

ENERGY  
SAFETY  
CANADA

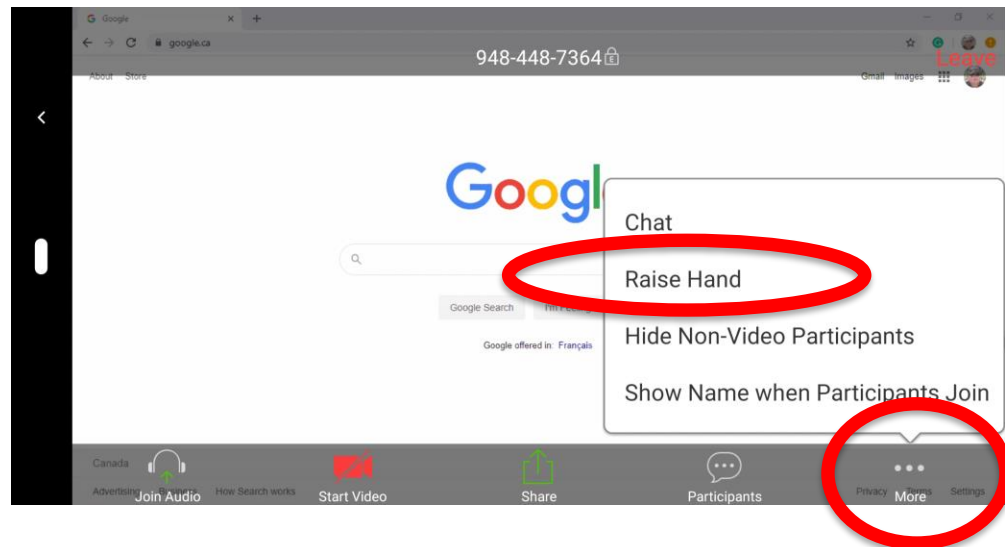
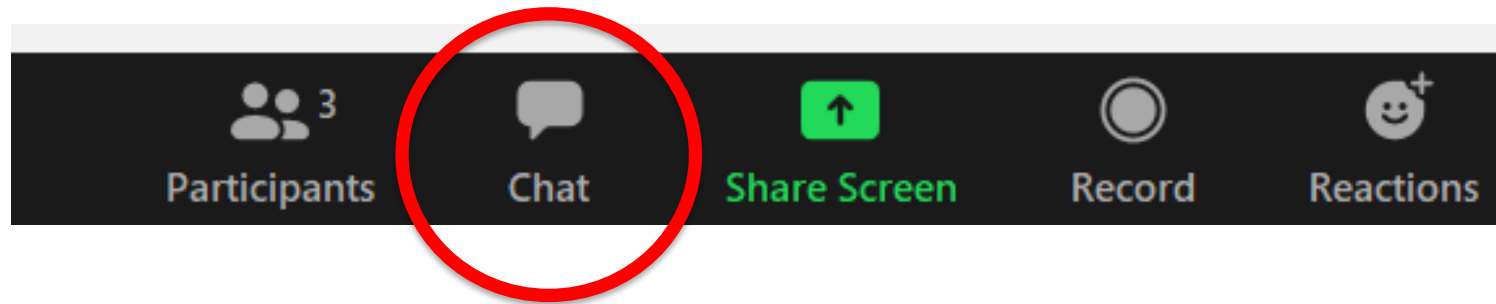
# Webinar | DROPS Canadian Chapter Launch



**Presenters: Various**  
**Host: Andrew Davis**  
**Start Time: 9:00 am**

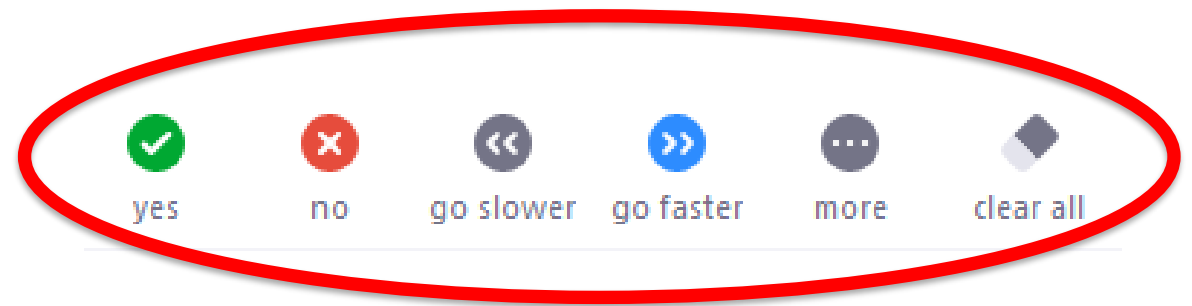
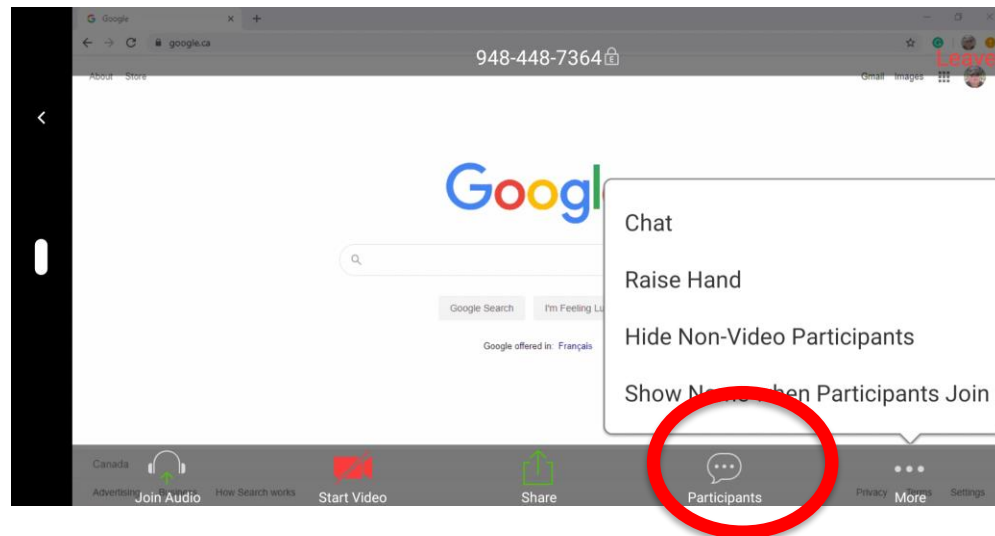
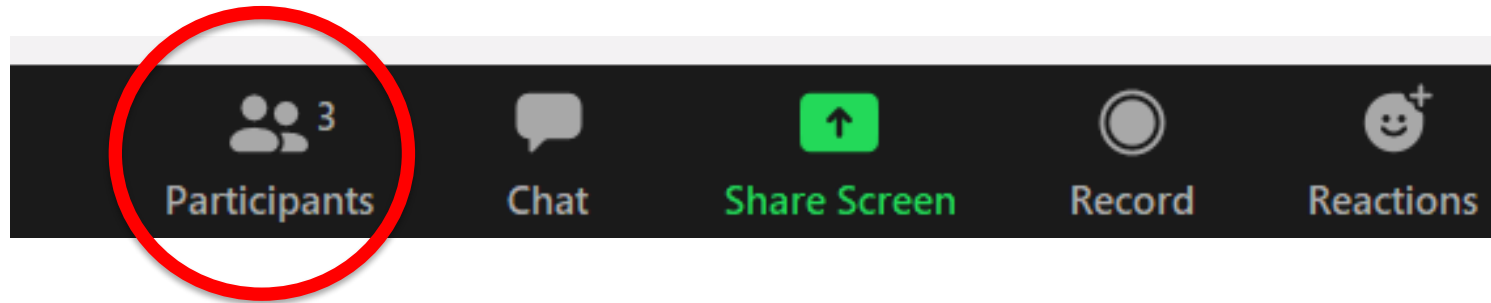
# Before we get started

- Interact with us - send any questions to the host.



