

# Making Serious Injury/Fatality Prevention Real.... ....Taking Risk Management to the Next Level



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**Alberta Mine Safety  
Association**



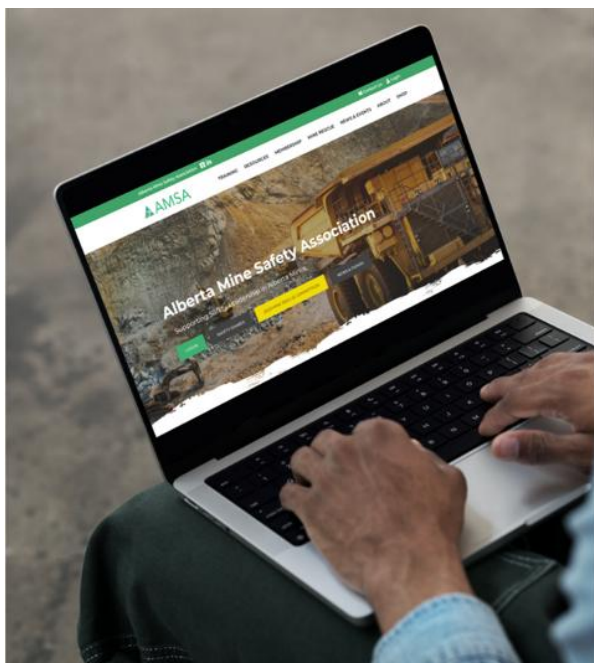
Supporting Safety Leadership in Alberta Mines



