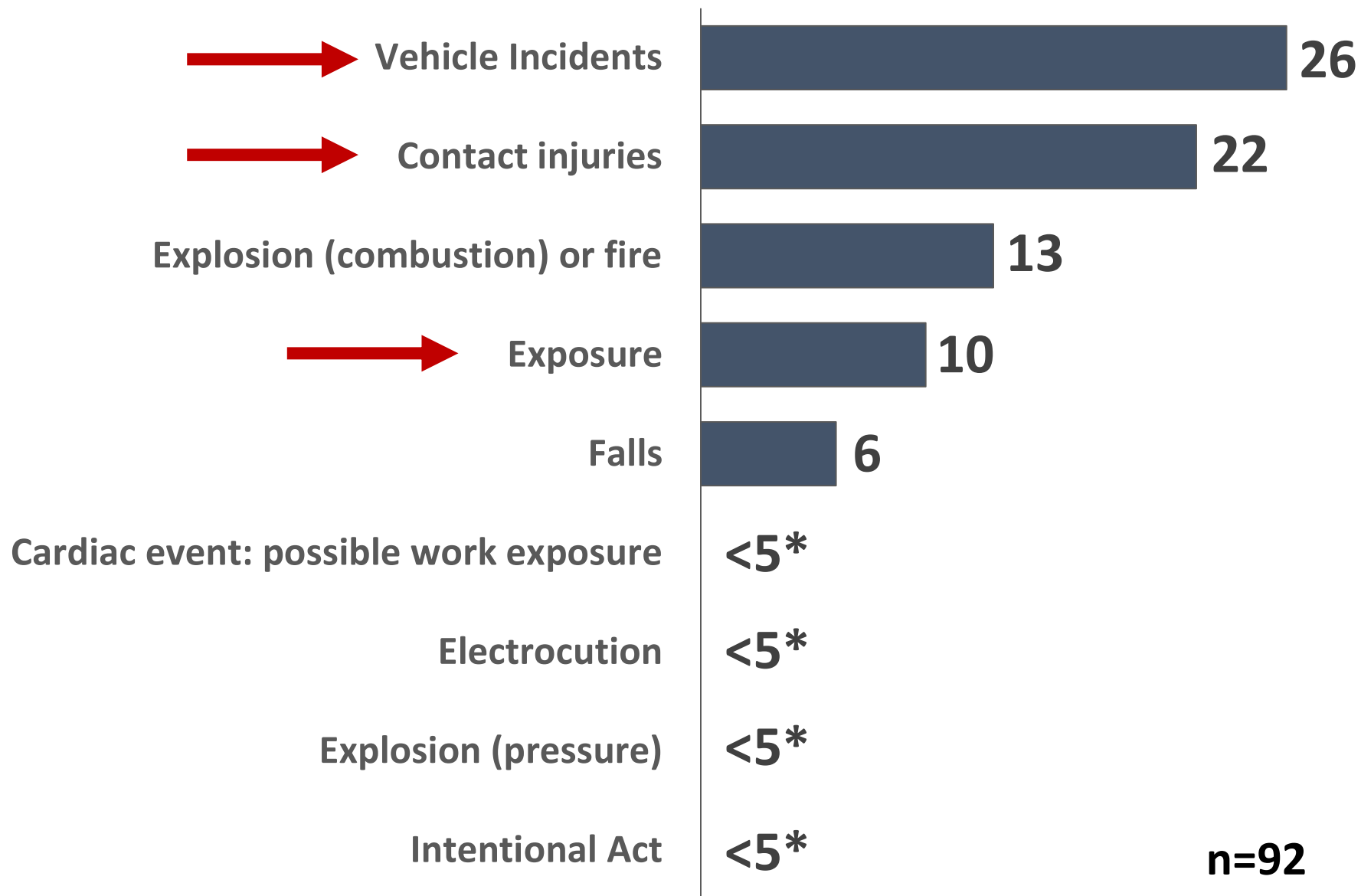
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Vehicle Incidents



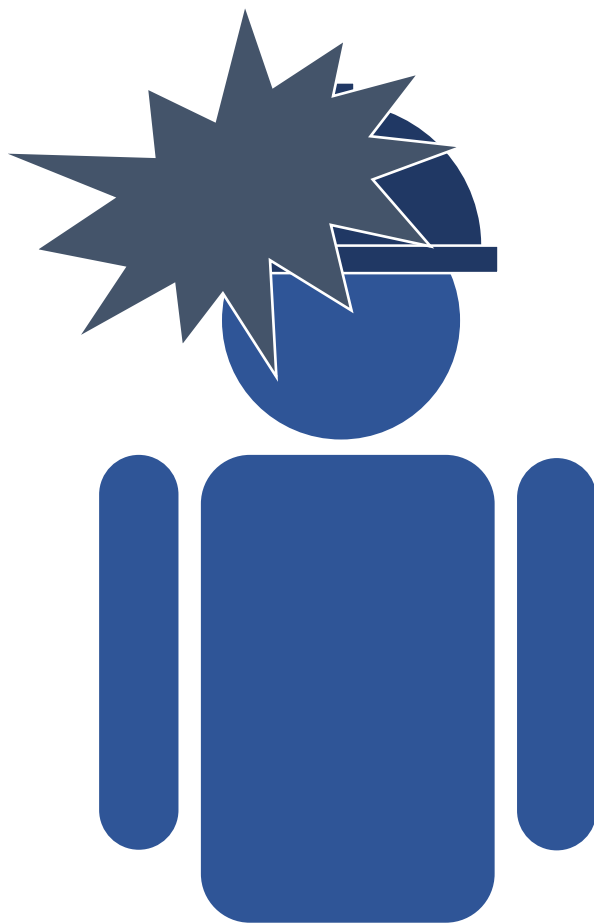
26 total fatalities

24 roadway

<5* on-site

<5* other location

Contact injuries



22 total fatalities

8 caught between/crushed

8 struck by

6 struck by falling object



Exposure

10 total fatalities

7 harmful substance

- H₂S
- Hydrocarbons

<5* environmental

<5* alcohol or drug poisoning

Activities

- Steps within operations
- Carried out several times
- As many as appropriate per incident