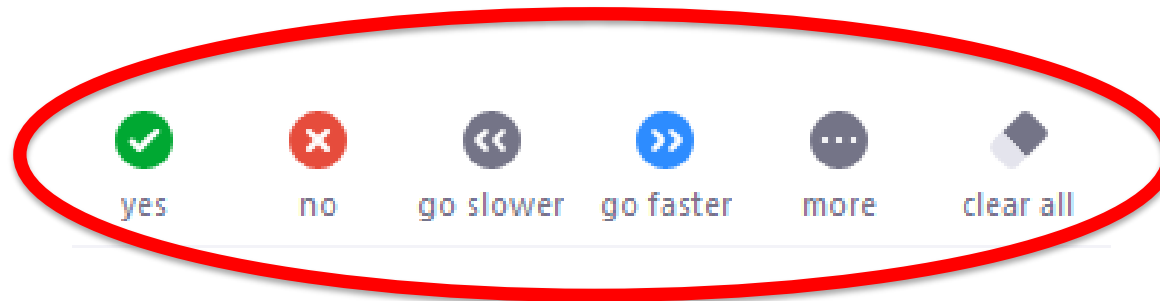
# Before we get started

- Give us feedback or answer basic questions



# Before we get started

- Can you see the presentation and hear clearly?  
(If not, an ESC co-host will reach out to you in Chat)



**Mr. Jose Pinerua**  
**Mr. Abbey Adeogun**  
**Mr. Allen Smith**  
**Mr. R. Waterhouse**



# Agenda

- Introductions and agenda review (5 min) - J. Pinerua
- Safety Moment (5 min) - A. Adeogun
- Why Dropped Objects? (15 min) - J. Pinerua
- DROPS “DropsOnline” (30 min) - A. Smith
- Terms of Reference Review (10 minutes) - J. Pinerua
- Break (10 min)
- Dropped Object Best Practice (20 min) - R. Waterhouse
- Exclusion Zone Tool (10 min) - R. Waterhouse
- Microlearning Review (10 min) - A. Adeogun
- Next Steps - J. Pinerua
- Discussion and Questions (20 min) - J. Pinerua



# **Safety Moment**

**Mr. Abbey Adeogun**



# Safety Moment

Two workers were removing an alignment bolt from an out-of-service pumpjack horse head at a storage yard. The horse head was connected to the walking beam and situated in an upright position, therefore containing stored energy. “Worker A” was positioned under the walking beam. When “Worker B” began removing the alignment bolt, the walking beam collapsed, crushing and fatally injuring “Worker A”.



Image of the fallen equipment.





# Safety Moment

A work crew was on location to dismantle a high arch trench box and then transport the disassembled box from one project work site to another. The disassembly process did not follow the manufacturer's instructions for the safe removal of the strut support pins holding the box together. Consequently, when the last strut support pin was removed from the box, it collapsed, causing a support arch to strike and fatally injure a worker.



View of incident site, source: CBC News



# Why Dropped Objects?

**Mr. Jose Pinerua**

(Chair)



# Dropped Objects

Dropped Objects continue to present significant safety challenges in all operational activities.

A dropped object is defined as an object that falls from a height and either causes or has the potential to cause an injury, asset damage or process safety event.



# Dropped Objects

Dropped Objects can be classified:

- Static: an object that falls from its previous fixed position under its own weight, solely due to the force of gravity; or
- Dynamic: any object that falls from its previous position due to the application of energy or force.



# Dropped Objects

Investigations of these events highlight a wide range of contributing factors including:

- Design
- Work processes
- Environment
- Behavior
- Inappropriate securing of:
  - Equipment and materials
  - Structural components
  - Tools



# WCB Data - Dropped Objects

## Poll Question:

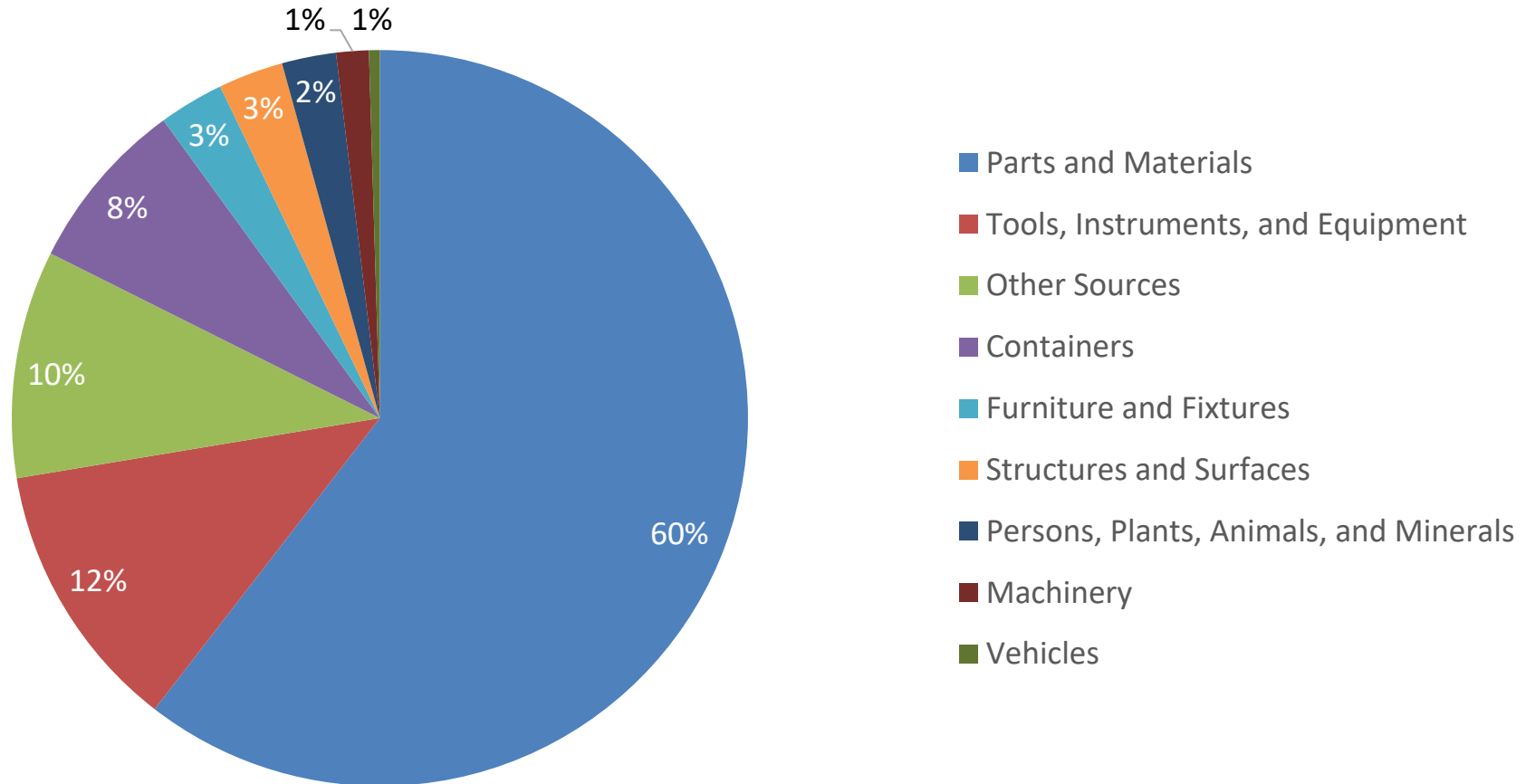
What is the top item being dropped that results in a WCB injury (Alberta)?

