

Opportunities for Physical Pipeline Barriers in the USA

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OVERVIEW

1. Excavator damage: #1 cause of pipeline incident injuries
2. Barrier systems offer fool-proof protection
3. HDPE barriers are an optimized solution

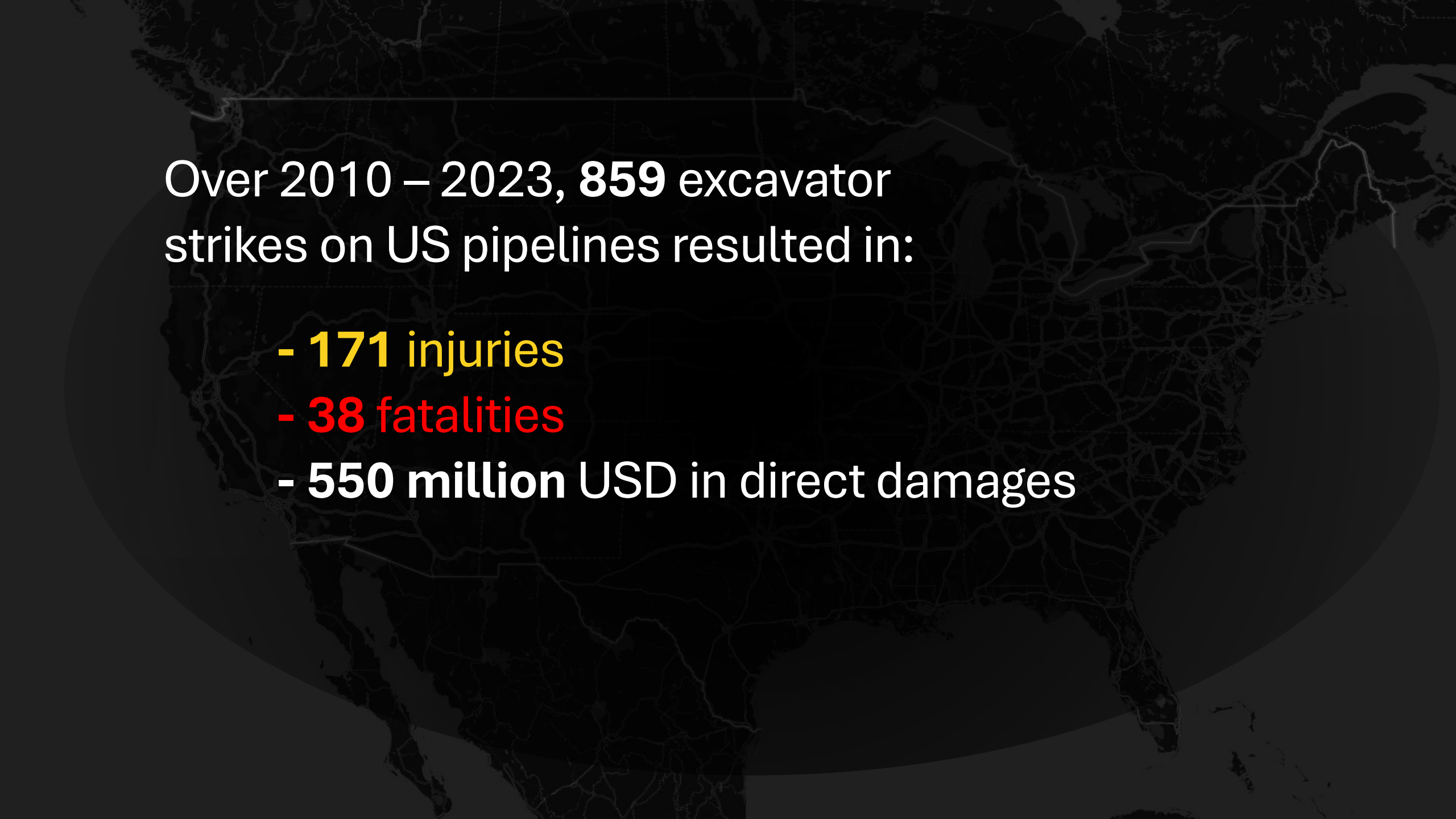


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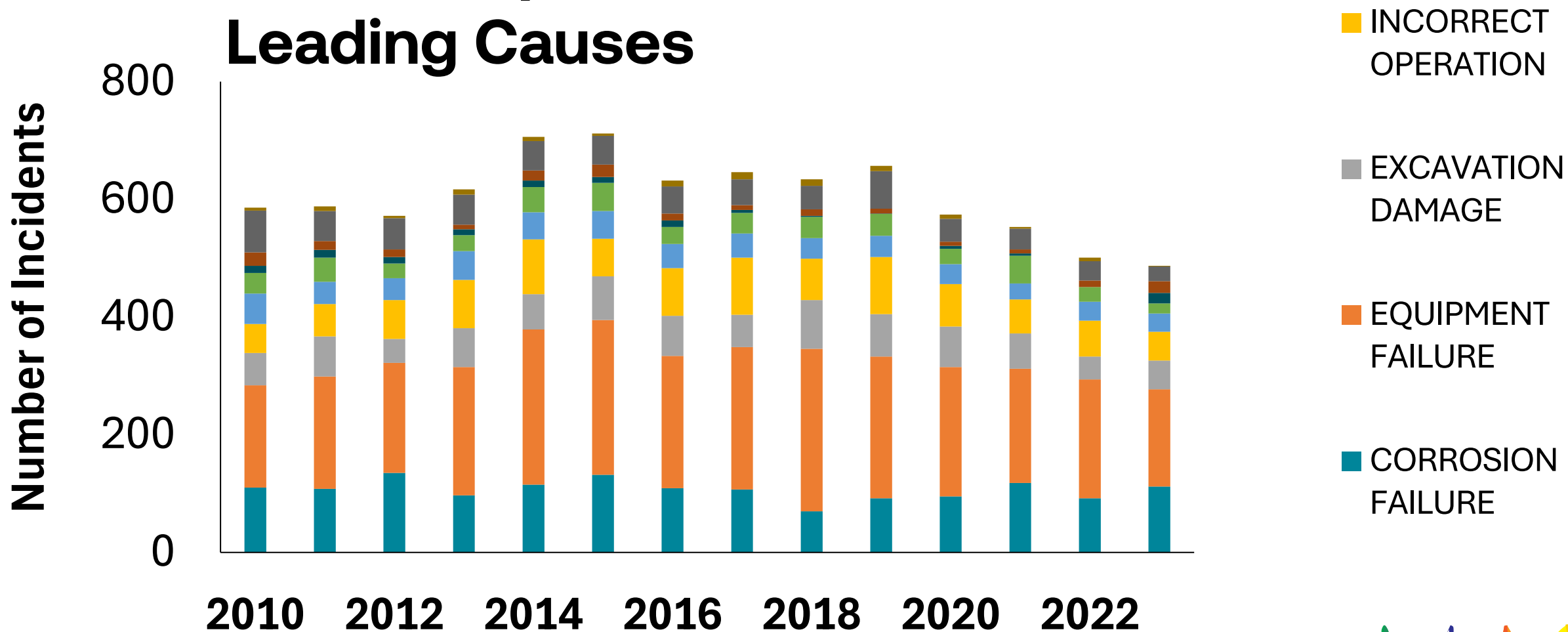




Over 2010 – 2023, **859** excavator strikes on US pipelines resulted in:

- **171** injuries
- **38** fatalities
- **550 million** USD in direct damages

PHMSA Pipeline Incidents: Leading Causes



data from: www.phmsa.dot.gov/data-and-statistics

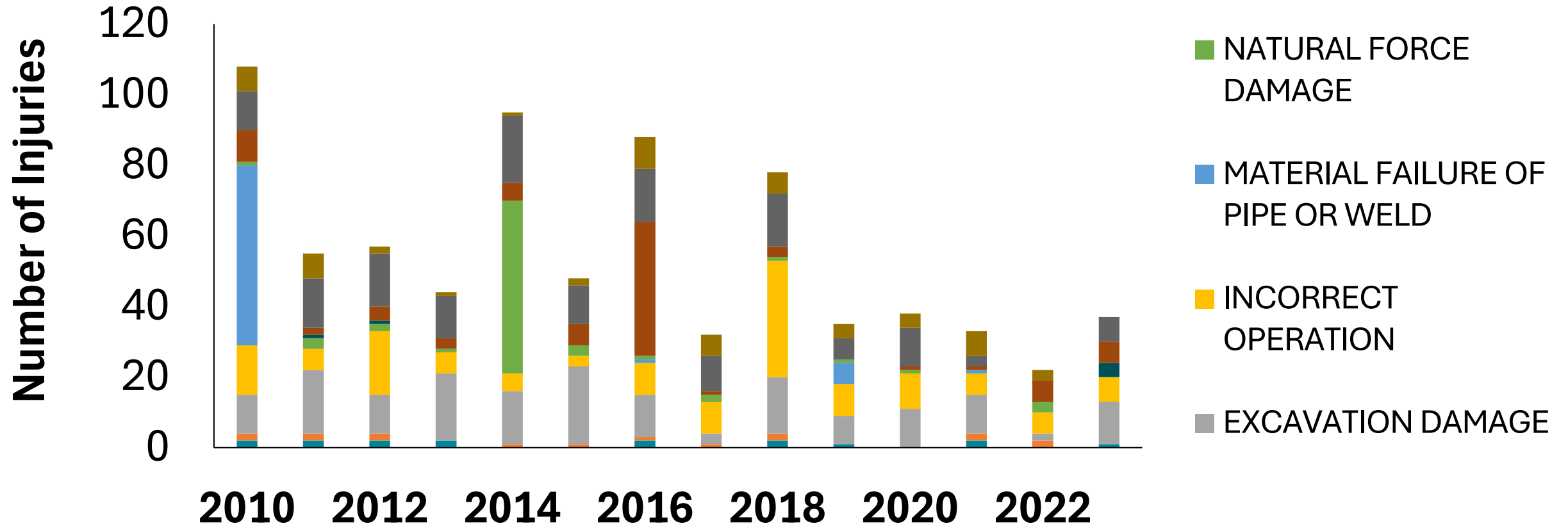
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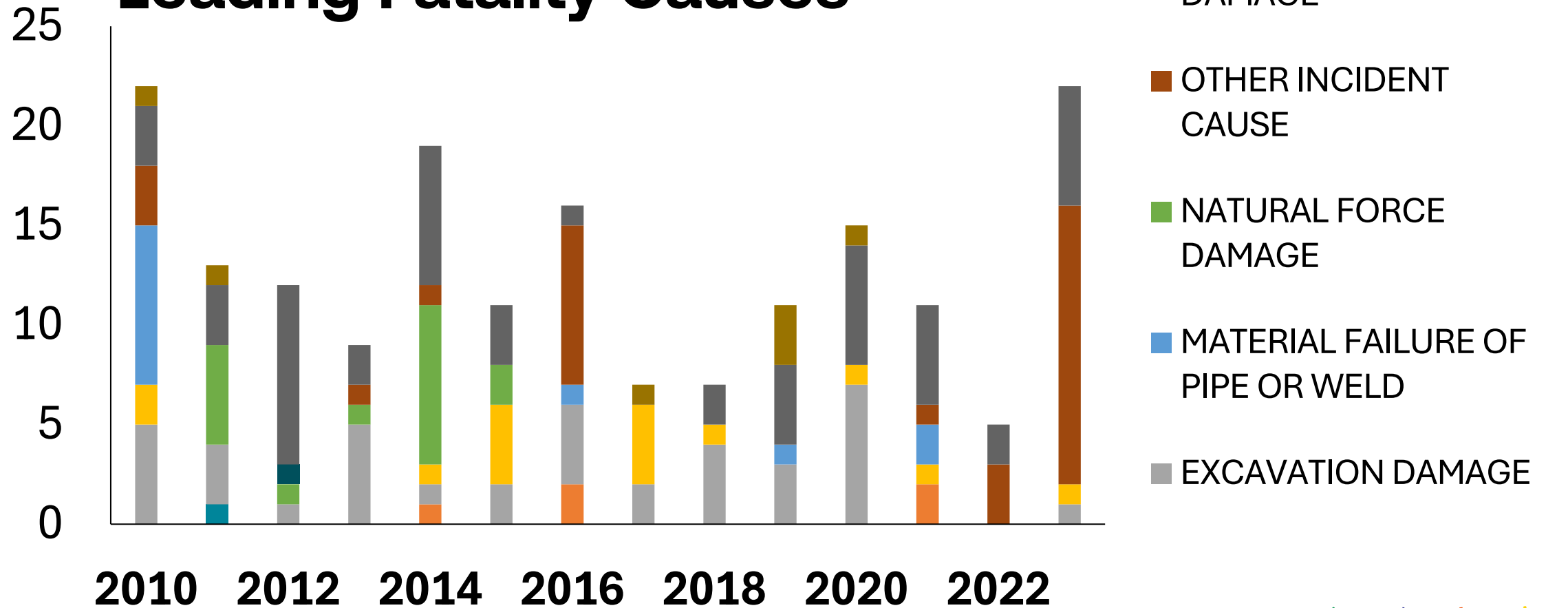
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PHMSA Pipeline Incidents: Leading Fatality Causes