43 total activities

5

Associated with
8+ fatalities

Most common activities associated with worker fatalities

FOG



**Motor vehicle travel
including non-traditional
commutes**

21



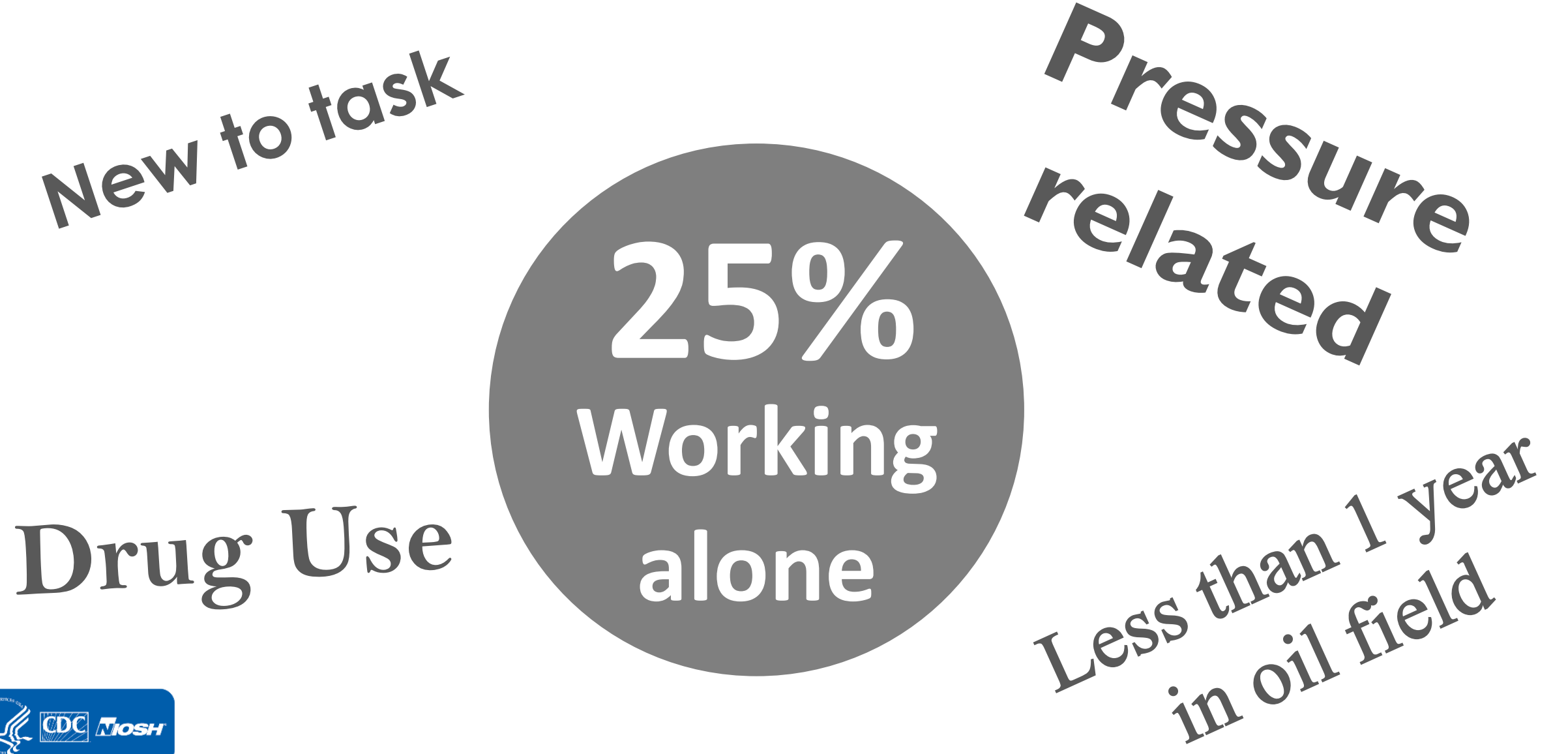
**Material handling:
crane, forklift, winch
truck, etc.**

10



Production rig activities

10



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from OSHA Severe Injury Reporting**

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recommendations

NEW!



Report a Fatality or Severe Injury

- All employers are required to notify OSHA when an employee is killed on the job or suffers a work-related hospitalization, amputation, or loss of an eye.
- A fatality must be reported within 8 hours.
- An in-patient hospitalization, amputation, or eye loss must be reported within 24 hours.



To Make a Report

- Call the nearest [OSHA office](#).
- Call the OSHA 24-hour hotline at [1-800-321-6742](#) (OSHA).
- [Report online](#)

Be prepared to supply: Business name; names of employees affected; location and time of the incident, brief description of the incident; contact person and phone number.

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Data from 2015 through 2017 is available for download...



[Data & Statistics](#) / Severe Injury Reports

Severe Injury Reports

OSHA requires employers to report all severe work-related injuries, defined as an amputation, in-patient hospitalization, or loss of an eye. The requirement began on January 1, 2015. This page provides information from those reports, including a description of the incident and the name and address of the establishment where it happened. Injuries are coded using the [Occupational Injury and Illness Classification System](#).

You can download a file of the reports below. The reports will be updated periodically and represent federal OSHA states only. They do not reflect injuries in state plans.

Please be aware the geocodes (latitude/longitude) provided were obtained through third party services based on address information provided with the injury report. The precision varies by case, and accuracy is not guaranteed.

[Download Data](#)

(Data from 1/1/2015 through 12/31/2017)

www.osha.gov/severeinjury

Data from 2015 through 2017 is available for download...



[Data & Statistics](#) / Severe Injury Reports

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Data from 2015 through 2017 is available for download...

...But lacks reports from State-Run Programs...



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History: Injury reporting

FOG

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...But lacks reports from State-Run Programs...

...Through OSHA-NIOSH Partnership, our team obtained OGE injury data from all 50 States!



[Data & Statistics](#) / Severe Injury Reports

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All Severe Injury information is from OSHA reporting and inspections

- No OSHA jurisdiction on public roadways
- Vehicle incidents are underreported in this dataset

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Data provided from OSHA:

- Company NAICS Code (211(111), 213111, 213112)
- Incident Date and Location
- Counts of Hospitalizations & Amputations
- OSHA Inspection Numbers (if applicable)
- **Incident Narratives**

Some narratives were brief....

Activity:

Operation:

Event Type:

Equipment:

Hosp. or Amp:

“An employee was injured during a fire at a gas well.”

Some narratives were brief....

Activity: ???

Operation: ???

Event Type: Explosion (combustion) or fire

Equipment: ???

Hosp. or Amp: Hospitalization

“An employee was injured during a fire at a gas well.”

Activity:

Operation:

Event Type:

Equipment:

Hosp. or Amp:

...And some were very descriptive!

“Employees were running rods downhole on a servicing rig when the pump hit a tight spot causing slack on the rods. The slack resulted in the rod elevator breaking and allowing the rods to come loose. The rod struck the employee in the middle, right side of his back and knocked him to the ground.”

Activity: Pulling or running rods

Operation: Well Servicing,
Intervention, or Workover

Event Type: Struck by falling object

Equipment: Rods, Rod Elevator

Hosp. or Amp: Hospitalization

...And some were very descriptive!

“Employees were running rods downhole on a servicing rig when the pump hit a tight spot causing slack on the rods. The slack resulted in the rod elevator breaking and allowing the rods to come loose. The rod struck the employee in the middle, right side of his back and knocked him to the ground.”

(Listed as 1 Hospitalization)

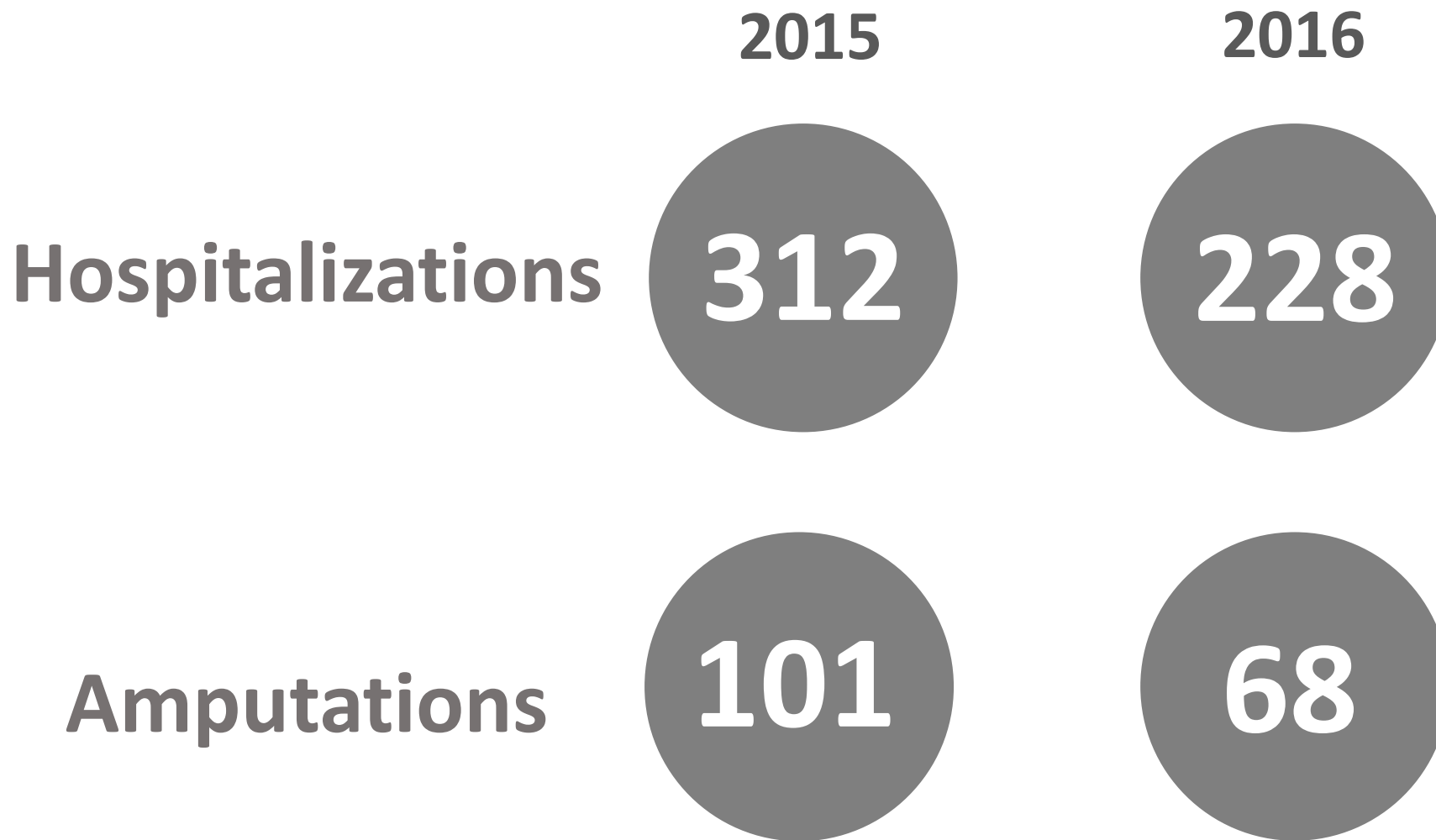
Starting point:

649

**Oil and Gas Related
incidents reported to
OSHA**

Summary of Severe Injuries 2015-2016

FOG



Summary of Severe Injuries 2015-2016

FOG

	2015	2016	TOTAL
Hospitalizations	312	228	540
Amputations	101	68	169

Severe Injuries by Operation 2015-2016

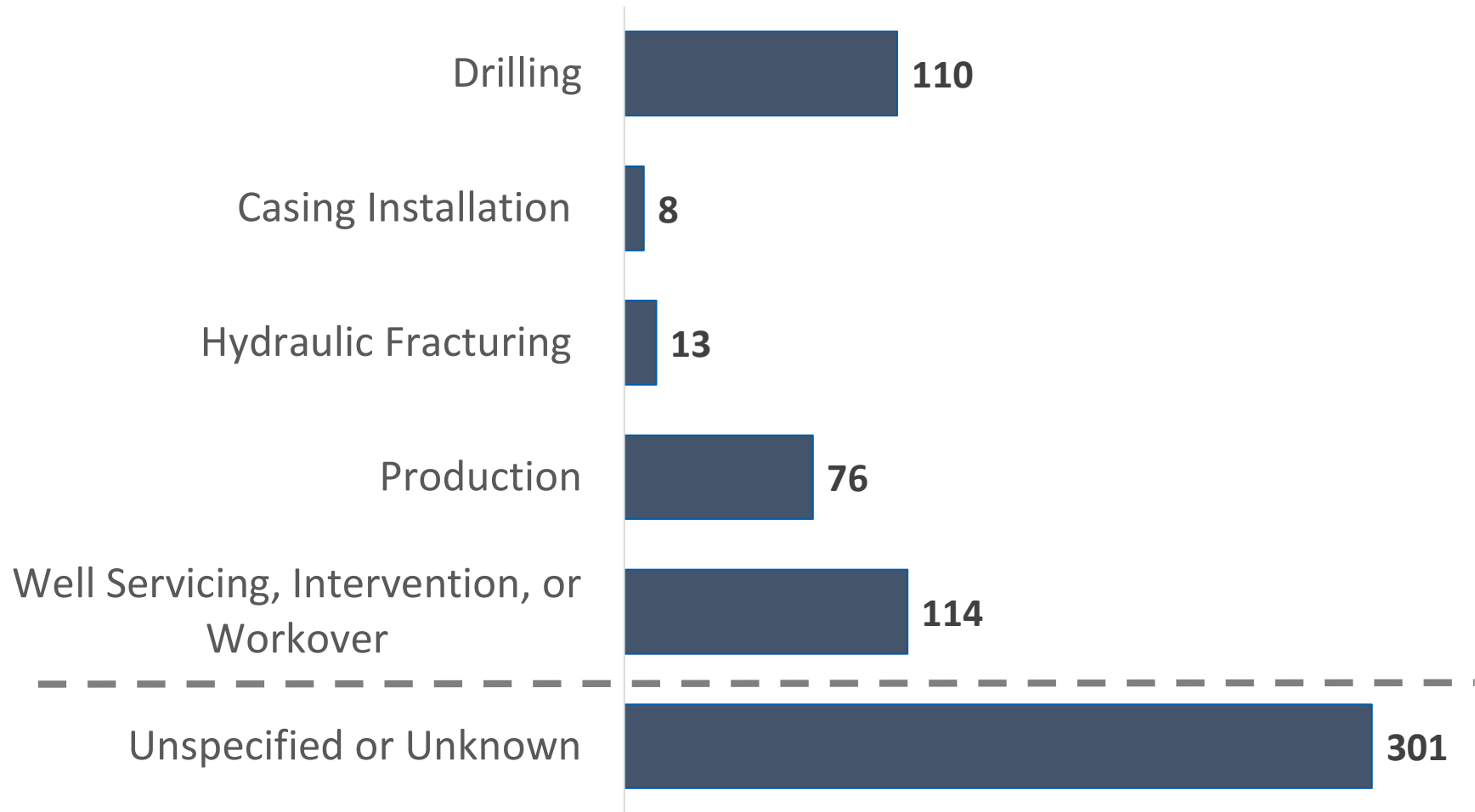
FOG

Operation

- Stages or distinct processes
- One per incident

★ Severe Injury data includes all hospitalizations and amputations related to oil and gas extraction NAICS codes

Operations by Stages of Well Development



All FOG data are preliminary, unpublished, and subject to change without notice.