- Tools and Equipment
- Plants (Tree branches, logs etc.)
- Ice and Snow
- Parts and Materials
- Furniture



# WCB Data - Dropped Objects

Source for Struck by Falling Object by Claim Count (2015-2020 Q3)



AB WCB Oil and Gas Funding Codes



# WCB Data - Dropped Objects

## Poll Question:

What is the top body part being injured by dropped objects in WCB data (Alberta)?

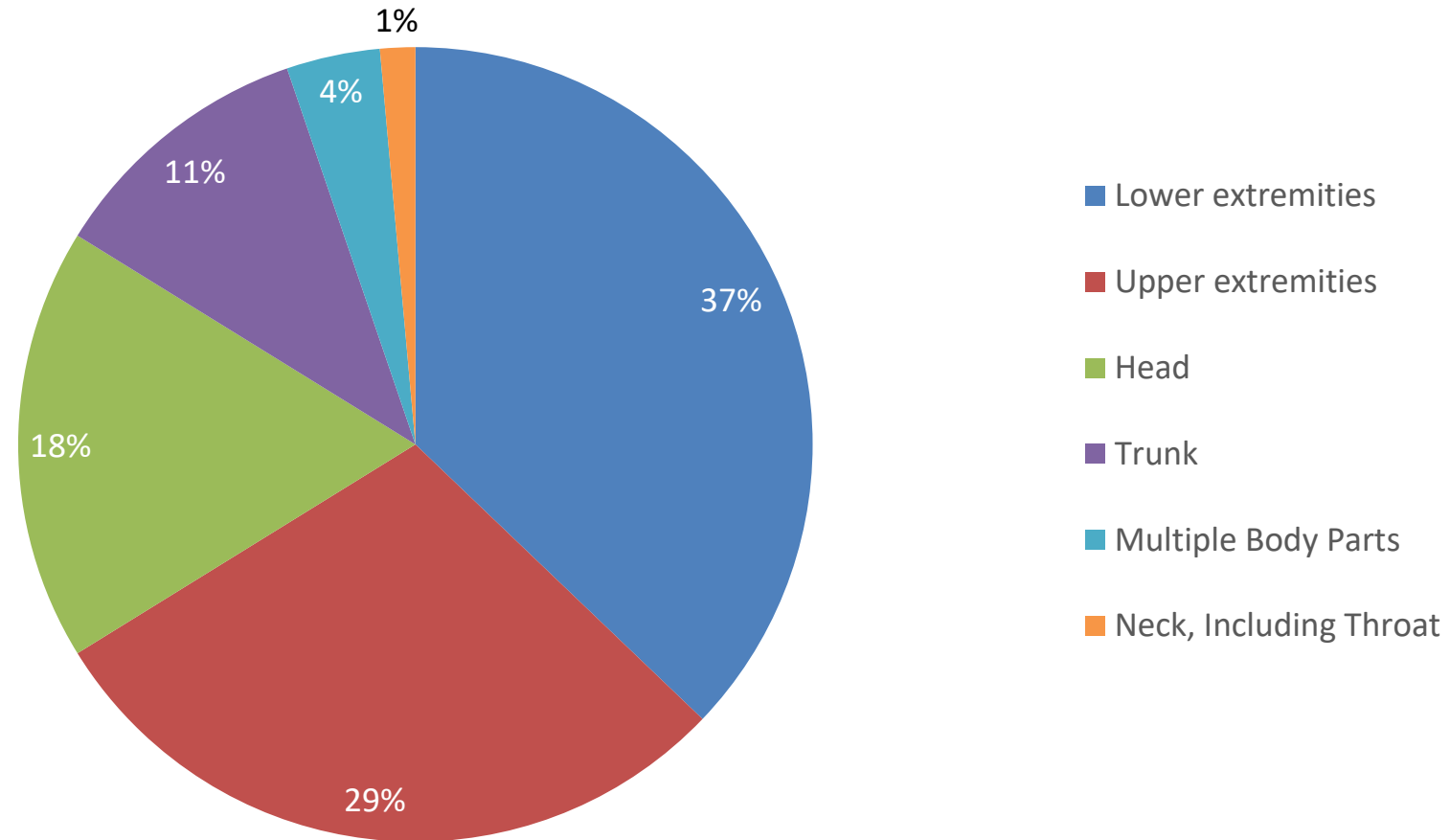
- Head
- Neck
- Arms and Hands
- Trunk
- Legs and Feet





# WCB Data - Dropped Objects

*Part of Body for Struck by Falling Object by Claim Count (2015-2020 Q3)*



AB WCB Oil and Gas Funding Codes



# What is a PSI?

According to Alberta OH&S, a Potentially Serious Incident (PSI) is “any event where a reasonable and informed person would determine that under slightly different circumstances, there would be a high likelihood for a serious injury to a person.”

- ESC’s PSI Guideline
- PSI Program (Applicable for Every Jurisdiction)
- ESCs has an agreement with AB OH&S where the oil and gas PSI data is shared
- This summary covers data from the time period of 2019 Q1 to 2020 Q3