Number of Fatalities



data from: www.phmsa.dot.gov/data-and-statistics

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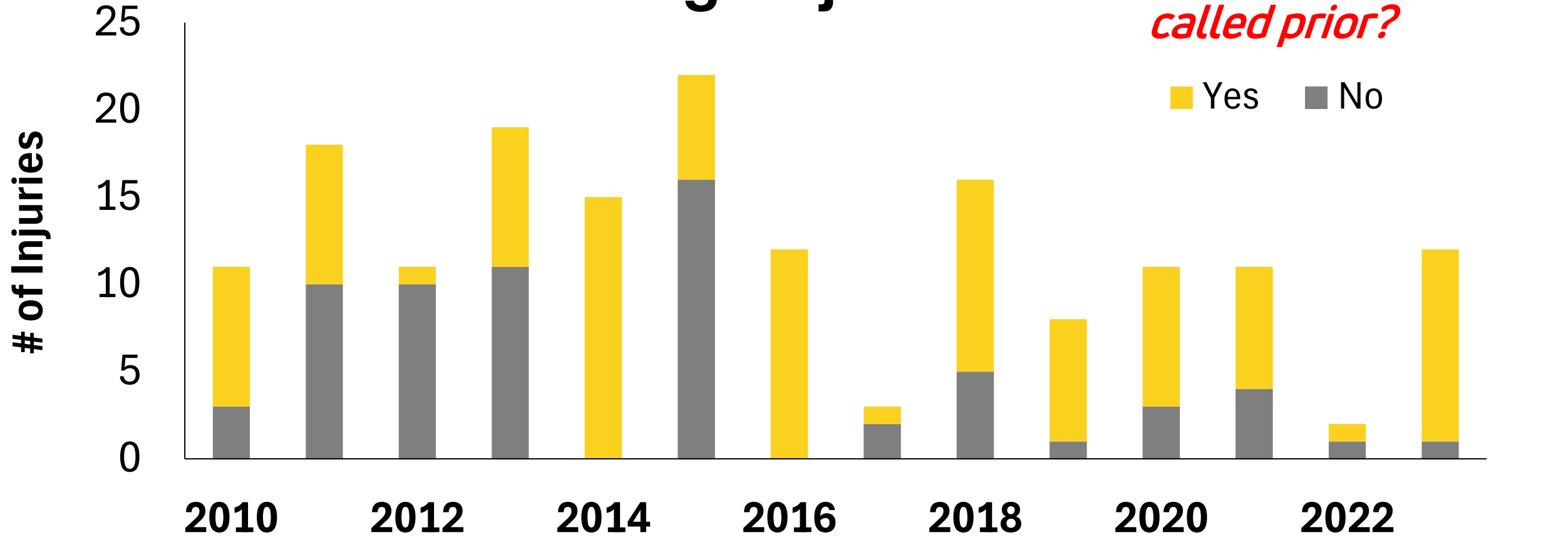
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PHMSA Pipeline Incidents: Excavation Damage Injuries