Severe Injuries by Operation 2015-2016

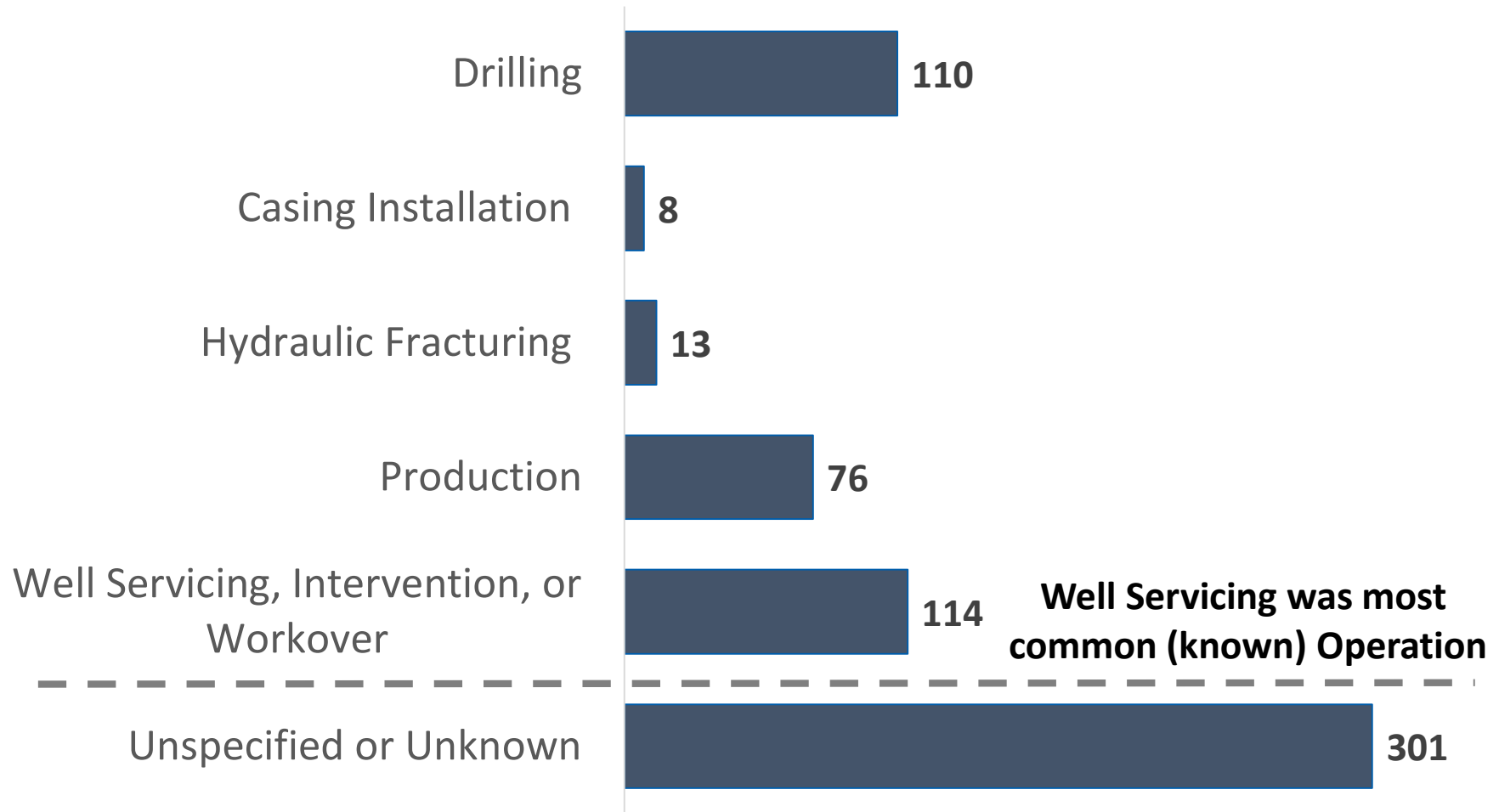
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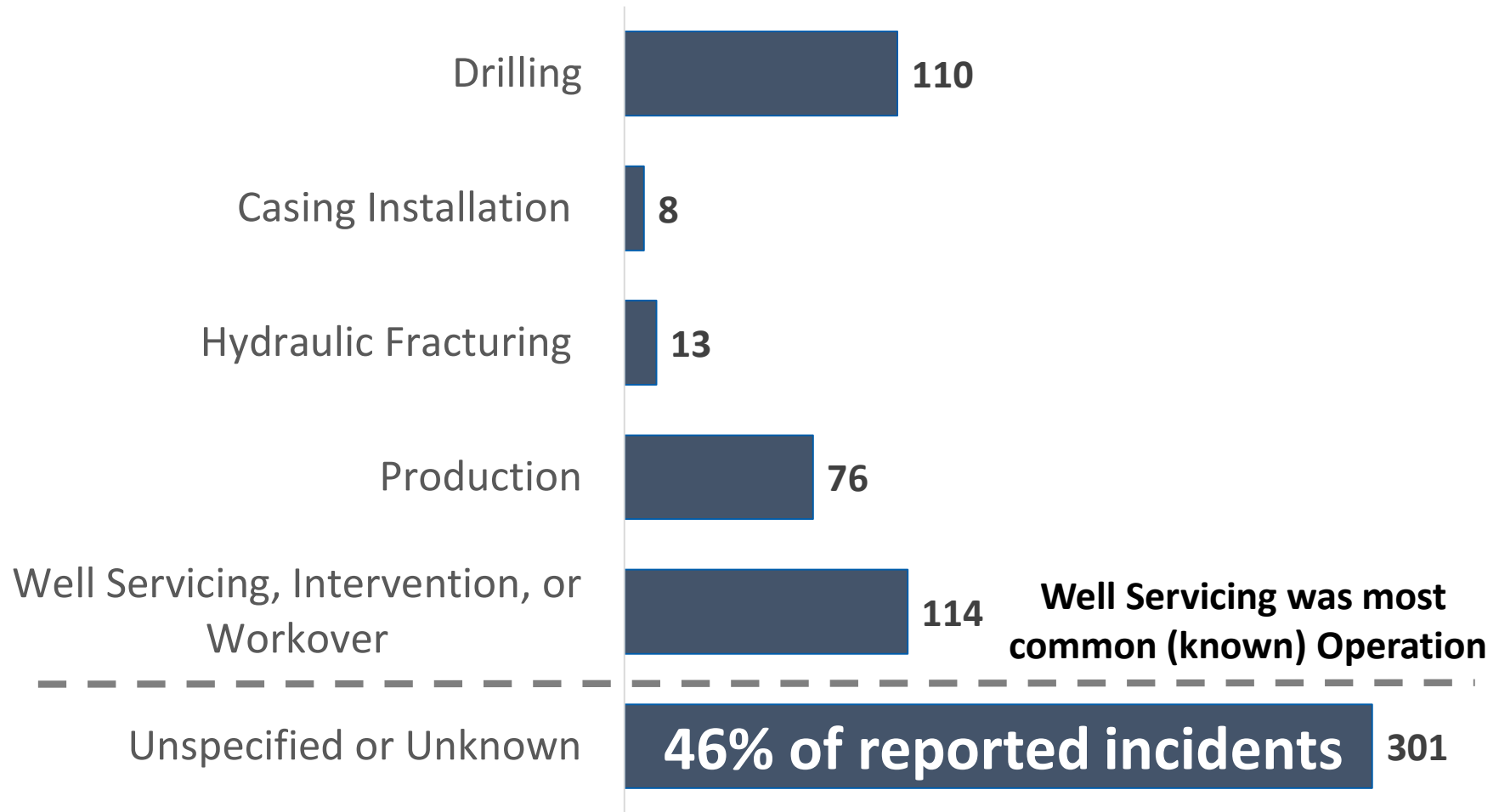
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Severe Injuries by Most Common Activity Type 2015-2016

FOG

of reported incidents

Activities

- Steps within operations
- Carried out several times
- As many as appropriate per incident



Rig or equipment repair or maintenance

87



Material handling: crane, forklift, winch truck, etc.