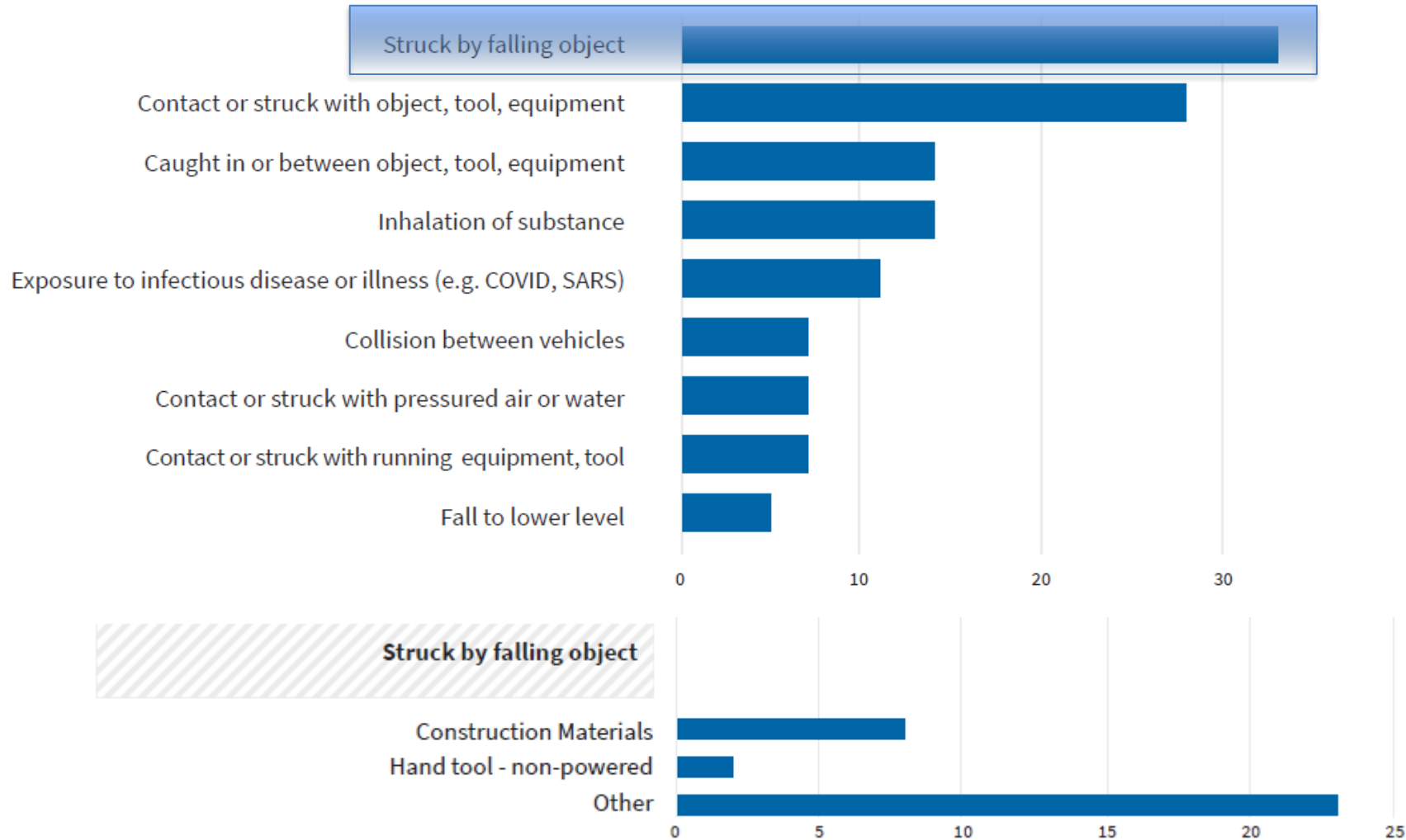


# Value of PSI/SIF/HiPo

- Significant component of preventing serious injuries and fatalities and supports Life Saving Rules and Process Safety
- PSIs provide an opportunity to learn before a serious incident occurs
- Most PSIs will provide a high-value learning opportunity and therefore warrant your attention and effort



# Incident Classifications



Half are  
Line of Fire  
related



**LINE OF FIRE**



# **DROPS “DropsOnline”**

**Mr. Allen Smith**  
(DROPS Administrator)





# **TOR Review**

**Mr. Jose Pinerua**  
(Chair)



# Terms of Reference

- **MANDATE:** The purpose of the Canadian Chapter of DROPS “DropsOnline.org” is to facilitate the on-going advancement of the prevention of dropped objects throughout industry. The Canadian Chapter will provide a forum for a multi-sector discussion of the hazards of dropped objects.
- **SCOPE:** The scope of the Canadian Chapter’s activities includes the following:
  - Holding Canadian Chapter meetings;
  - Sharing of dropped object incidents and prevention best practices; with a focus on onshore and sectors in addition to drilling and offshore activities;
  - Developing supportive resources to assist industry with a focus on onshore and sectors in addition to drilling and offshore; and
  - Out of scope items include providing direction to ESC on how it conducts its business.



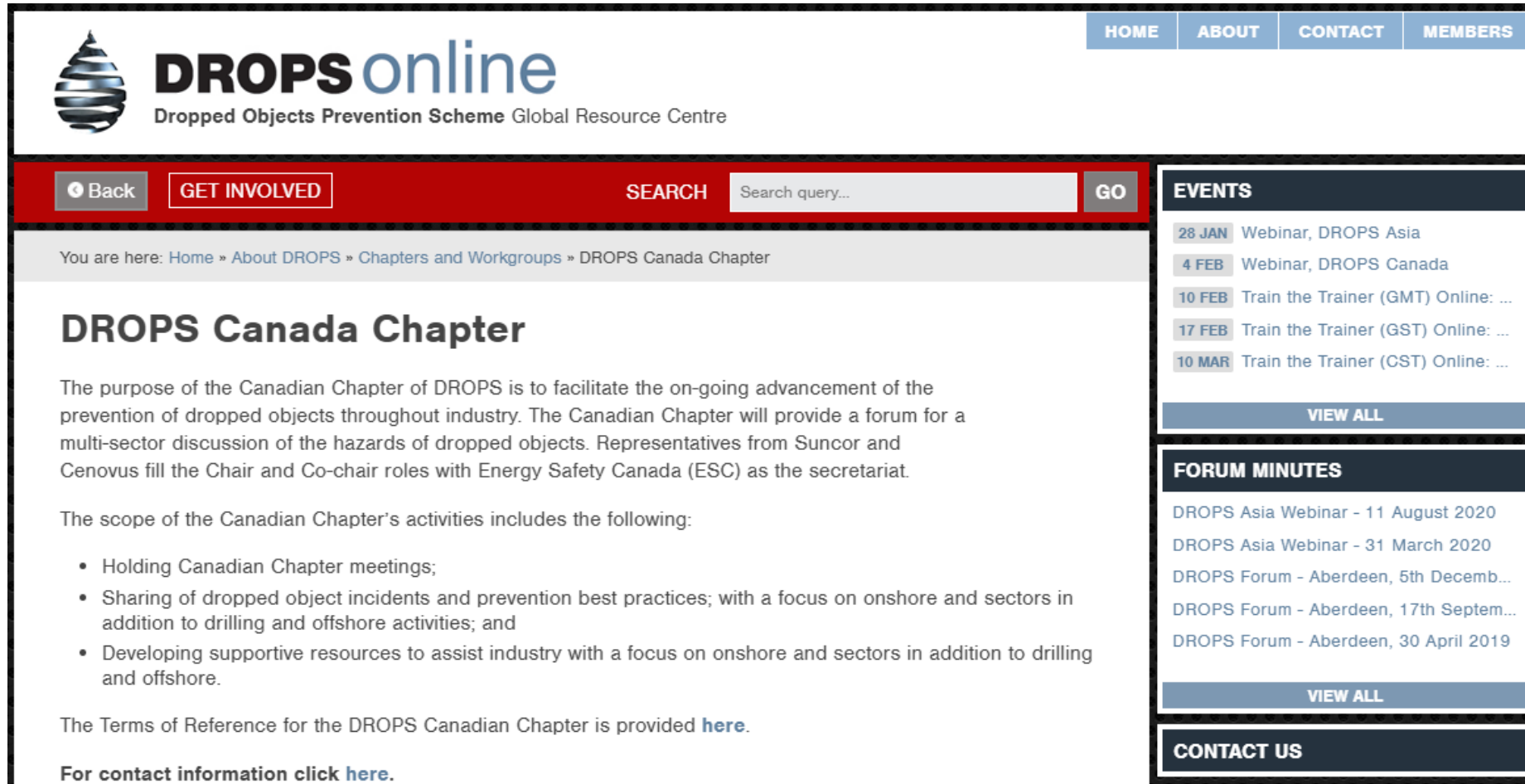


# Terms of Reference

- **Members of the DROPS Canadian Chapter will:**
  - Commit to abiding by the Code of Conduct (Appendix A);
  - Prepare for and attend meetings;
  - Contribute to group discussions, actively sharing industry expertise and opinions in an open and transparent manner;
  - Demonstrate critical judgment when making recommendations;
  - Recommend best practices and resources for review and consideration;
  - Report regularly with stakeholders they represent;
  - Complete assigned tasks and action items in timely manner; and
  - Take an active role (be an ambassador) in promoting and advocating the implementation of the prevention of dropped objects throughout industry.