*Was a one-call line
called prior?*



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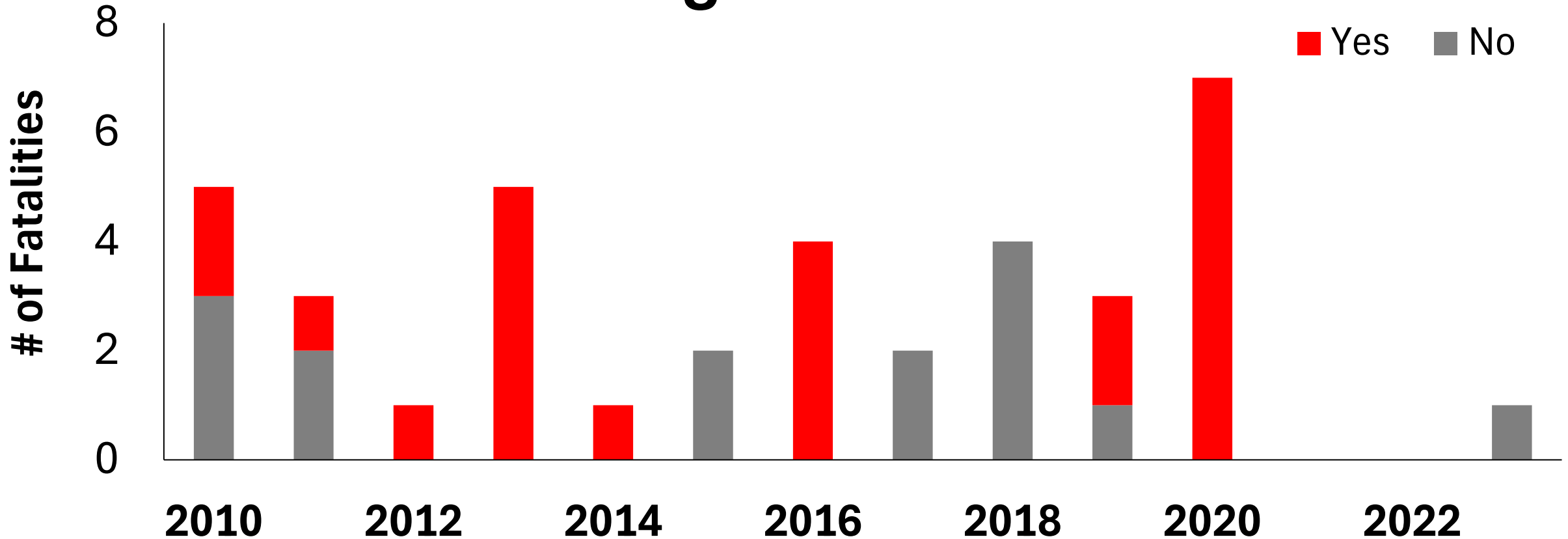
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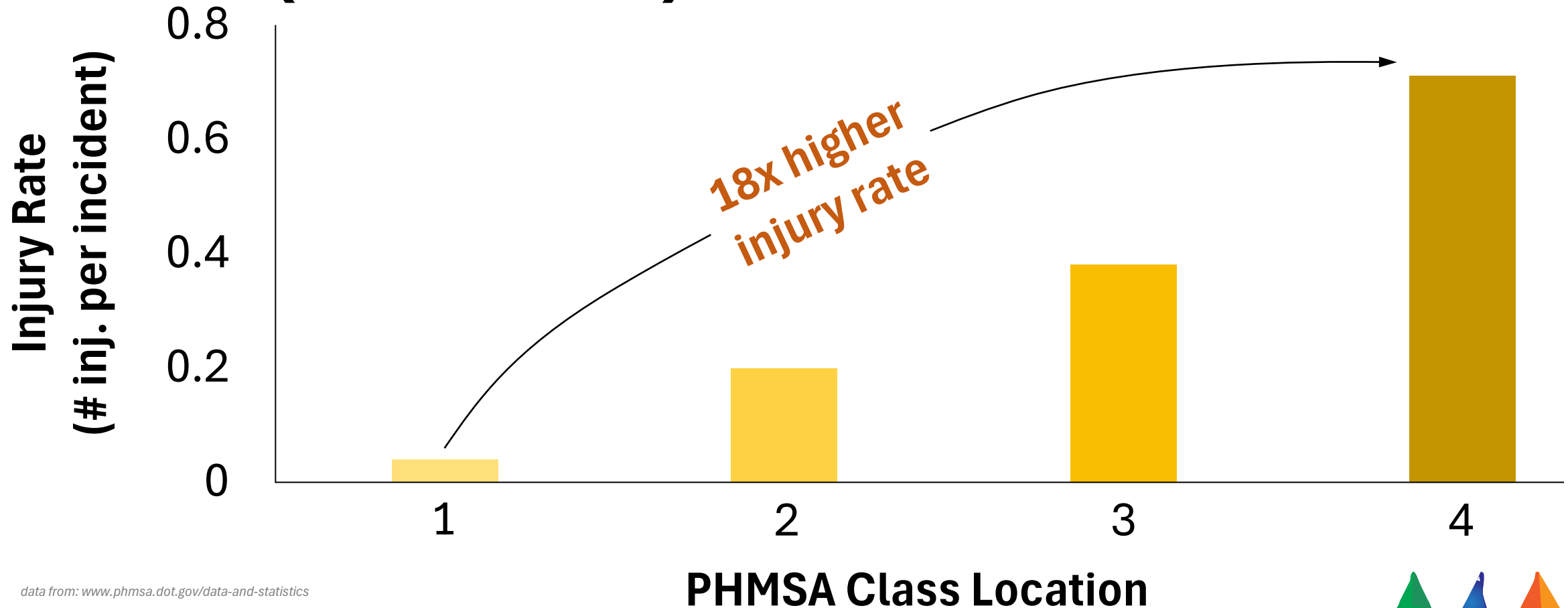