# Building on Good Work

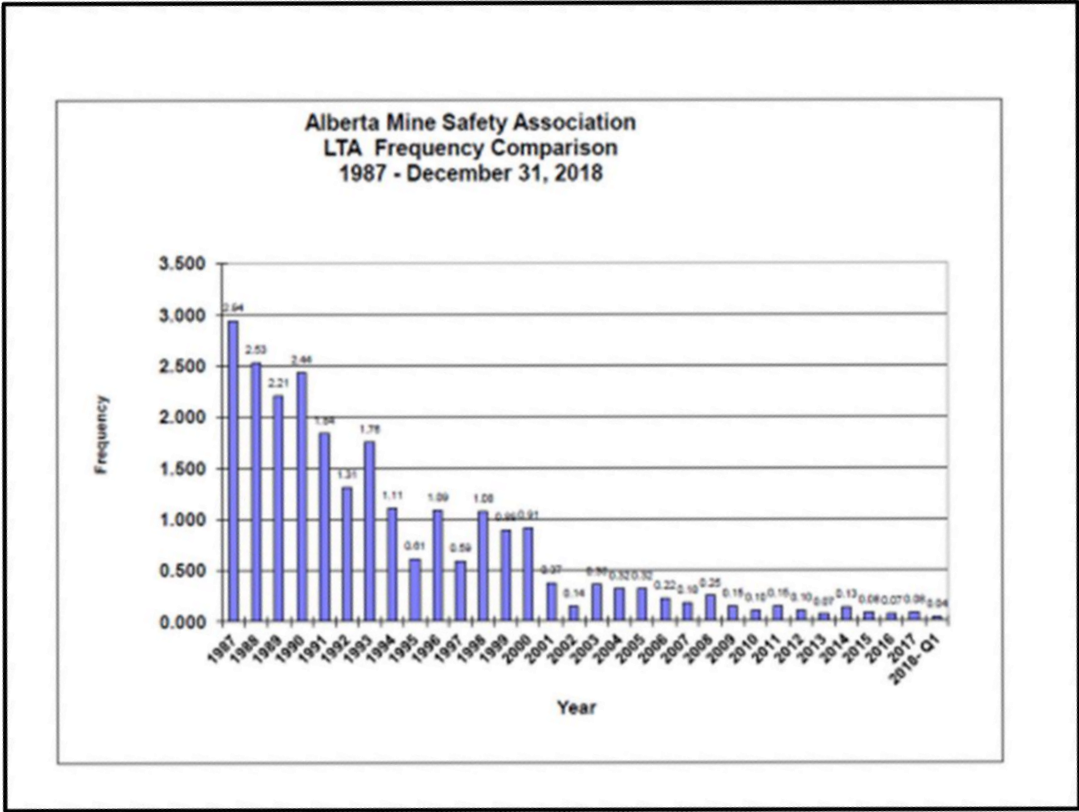
# Collaboration

**AMSA**  
Alberta Mine Safety Association



# Building on Good Work

# Collaboration



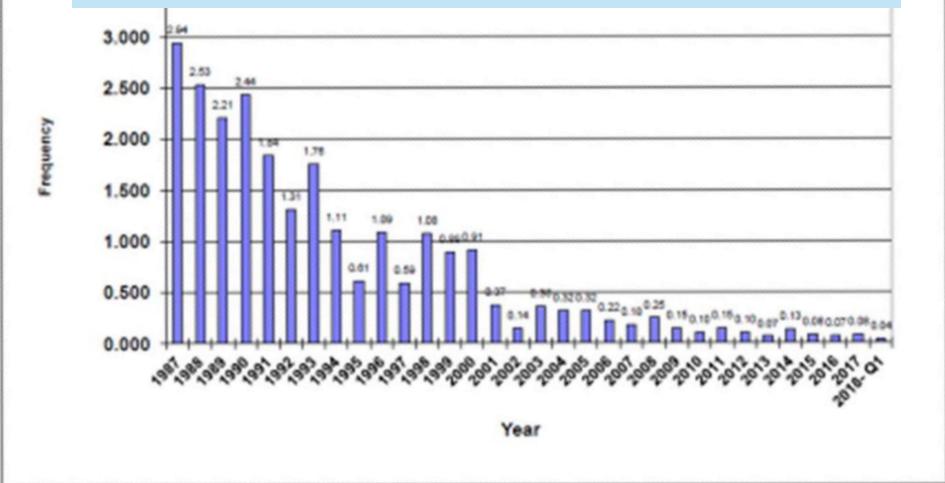


# Building on Good Work

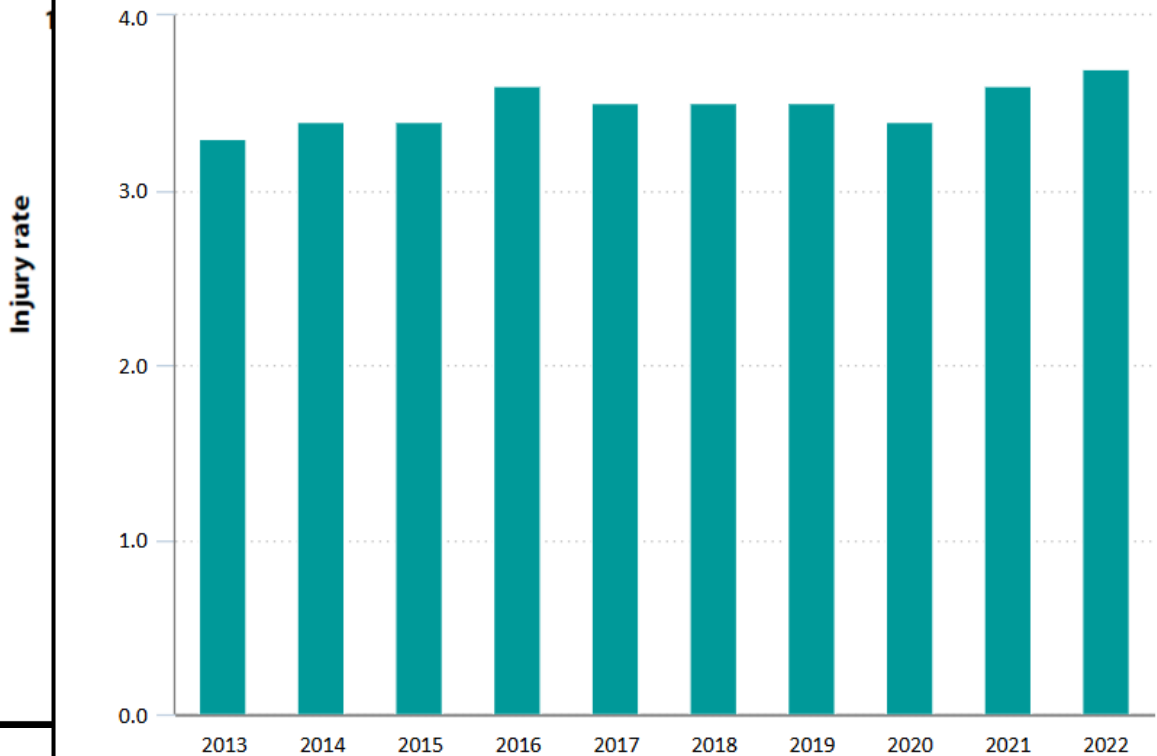
# Collaboration

# The Challenge

We have not seen a reduction in the high potential incident frequency, and are struggling to curb that trend.”  
*Industry Safety Leader*



Rate of fatal work injuries per 100,000 full-time workers, 2013–22



Hover over chart to view data.  
Source: U.S. Bureau of Labor Statistics.