# Canadian Chapter Participation



The screenshot displays the DROPS online website interface. At the top left is the DROPS online logo, featuring a stylized drop icon and the text "DROPS online" with the tagline "Dropped Objects Prevention Scheme Global Resource Centre". To the right of the logo are navigation links: HOME, ABOUT, CONTACT, and MEMBERS. Below the logo is a red navigation bar containing a "Back" button, a "GET INVOLVED" button, a search bar with the text "SEARCH" and "Search query...", and a "GO" button. The main content area shows the breadcrumb "You are here: Home » About DROPS » Chapters and Workgroups » DROPS Canada Chapter" and the heading "DROPS Canada Chapter". The text describes the purpose of the Canadian Chapter and lists its activities. On the right side, there are two sidebar sections: "EVENTS" with a list of upcoming events and a "VIEW ALL" button, and "FORUM MINUTES" with a list of past forum minutes and a "VIEW ALL" button. At the bottom right, there is a "CONTACT US" button.

**DROPS online**  
Dropped Objects Prevention Scheme Global Resource Centre

HOME ABOUT CONTACT MEMBERS

Back GET INVOLVED SEARCH Search query... GO

You are here: Home » About DROPS » Chapters and Workgroups » DROPS Canada Chapter

## DROPS Canada Chapter

The purpose of the Canadian Chapter of DROPS is to facilitate the on-going advancement of the prevention of dropped objects throughout industry. The Canadian Chapter will provide a forum for a multi-sector discussion of the hazards of dropped objects. Representatives from Suncor and Cenovus fill the Chair and Co-chair roles with Energy Safety Canada (ESC) as the secretariat.

The scope of the Canadian Chapter's activities includes the following:

- Holding Canadian Chapter meetings;
- Sharing of dropped object incidents and prevention best practices; with a focus on onshore and sectors in addition to drilling and offshore activities; and
- Developing supportive resources to assist industry with a focus on onshore and sectors in addition to drilling and offshore.

The Terms of Reference for the DROPS Canadian Chapter is provided [here](#).

For contact information click [here](#).

### EVENTS

- 28 JAN Webinar, DROPS Asia
- 4 FEB Webinar, DROPS Canada
- 10 FEB Train the Trainer (GMT) Online: ...
- 17 FEB Train the Trainer (GST) Online: ...
- 10 MAR Train the Trainer (GST) Online: ...

VIEW ALL

### FORUM MINUTES

- DROPS Asia Webinar - 11 August 2020
- DROPS Asia Webinar - 31 March 2020
- DROPS Forum - Aberdeen, 5th Decemb...
- DROPS Forum - Aberdeen, 17th Septem...
- DROPS Forum - Aberdeen, 30 April 2019

VIEW ALL

### CONTACT US



**Break**  
**(10 min)**



# Best Practice

**Mr. Robert Waterhouse**  
(Secretariat)



# What is a Dropped Object?

## Poll Question:

What comes to mind when you think of dropped objects (Select one or two)?

- Human error
- Working at height
- Drilling activities
- Offshore activities
- Mechanical lifting
- Falling icicles
- Dangerous trees
- Workers and hand tools
- Corroded fasteners
- Simultaneous operations

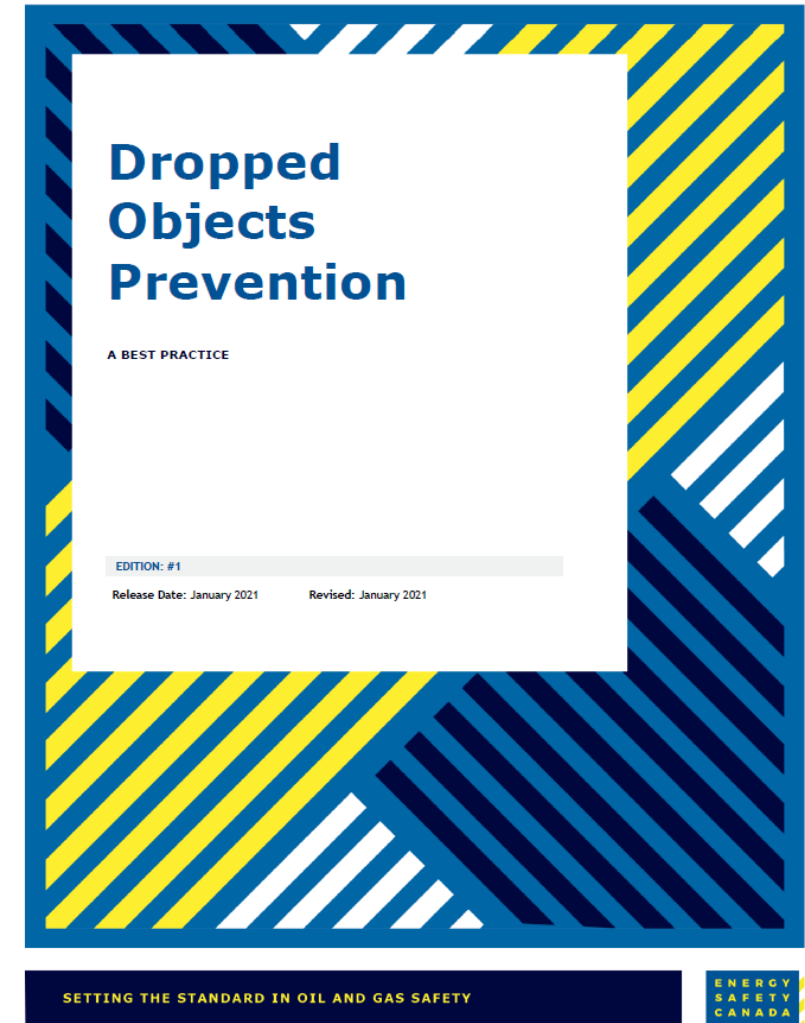
# Dropped Objects Existing Focus

- To date, the focus has been primarily on the following areas and type of objects:
  - Offshore | All objects
  - Drilling | All objects
  - Construction | Tools



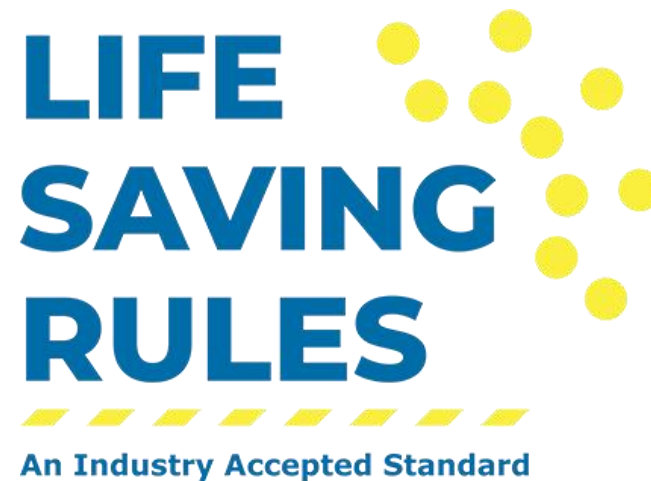
# Best Practice

- Created to do the following:
  - Address the top PSI
  - Elevate prevention of dropped objects throughout Canadian onshore oil and gas industry
  - Leverage existing control strategies: DROPS and others
  - Align with existing programs and standards: Life Saving Rules, etc.