66



Make up or break out tubulars

45



Equipment install or dismantle

31



Material handling: Manual

31



Unknown Activity

144

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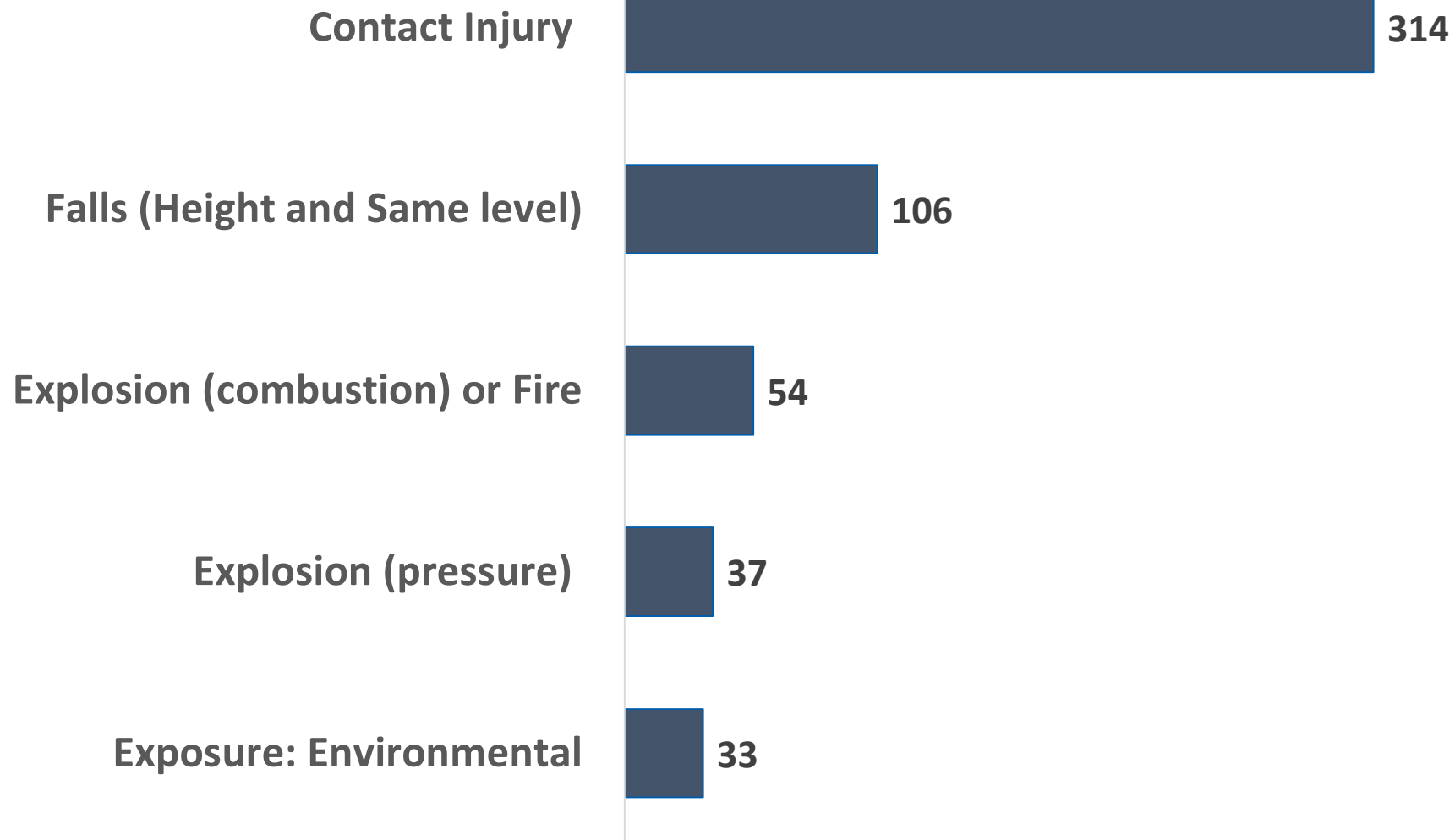
Severe Injuries by Most Common Event Type 2015-2016

FOG

Event type

- How injury occurred
- Initial event
- One per incident

★ N=649



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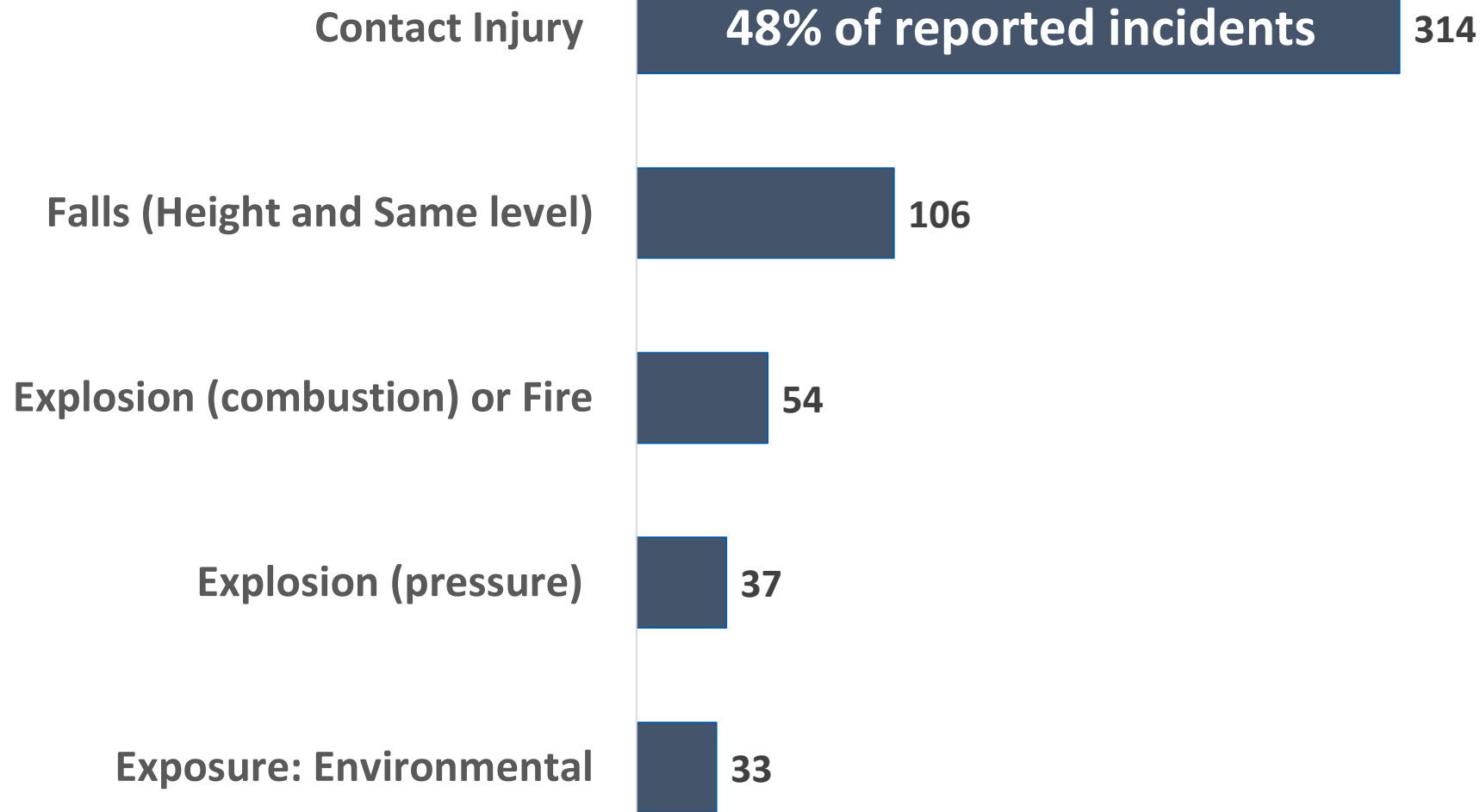
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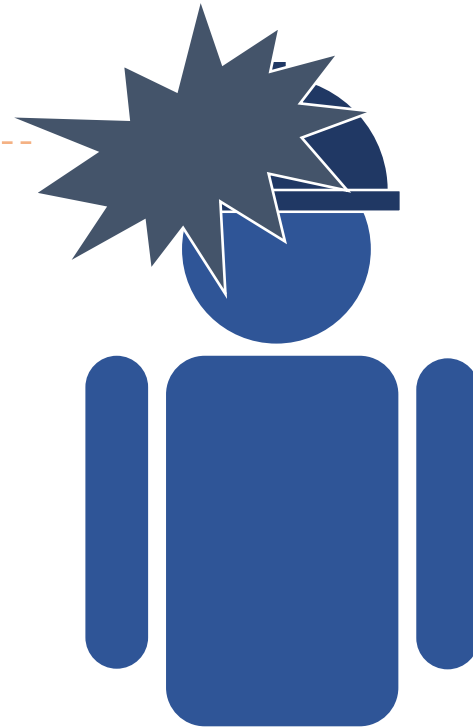
Contact injuries