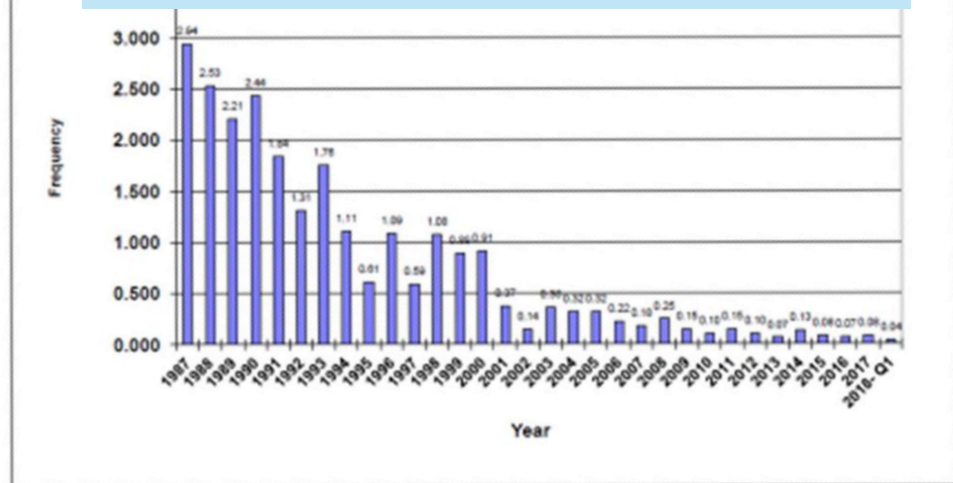


# Building on Good Work

# Collaboration



We have not seen a reduction in the high potential incident frequency, and are struggling to curb that trend.”  
*Industry Safety Leader*