# ESC Program and Standard Alignment

- Potentially Serious Incidents (PSI)
- Are You in the Line of Fire?
- Life Saving Rules





# Life Saving Rules



**LINE OF FIRE**



**WORKING AT  
HEIGHT**



# DROPS Calculator

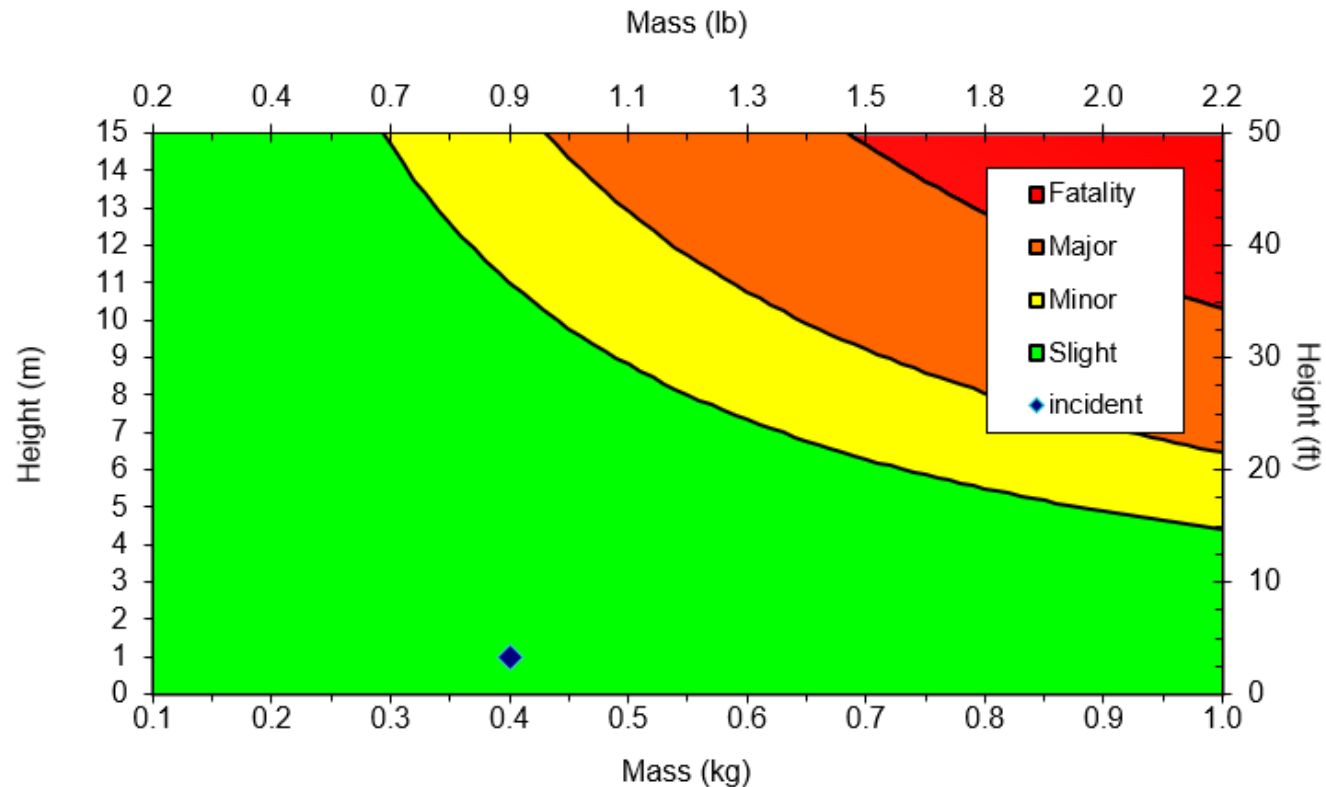


**Outcome Calculator**

Height:  m

Mass:  kg

Outcome:



# What other consequences can a dropped object have?

- Process Safety, Arkansas 1980
- Command and Control Documentary, Netflix



# Risk Factors

- **Activities**  
(Work at height or below grade, mechanical lifting, line of fire)
- **Vibration**  
(transported, operations, earthquakes)
- **Corrosion**  
(dissimilar metals, corrosive environments)



# Risk Factors

- **Weather**  
(outdoor elements, ice and snow)
- **Equipment**  
(limited access, temporary, 3<sup>rd</sup> party, foreign objects)
- **Occupancy**  
(density and frequency of personnel)



# Understanding Failure

## Poll Question (Worker Perspective):

A worker fumbles a bolt just as she removes it from a piece of overhead equipment that is not working. The bolt falls 20 meters below and almost hits some workers. How can this be prevented? (Select one that a worker can control)

- Read H&S policy
- Use tool tethers
- Establish an exclusion zone
- Obtain re-training
- Leadership training
- Look for another job
- Focus harder next time
- Install safety netting

# Understanding Failure

## Poll Question (Management Perspective):

A worker fumbles a bolt just as she removes it from a piece of overhead equipment that is not working. The bolt falls 20 meters below and almost hits some workers. How can this be prevented? (Select one that management controls)

- Provide tool tethers
- Discipline worker
- Exclusion zone program
- Re-train worker on hazards
- Revise H&S policy
- Improve hiring practices
- Enforce Fit for Duty Rule
- Leadership training

# Human and Organizational Performance

- Five Principles<sup>(1)</sup>:
  - Error is normal
  - Blame fixes nothing
  - Learning and improving are vital. Learning is deliberate.
  - Context influence behaviors. Systems drive outcomes.
  - How you respond to failure matters. How leaders act and respond counts.