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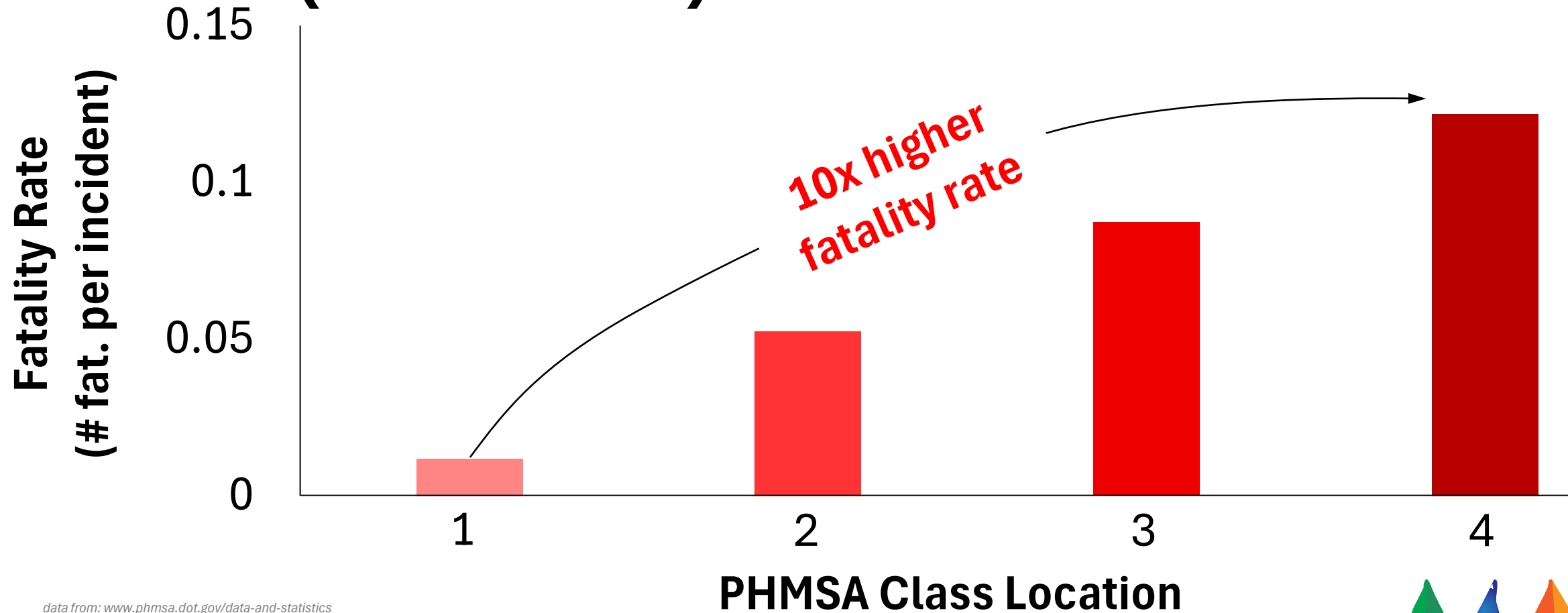
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PHMSA Pipeline Incident Injury Rates (2010 – 2023)