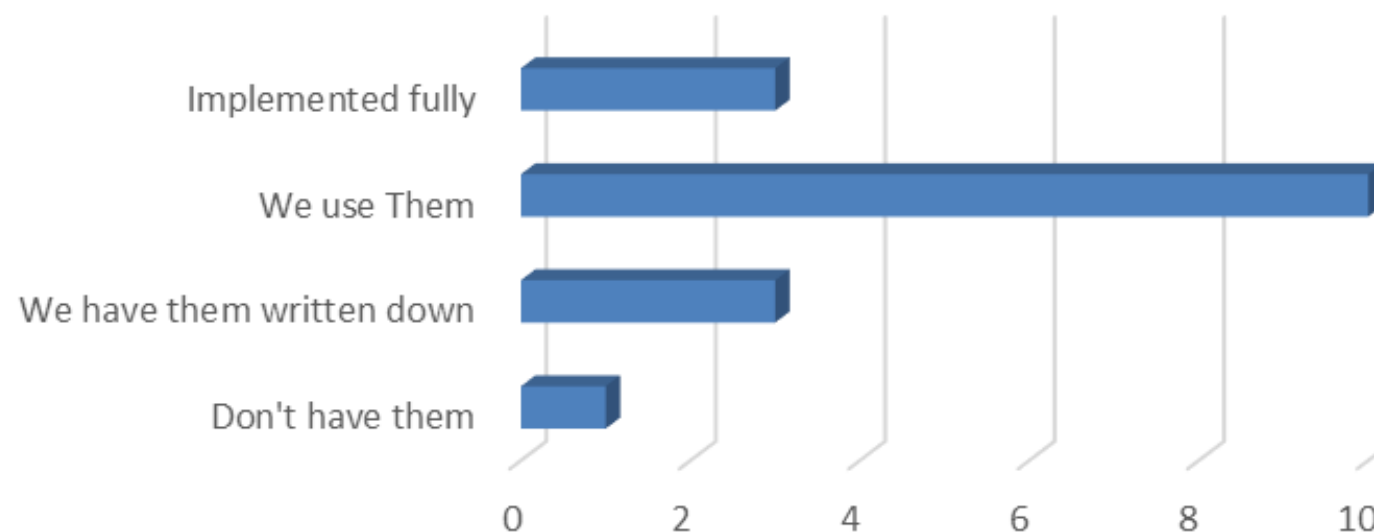


# AMSA Life Saving Rule Survey and Application

SIF 101

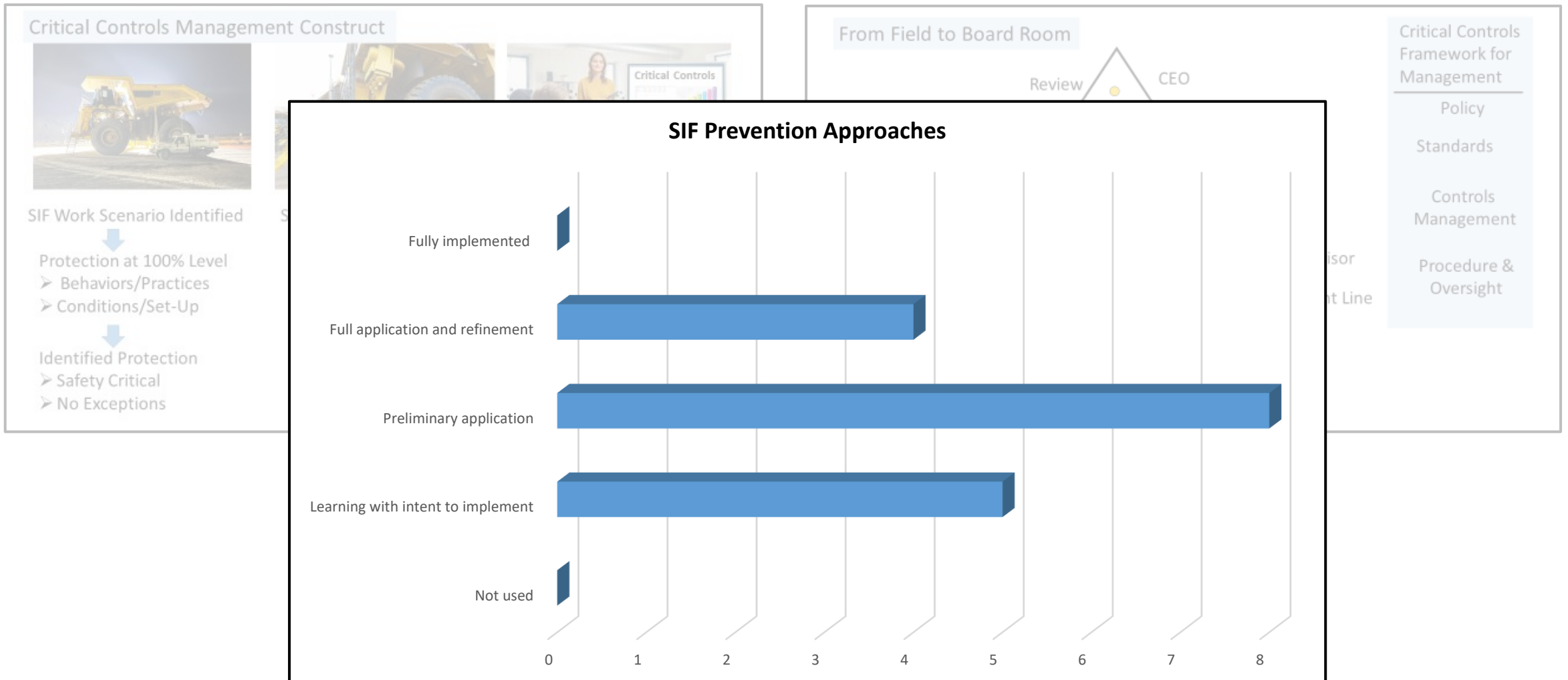
	Confined Space	Working at Heights	Work Authorization	Energy Isolation/Control of Work	Line of Fire	Tampering/Bypassing Safety Controls	Driving	Hot Work	Safe Mechanical Lifting	Fit for Duty/D+A	Hazard Assessment and Safe Work Planning	Equipment and Tools	Personal Conduct	Seat Belts	Breaking Containment	Critical Procedures
NACG	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
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TransAlta		<input checked="" type="checkbox"/>														
WestMet/Westmoreland		<input checked="" type="checkbox"/>														
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Rig Horn																
Finning																
Graham																
Graymont																
Hammerstone																
KMC																
Lafarge																
McKay Metis Contracting																
SMS																