211 total hospitalizations

96 caught between or crushed

75 struck by

40 struck by falling object



141 total amputations*

123 caught between or crushed

10 struck by

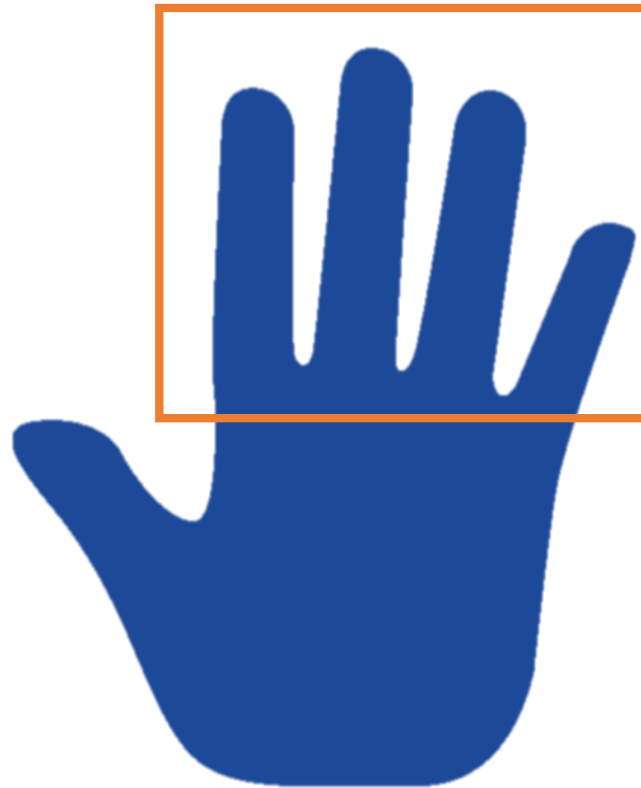
8 struck by falling object

Severe Injury Amputation Events 2015-2016

FOG

128

Finger(s),
Fingertip(s) or
Partial Finger(s)