PHMSA Pipeline Incident Fatality Rates (2010 – 2023)



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Example #1: Expired locate ticket, bystander killed

Topeka, KS - 2012

[Topeka Woman Dies After House Explosion | FOX 4 Kansas](#)

- Lawn company hits line while trenching
- Neighboring house explodes; woman dies of her injuries
- Underlying cause: operating with expired locate ticket

Line location relies on ongoing compliance



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Example #2: \$2.5 million dollar incident

Bakersfield, California - 2015

Fresno Officials Dispute PG&E Account of Gas Blast | KQED

- Line struck by heavy agricultural equipment
- Gas ignites, resulting in two injuries and one fatality
- **Total damages = 2.5 million USD**

**Excavator damage can have
tragic and costly consequences**



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Example #3: Fatalities without ignition / explosion

Bismarck, North Dakota - 2010

- Electrical line plow strikes HP gas line
- No one-call or locate
- One fatality: employee is **thrown 80 ft by rupture**

**Utilities can be dangerous
even without ignition**



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Example #4: EU response to pipeline disaster

Ghislenghien, Belgium, 2004

- HP gas line struck during mall construction
- **Explosion kills 24 & injures 132**
- Regulatory response across the world
- French QRA evaluates damage prevention measures

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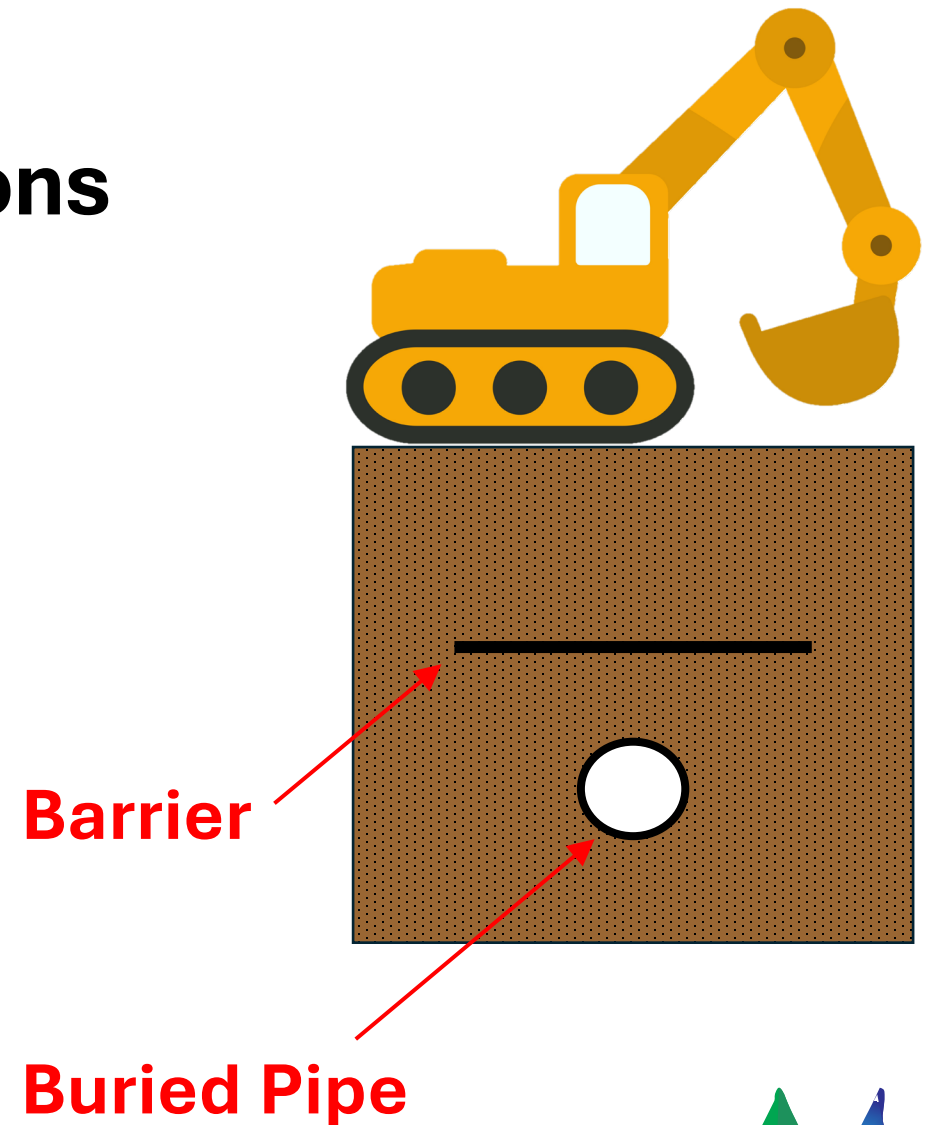
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Pipe Barriers: Existing Solutions