## Life Saving Rules



# AMSA SIF Prevention Implementation

## SIF STATUS



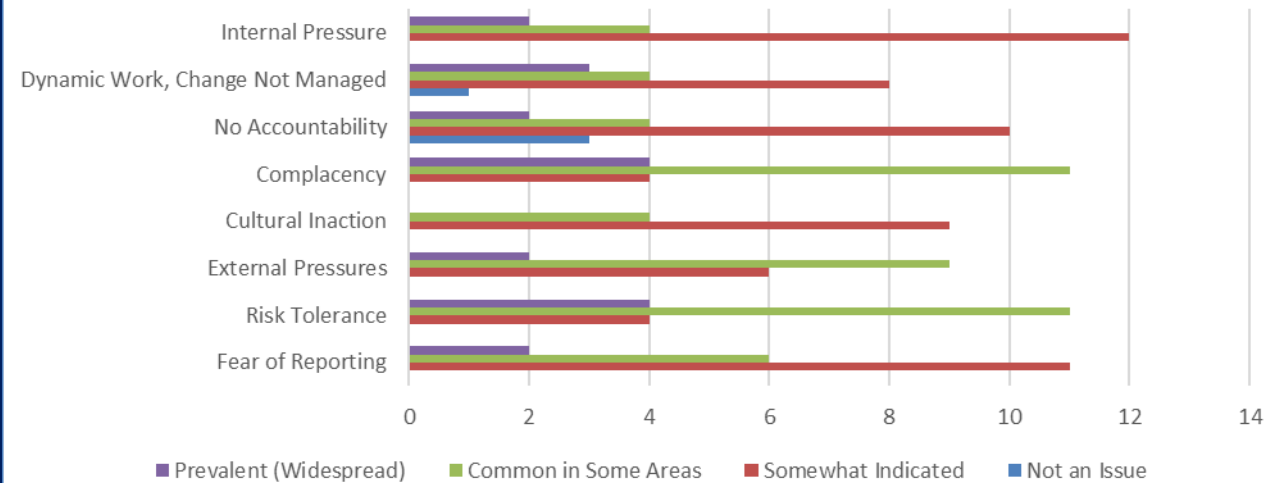


# Building on Good Work.....Learning from Others

## Latent Root Causes - System Gaps



## Latent Root Causes - Cultural Gap



# Making Serious Injury/Fatality Prevention Real.... ....Taking Risk Management to the Next Level

Exxon/Imperial Oil/Kearl Oil Sands

Westmoreland Mining

Suncor Energy

Bird Construction

Construction Safety Research Alliance/University of Colorado

Suncor/Syncrude Aurora Operation (2006)

SMS Equipment

CIM Connect 2024 Conference

Cementation Corporation

Nutrien Saskatoon

Finning/CAT

University of Calgary

CIM Health & Safety Society Inaugural Conference 2024

CNRL Horizon

CNRL Albion

Syncrude

Fort Mckay Group

University of Alberta

Mine Safety Round Table

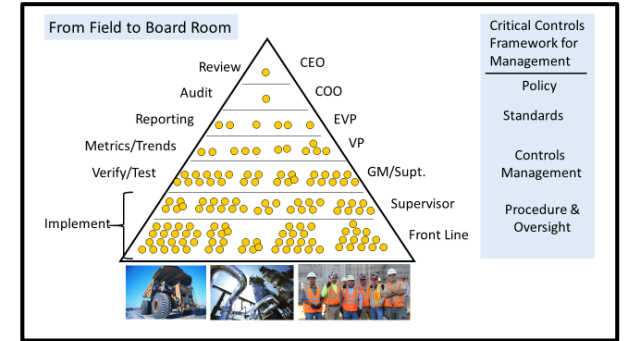




# Shaping the Safety Culture



Targeting Tasks with SIF Potential and Implementing Rigorous Controls, Critical Control Assurance, and Performance Reporting to Support Sustained Mitigation