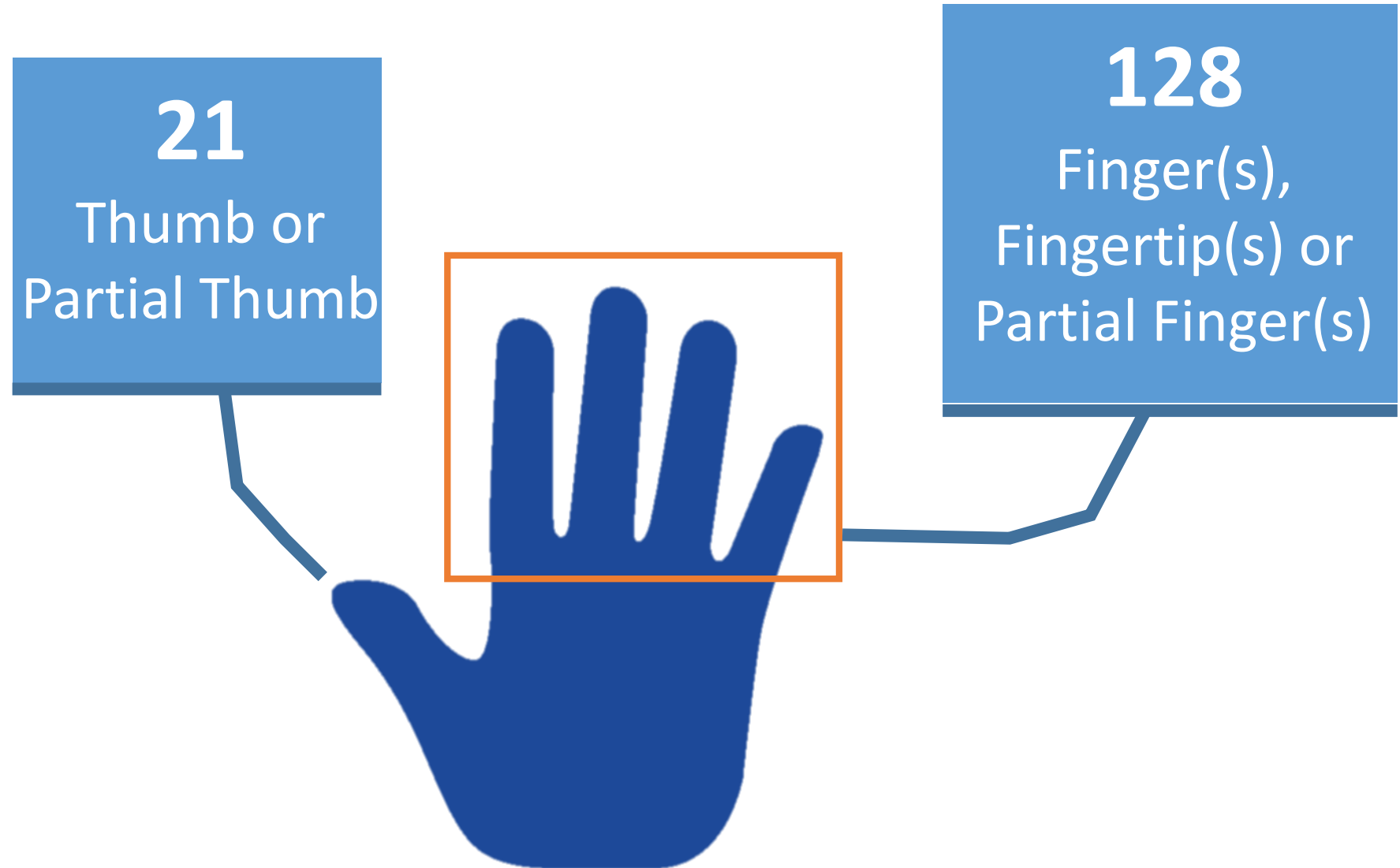


N=169

*Hand Icon created by Sasha Willins from Noun Project

Severe Injury Amputation Events 2015-2016

FOG

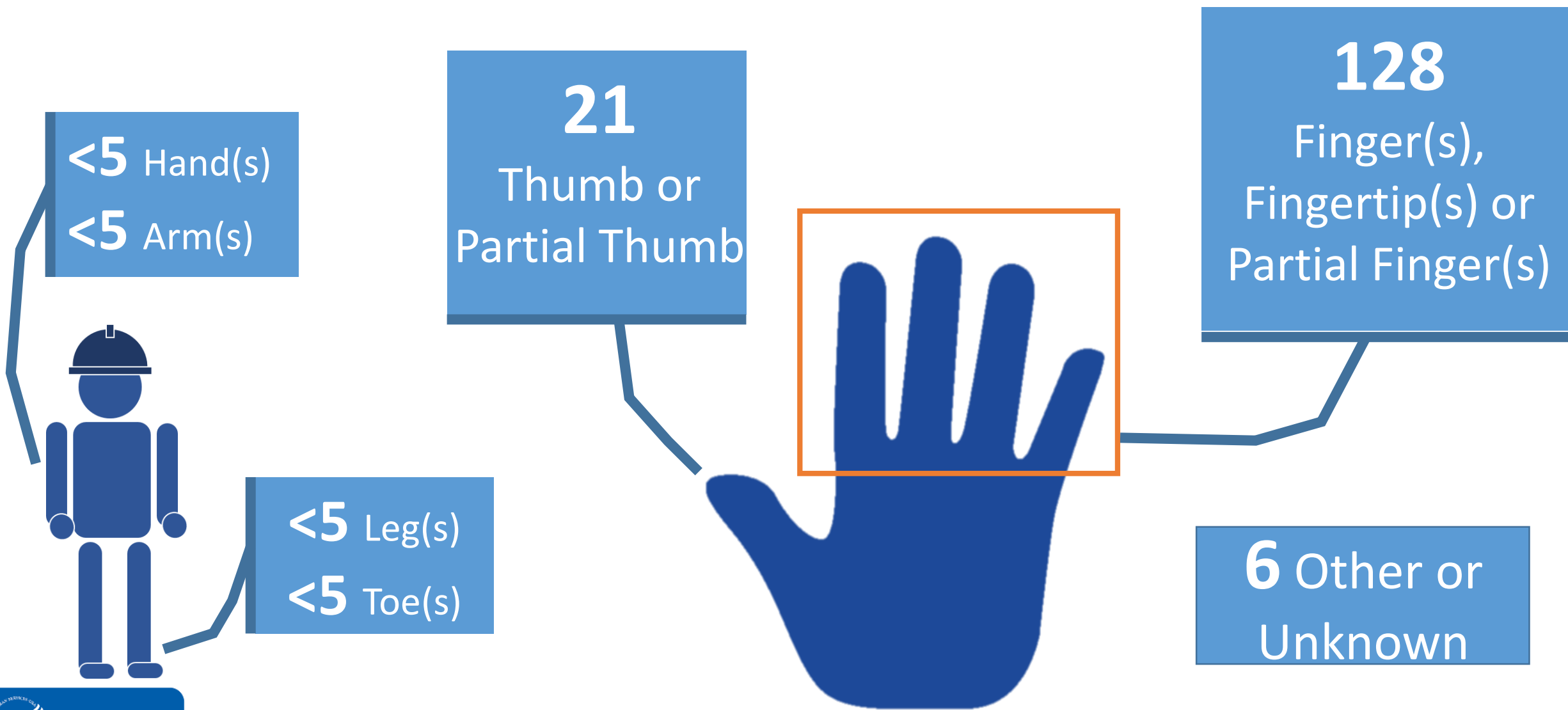


N=169

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Severe Injury Amputation Events 2015-2016

FOG



N=169

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Forklifts

**Hand tools
(manual and powered)**

Power tongs

Pressure Washers

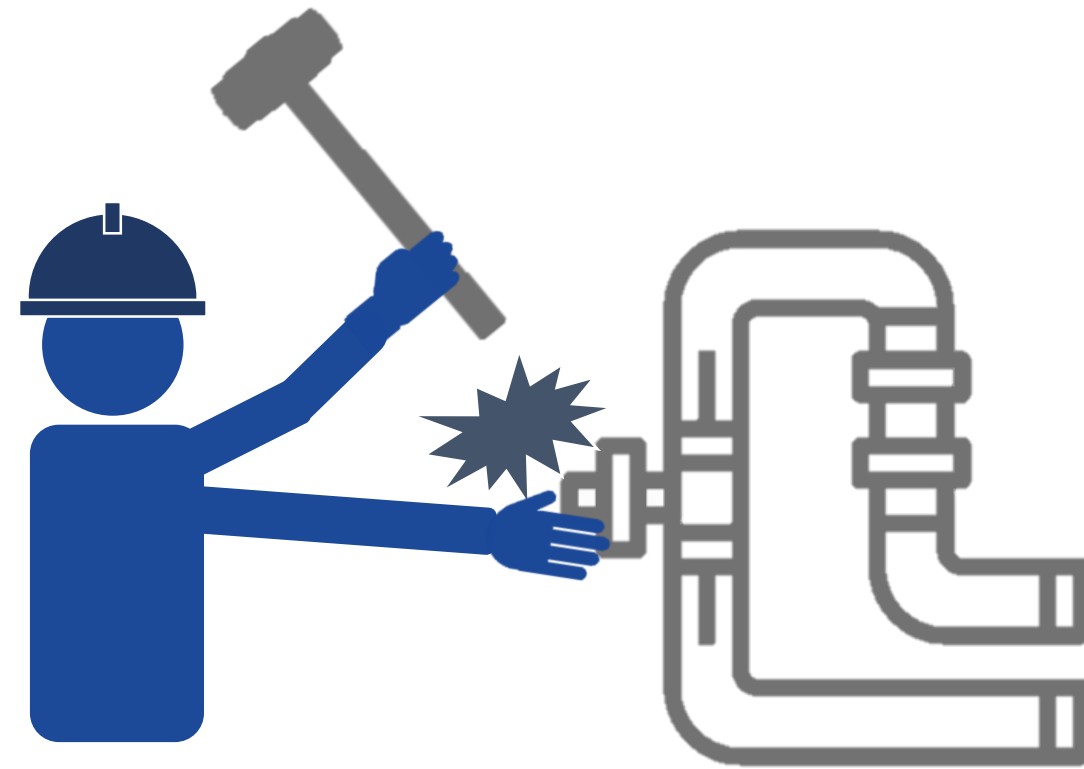
Hoses

Hand tools (manual and powered)

“Employee was using a 10 lb. sledge hammer to tighten a hammer union.

The employee missed and caught his right index finger between the handle of the hammer and a valve handle.”

(Finger was amputated)



OSHA Jurisdiction does not cover:

- Incidents that occur on public streets, highways, or on normal commute¹

Trucking and Hauling related incidents may be listed on other NAICs codes

Under-reporting and reporting errors

- Estimated to be roughly 50% underreported based on workers compensation data²
- Self-reported incidents may lack crucial detail or information

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**I WANT YOU
TO COMPLY WITH
OSHA REPORTING
REQUIREMENTS & TO
REPORT COMPLETE
INFORMATION!**

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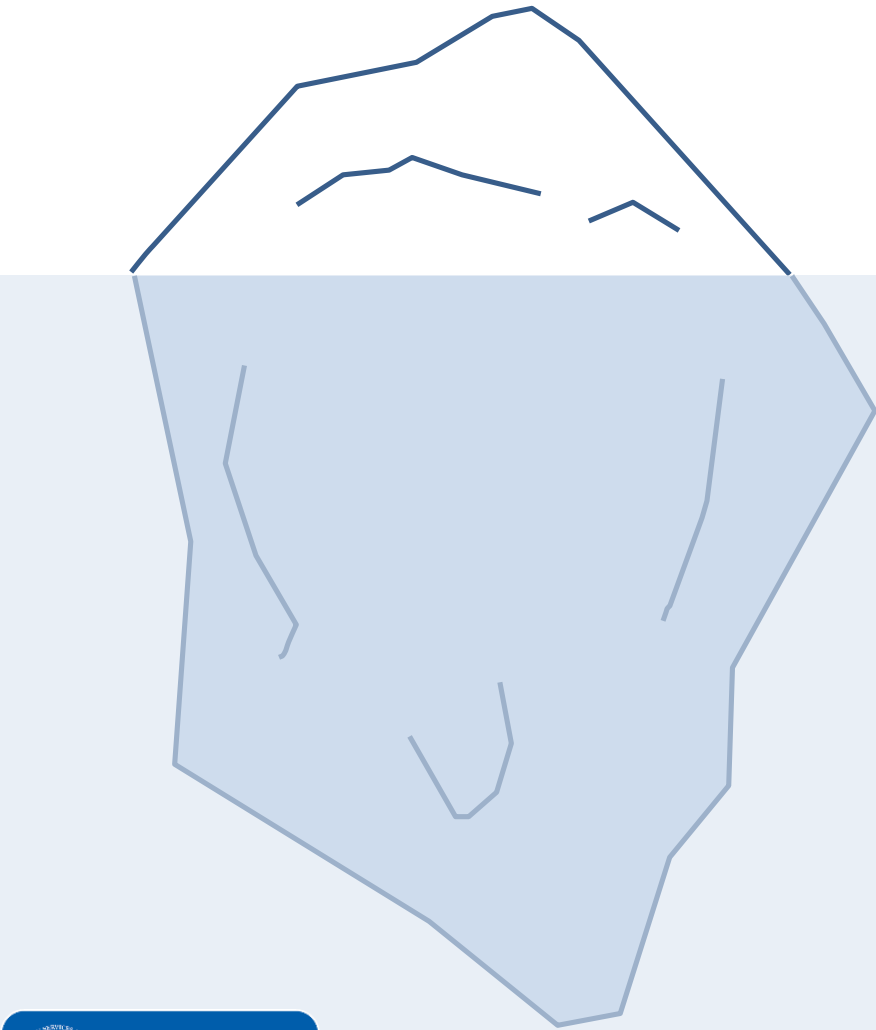
**Putting it all together: trends and
recommendations**