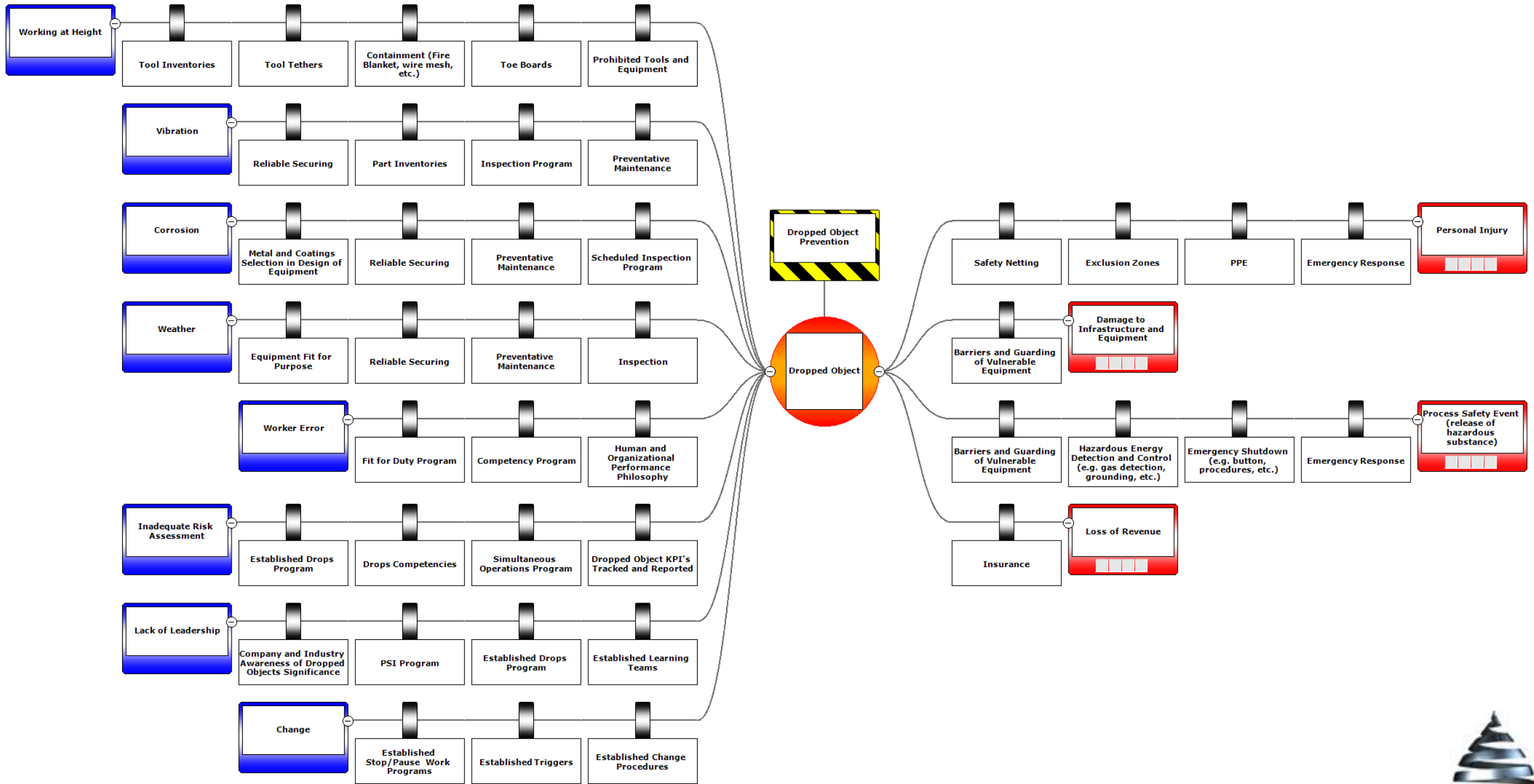
<sup>1</sup>Conklin, Todd E, PhD. The 5 Principles of Human Performance: A Contemporary Update of the Building Blocks of Human Performance for the New View of Safety. Santa Fe, NM, PreAccident Media, 2019.



# Capacity to Fail Safely

- Understanding the quality of safeguards and vulnerabilities - human error
- Planning for failure - plan to fail safely
- Well aligned with Bowtie methodology that looks at threats and consequences





# **Exclusion Zone Tool**

**Mr. Robert Waterhouse**  
(Secretariat)



# Exclusion Zones

- This tool was developed because:
  - Serious incidents occur outside of exclusion zones from deflections
  - Industry is highly reliant on exclusion zones in many instances and often does not understand the vulnerability in relation to deflections
  - Existing exclusion zones are most often inadequate in relation to deflections and are not risk-based



# Existing Strategies

- Often based on what work environment will allow
- Based on rules of thumb:
  - 1:1 (Cone of Exposure, 45°: 1 up - 1 out)
  - 4:1 (Ladder Rule: 4 up - 1 out)
  - Discrete distance e.g. 3 meters beyond perimeter



# Exclusion Zones

## Poll Question:

What strategy does your company use to dictate the size of exclusion zones?

- We let operations decide
- 1:1 (Cone of Exposure)
- 4:1 (Ladder Rule)
- Discreate distance
- Unknown



# Dropped Object Exclusion Zone

## Poll Question:

A worker is removing some bolts from an overhead piece of equipment located 0.25 meters adjacent to a walkway 20 meters high. Some piping is located 5 meters above the ground beneath the equipment. Approximately what size of exclusion zone is needed to have the capacity to handle most, but not all deflected bolts?

- 5 meters
- 10 meters
- 20 meters
- 40 meters

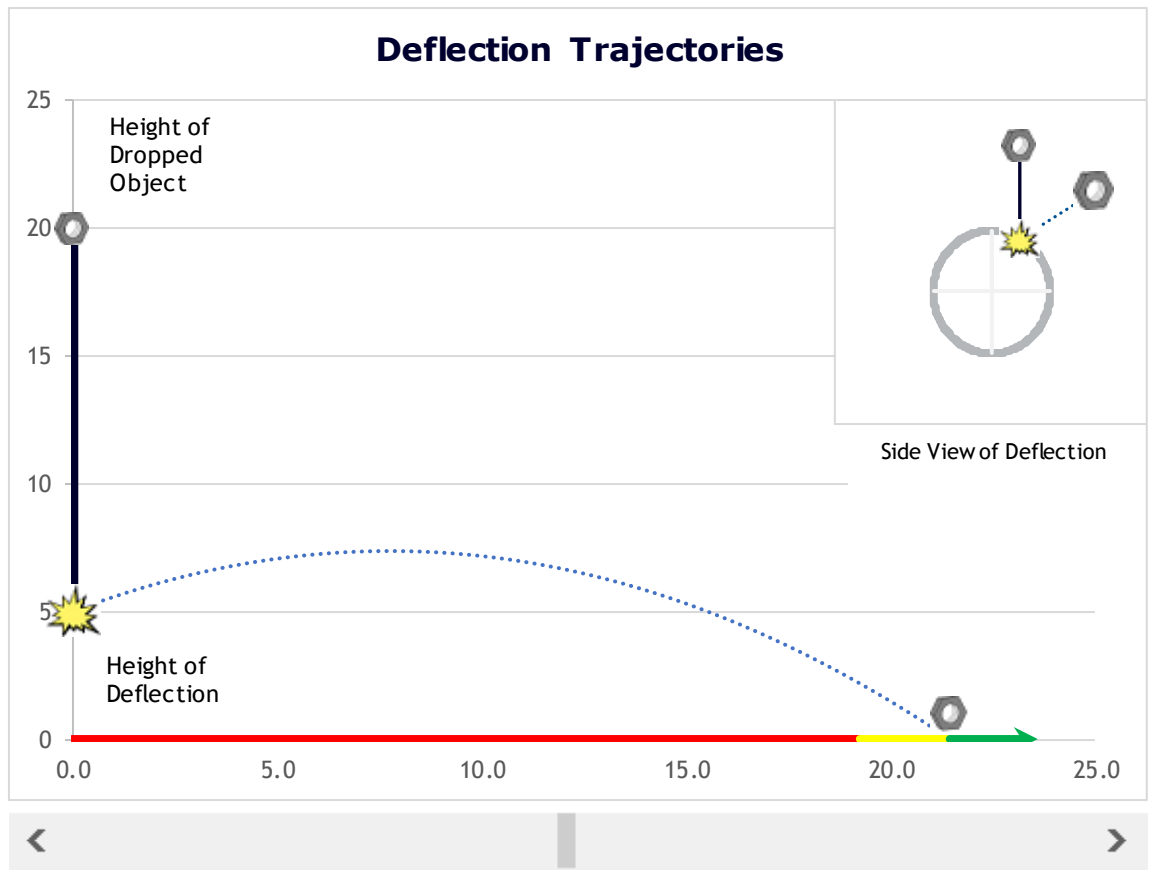
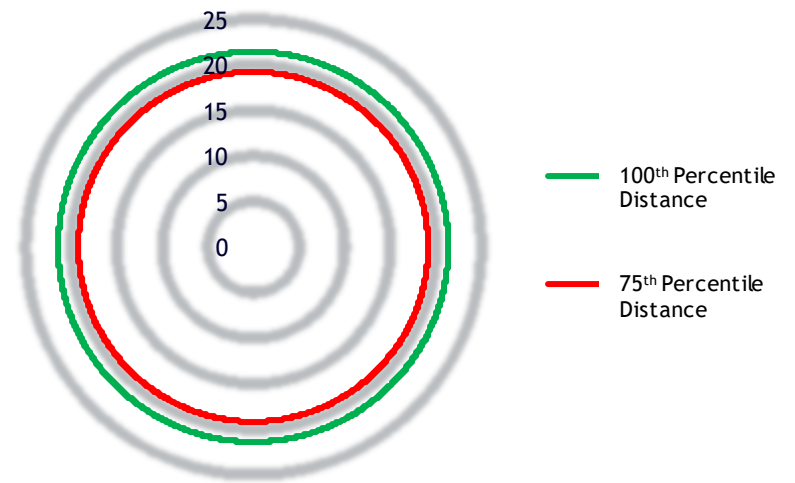