Two Known Methodologies to Prevent SIF Incidents



## Safety Culture Focus

### 5 PRINCIPLES OF HOP

ERROR IS NORMAL

BLAME FIXES NOTHING

CONTEXT DRIVES BEHAVIOUR

LEARNING AND IMPROVING IS VITAL

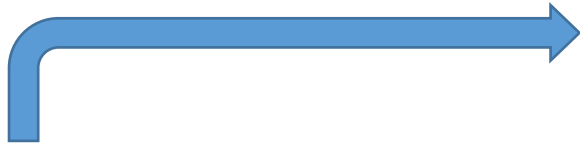
LEADERSHIP RESPONSE MATTERS

Critical Task Management

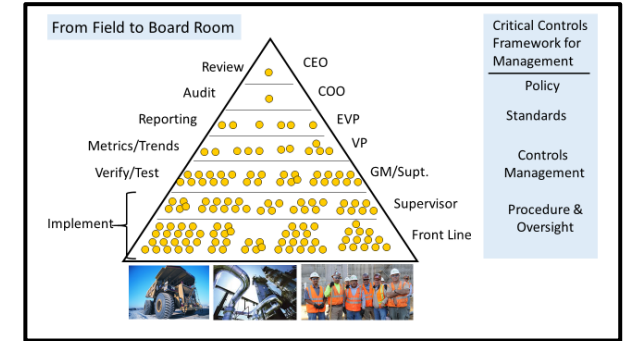
Supervisor Time in Field 69.5 %



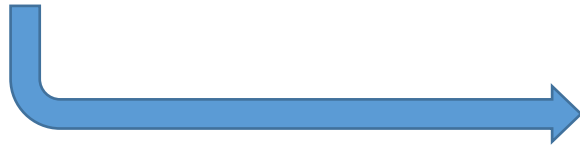
# Shaping the Safety Culture



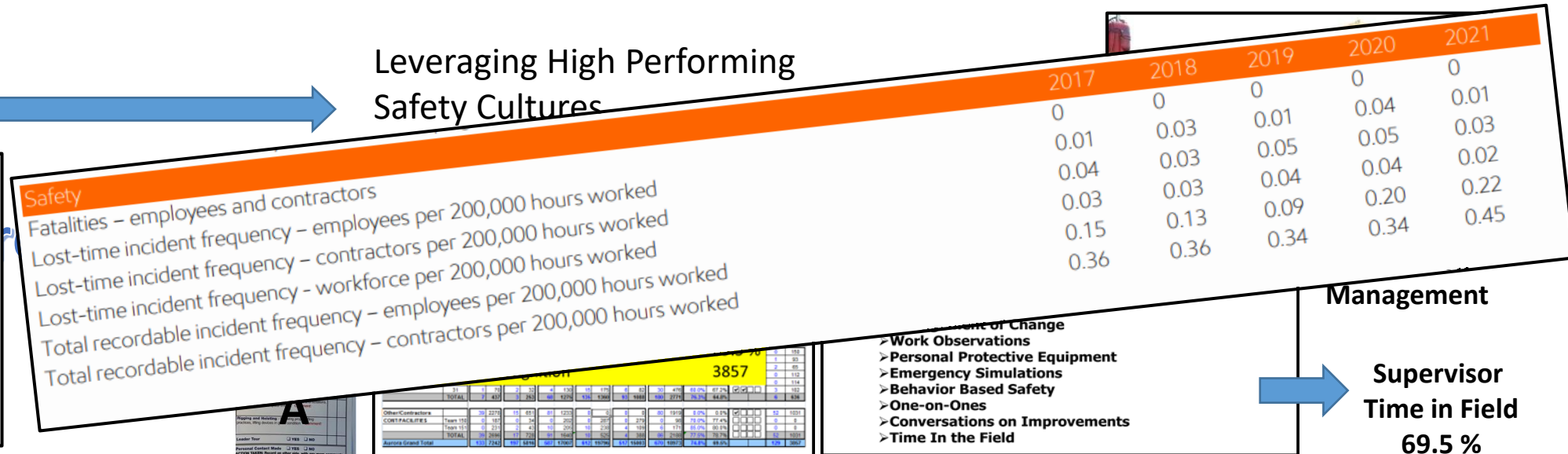
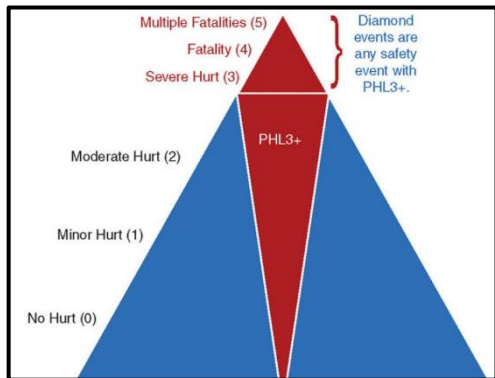
Targeting Tasks with SIF Potential and Implementing Rigorous Controls, Critical Control Assurance, and Performance Reporting to Support Sustained Mitigation