Fatalities are the tip of the iceberg

High number of fatalities and severe injuries for:

- Well servicing, workover, intervention operations
- Drilling operations
- Contact injuries
- Material handling: crane, forklift, winch truck
- Pressure related events



Fatalities

Severe Injuries

Falls

6%
of fatalities

16%
of severe injuries

Hand tools

Not a major source

Major source

Manual material handling

None

5th
most common activity

Exposure: environmental

1-3%
of fatalities

5%
of severe injuries

Vehicle incidents

Some information

Very little information

Driving: The most dangerous activity for oil and gas workers

FOG

Strategies

Tools/Resources

Ensure 100% of drivers are wearing their seatbelt

-IOGP Buckle UP

Consider the implementation of In-Vehicle Monitoring System (IVMS) with coaching

-IOGP Report 365-12

Utilize journey management concepts

-IOGP Report 365-2

Address driver impairment (fatigue, distraction, substances): including during long-distance commutes

-IVMS
-Journey management
-Oil and Gas workers: How to prevent fatigued driving at work (NIOSH)

Contact Injuries: Use multi-intervention approach

FOG

Struck by falling object

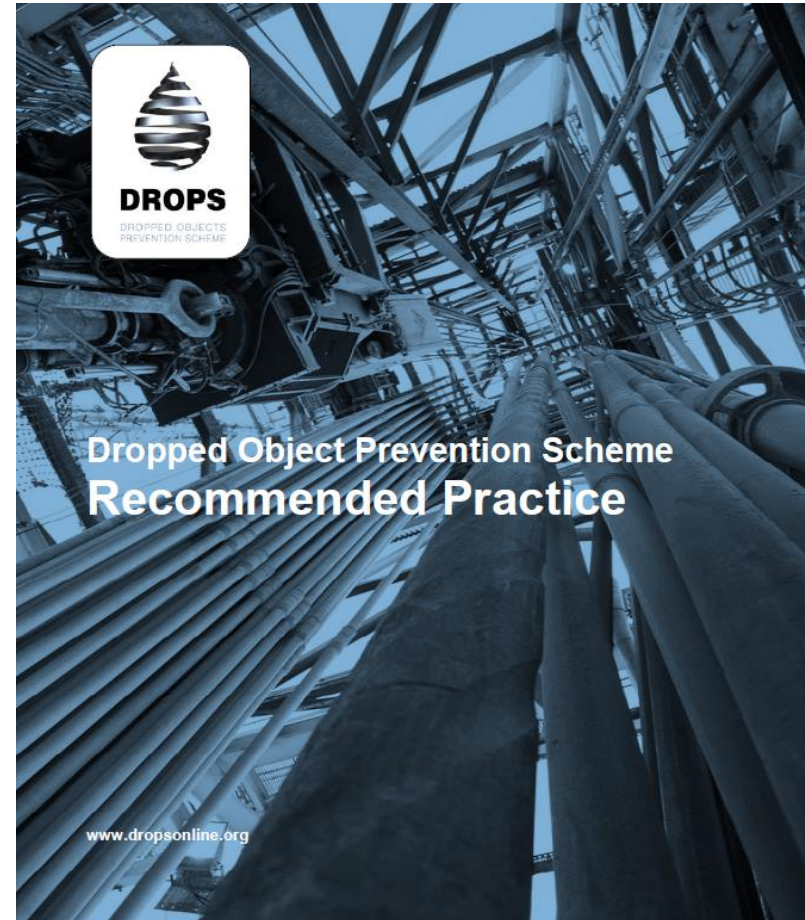
Strategies:

- DROPS
- Load securement (IOGP 365-18)

Caught between or crushed

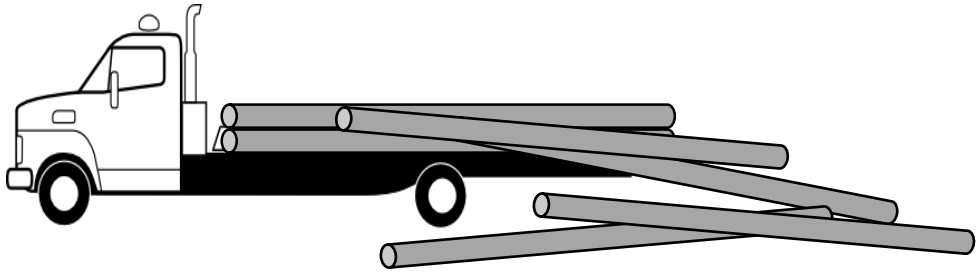
Strategies:

- Lock out tag out
- Machine guarding
- Reduce pinch points



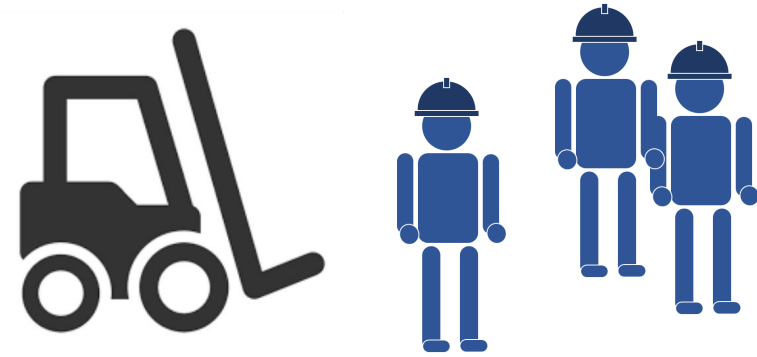
Material handling: Follow industry practices

FOG



Load securement

- Properly secure and unsecure loads (IOGP 365-18)
- Ensure cables and other handling equipment is properly used and inspected
- Train workers to stay out of fall zones



Vehicle Safety

- Use spotters
- Ensure vehicles have back-up alarms
- Improve communication on multi-employer sites

What's next

- Relaunch of updated FOG website
- FOG data tables available on-line
- 2015-2016 FOG infographics for injuries, hospitalizations, and fatalities
- Reporting of analysis for 2017 severe injuries and fatality FOG data
- **FOG 5 year report for 2014-2018 fatalities!**



Contact

Alejandra Ramirez-Cardenas
ARamirez-Cardenas@cdc.gov

www.cdc.gov/niosh/topics/fog



@NIOSHOilandGas

Resources

FOG Website

<https://www.cdc.gov/niosh/topics/fog/default.html>

OSHA Severe Injury

<https://www.osha.gov/severeinjury/index.html>

IOGP Buckle Up

<https://www.osha.gov/severeinjury/index.html>

IOGP Report 365-12

<https://www.iogp.org/bookstore/product/implementing-an-in-vehicle-monitoring-program-a-guide-for-the-oil-and-gas-extraction-industry/>

IOGP Report 365-2

<https://www.iogp.org/bookstore/product/land-transportation-safety-recommended-practice-journey-management/>

Oil and Gas workers: How to prevent fatigued driving at work

<https://www.cdc.gov/niosh/docs/2018-126/default.html>

DROPS

<http://www.dropsonline.org/>

IOGP 365-18

<https://www.iogp.org/bookstore/product/365-18-load-securement-land-transportation-safety-recommended-practice-guidance-note-18/>



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New video

Printed products

NIOSH researchers

NIOSH Breakout Sessions

Industrial Hygiene Strategies for Assessing Exposures during Onshore Drilling Activities

Bradley King, 11:30-12:15p, 355-A

A new method for assessing worker exposure to diesel-based drilling fluids

Michael Breitenstein, 2-2:45p, 355-B