- **Last line of defense** against pipeline strikes
- **Concrete slabs:** heavy, inconsistent quality, prone to degradation, can contact pipe over time
- **Steel plates:** heavy, costly, prone to corrosion



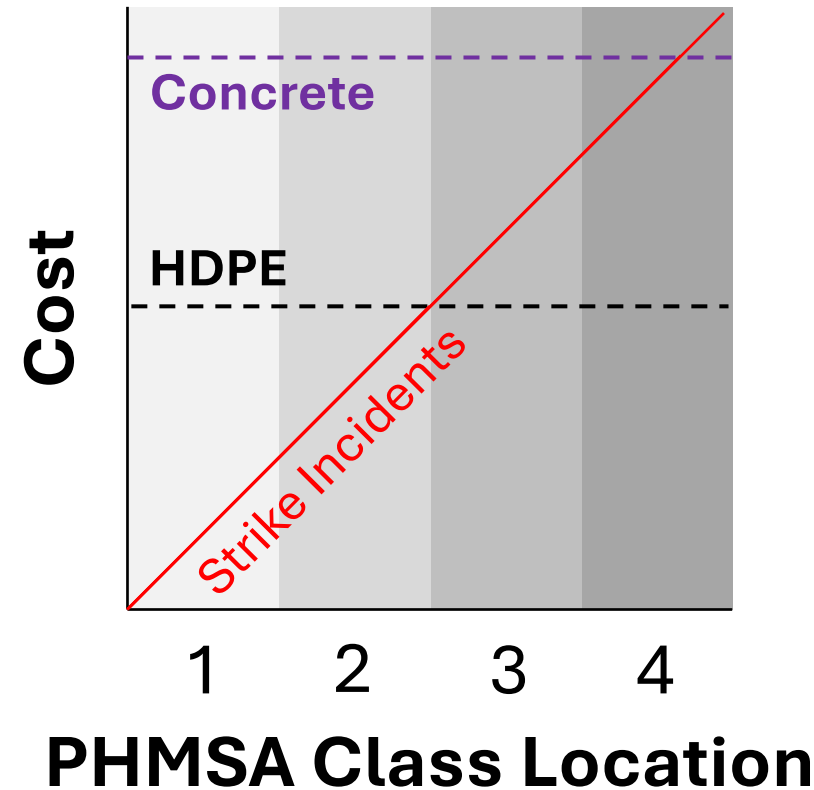
Design Objectives

Strength
Ease of installation
Compatibility



**Reduced risk threshold
for buried utility strikes**

Excavator Strike Risk Mitigation



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Strength Testing (ESM Task 4)

Equivalent impact resistance between:

- 10cm thick concrete slab w/ mesh
- 15mm thick HDPE slab

↓ 85% thickness

↓ 60% density

↓ **94% weight per protected area**



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Buried Performance Testing (ESM Task 6)

Equipment	Concrete Slab	HDPE Plate
21 ton excavator	No damage	No damage
32 ton excavator	Damage after slab removal	No damage
Drilling machines	No perforation	Perforation, but clear indication
Soil stabilizer	Stops equipment	Stops equipment
Chain trencher	Stops equipment	Stops equipment



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Real-Life Testing (ESM Task 8)

- Human factors testing
- Warning message eliminates all strikes
- Yellow = buried gas line
- **Yellow with message = highest level of protection possible**



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Case Study: Coastal GasLink

TC Energy – BC, Canada, 2023

- Natural gas expansion project in BC
- Pipeline near major highway – high consequence area
- **HDPE** used to cover 1 km: no delays, no install risks, and minimal costs



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Case Study: Urban Encroachment

Sonacol – Chile, 2023

- Rapid urban growth near buried HP gas lines
 - Pipeline class change – new measures required
- Limited access for concrete slabs
- **HDPE**: easiest & least expensive system to install



Thank you!



Contact info!

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