## Two Known Methodologies to Prevent SIF Incidents

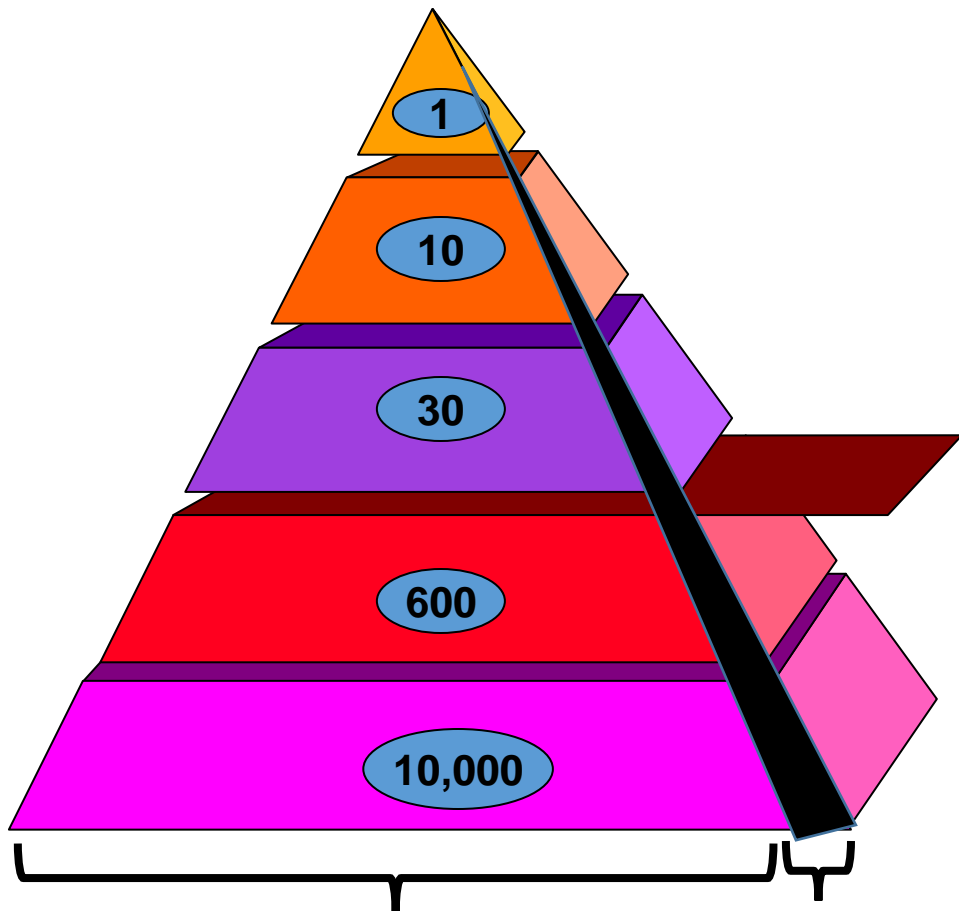


Leveraging High Performing Safety Cultures





Looking Back on Life Saving Rules



## Life Saving Rules – One Misstep from Fatality:

- Lack of Fall Protection
- Walking Under Suspended Load
- No Isolation/Lockout
- Unauthorized Confined Space Entry

**SIF 101**



## Core Rules

Obtain  
authorisation  
before entering a  
confined space

Protect yourself  
against a fall  
when working  
at height

Do not walk under  
a suspended load

Wear your  
seat belt



While driving, do  
not use your phone  
and do not exceed  
speed limits

Follow prescribed  
Journey  
Management Plan

Work with a valid  
Work Permit when  
required

Verify isolation  
before work  
begins and use  
the specified life  
protecting  
equipment

## Supplementary Rules

Prevent dropped  
objects

Position yourself in  
a safe zone in  
relation to moving  
and energised  
equipment