# Dropped Objects Exclusion Zone Tool (Final Draft) Version 2.2

This tool has four inputs: Metric or Imperial, Height of Dropped Object and Height of Deflection (both measured from the ground). The tool predicts the horizontal distance (radius) and associated probability where a steel object will strike the ground following a static drop and deflection. See "Example" sheet tab below for an example.

| Inputs   |  |        |
|--|--|--------|
| STEP 1: Select Metric or Imperial                        |  | Metric |
| STEP 2: Input Height of Object (meters)                  |  | 20.0   |
| STEP 3: Input Height of Deflection (meters)              |  | 5.0    |
| Approximate Outputs (Distance to strike the ground)      |  |        |
| 100 <sup>th</sup> Percentile Distance (radius in meters) |  | 21.5   |
| 75 <sup>th</sup> Percentile Distance (radius in meters)  |  | 19.2   |
| 50 <sup>th</sup> Percentile Distance (radius in meters)  |  | 13.5   |
| 25 <sup>th</sup> Percentile Distance (radius in meters)  |  | 6.9    |

### Exclusion Zone Bullseye



Radius Percentage: 48.9%      Deflection Angle\*: 58.5      Distance: 21.5  
 \*Angle in degrees relative to vertical is proportional to probability and as such all angles may not be displayed.





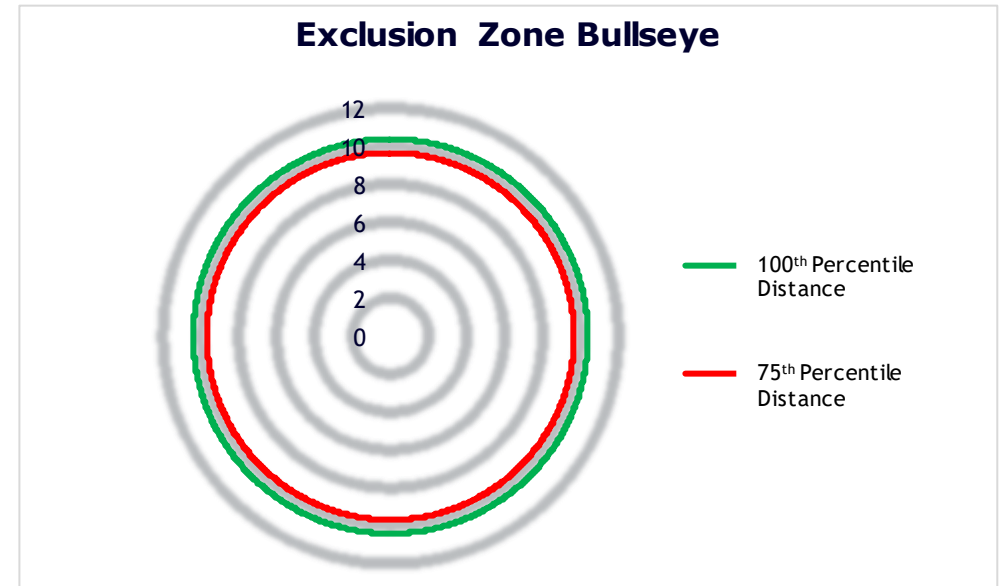
# Dropped Object Exclusion Zone

- Tool can be used to do the following:
  - Educate industry personnel on the risks of a deflection
  - Focus industry to prevent the dropped object and add other safeguards to fail safely
  - Create an exclusion zone that is risk-based, where feasible
  - Work in concert with the DROPS Calculator (mass needed)



# Dropped Object Exclusion Zone

- Limitations of Tool
  - Impact with a round surface
  - Static drop
  - Assumes no resistance/friction
  - Provides a probability distribution distance
  - Predicts striking distance not final resting distance



# Comparative Evaluation – Percent Error in Other Methods

| Percentile Comparison         | Average Percent Error | Range of Percent Error | Error Category         |
|-------------------------------|-----------------------|------------------------|------------------------|
| <b>4:1 (Ladder Rule)</b>      |                       |                        |                        |
| 100 <sup>th</sup> tile        | -69%                  | -39% to -77%           | Under Protective       |
| 75 <sup>th</sup> tile         | -66%                  | -34% to -74%           | Under Protective       |
| <b>1:1 (Cone of Exposure)</b> |                       |                        |                        |
| 100 <sup>th</sup> tile        | +24%                  | -9% to +144%           | Mostly Over Protective |
| 75 <sup>th</sup> tile         | +36%                  | +3% to +163%           | Over Protective        |

\*Based on 10 incremental evaluations in metric from 10/9.7 down to 10/1.



# Tool Update

- Tool has been updated based on industry feedback and incorporates:
  - Energy loss - “e” value of 0.66 (golf ball is 0.8)
  - A margin for safety to address rotational motion - unit selection matters!
  - Additional data validation - separation distance of 0.3 meters or 1 foot



# What Next

- Publish mathematics behind tool in peer-reviewed paper - will include considerations for how to test tool
- Conduct testing as part of continuous improvement to see if any refinements can be made



# **Microlearning Review**

**Mr. Abbey Adeogun**



# Microlearning

- Scope: Microlearning's are short (under 3 min) videos to reinforce safety and generate reflective learning

## Dropped Object Microlearning



# **Nest Steps**

**Mr. Jose Pinerua**  
(Chair)





# Next Steps

- Sign-up to become members of the Canadian Chapter
- Next Meeting Dates:
  - June 2 (AM)
  - October 6 (AM)
- We want to hear from you!
  - Presentations on your company's journey



ENERGY  
SAFETY  
CANADA

# Q&A

# Upcoming Webinars

- Feb 12 | Canadian Energy Museum
- Feb 24 | Think Twice Lift Once - Back Care and Safety
- Register at [www.energysafetycanada.com/Events](http://www.energysafetycanada.com/Events)



# Feedback Survey

Please let us know how we are doing!

- You should have just received a survey link via email
- Let us know what you thought of the presentation
- What did you learn, and how can we improve?
- What topics interest you we could offer webinars on?

You should receive a survey shortly or complete it here:

<https://www.surveymonkey.com/r/FNVPBH6>