Obtain  
authorisation  
before starting  
excavation  
activities

Conduct gas tests  
when required

Wear a personal  
flotation device  
when required



Do not work  
under or near  
overhead electric  
power lines

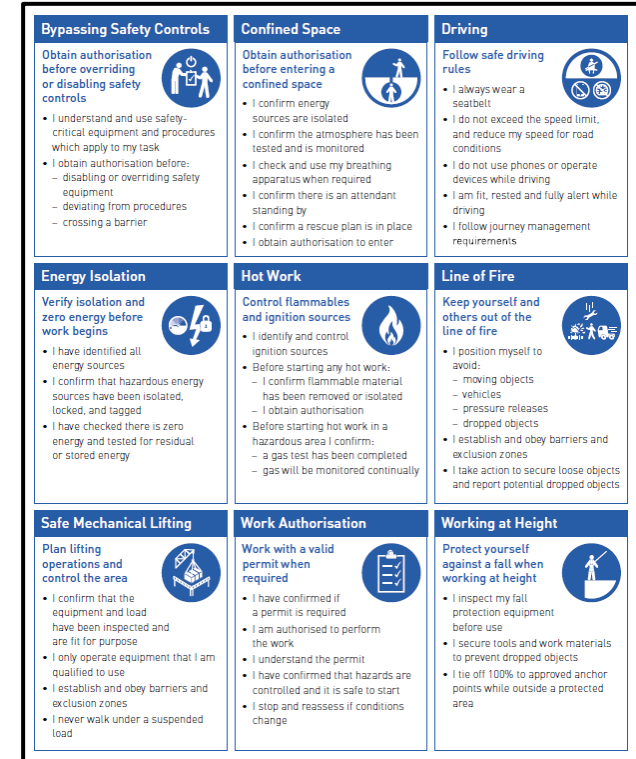
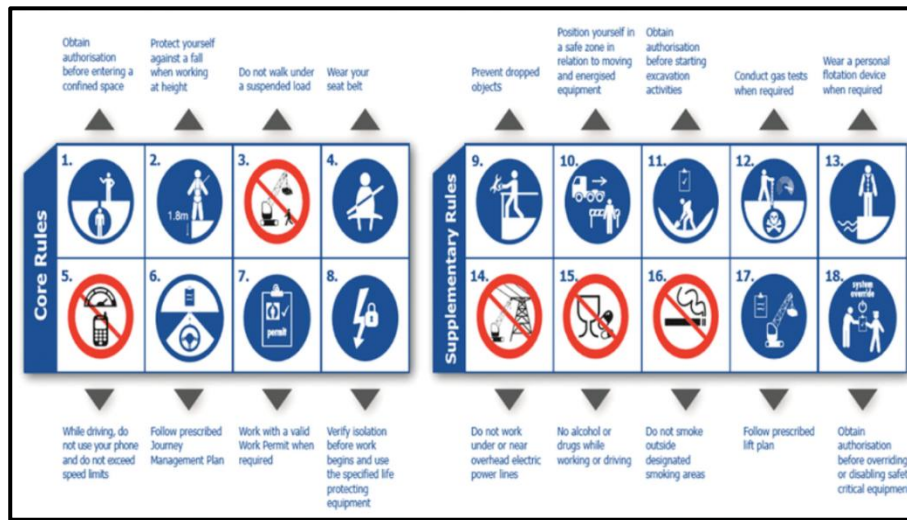
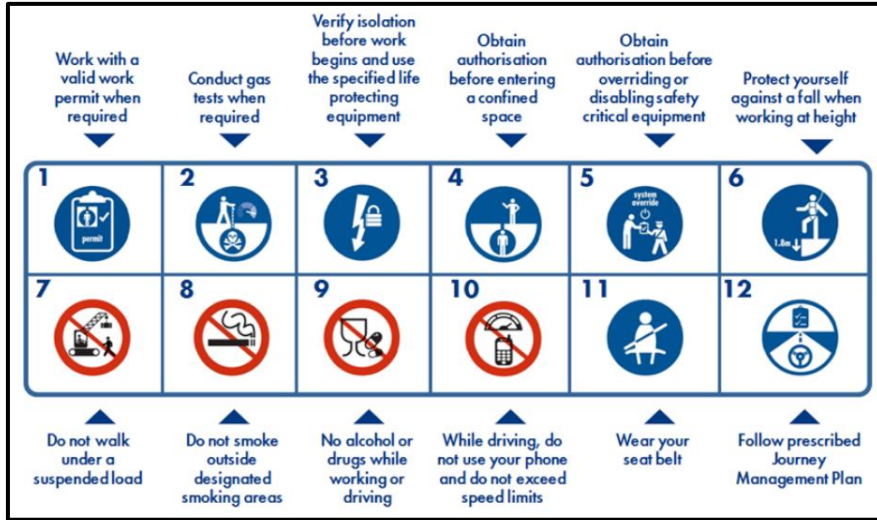
No alcohol or  
drugs while  
working or driving

Do not smoke  
outside  
designated  
smoking areas

Follow prescribed  
lift plan

Obtain  
authorisation  
before overriding  
or disabling safety  
critical equipment

# Life Saving Rules Overview







<b>Bypassing Safety Controls</b> <b>Obtain authorisation before overriding or disabling safety controls</b>  <ul style="list-style-type: none"> <li>I understand and use safety-critical equipment and procedures which apply to my task</li> <li>I obtain authorisation before: <ul style="list-style-type: none"> <li>disabling or overriding safety equipment</li> <li>deviating from procedures</li> <li>crossing a barrier</li> </ul> </li> </ul>	<b>Confined Space</b> <b>Obtain authorisation before entering a confined space</b>  <ul style="list-style-type: none"> <li>I confirm energy sources are isolated</li> <li>I confirm the atmosphere has been tested and is monitored</li> <li>I check and use my breathing apparatus when required</li> <li>I confirm there is an attendant standing by</li> <li>I confirm a rescue plan is in place</li> <li>I obtain authorisation to enter</li> </ul>	<b>Driving</b> <b>Follow safe driving rules</b>  <ul style="list-style-type: none"> <li>I always wear a seatbelt</li> <li>I do not exceed the speed limit, and reduce my speed for road conditions</li> <li>I do not use phones or operate devices while driving</li> <li>I am fit, rested and fully alert while driving</li> <li>I follow journey management requirements</li> </ul>
<b>Energy Isolation</b> <b>Verify isolation and zero energy before work begins</b>  <ul style="list-style-type: none"> <li>I have identified all energy sources</li> <li>I confirm that hazardous energy sources have been isolated, locked, and tagged</li> <li>I have checked there is zero energy and tested for residual or stored energy</li> </ul>	<b>Hot Work</b> <b>Control flammables and ignition sources</b>  <ul style="list-style-type: none"> <li>I identify and control ignition sources</li> <li>Before starting any hot work: <ul style="list-style-type: none"> <li>I confirm flammable material has been removed or isolated</li> <li>I obtain authorisation</li> </ul> </li> <li>Before starting hot work in a hazardous area I confirm: <ul style="list-style-type: none"> <li>a gas test has been completed</li> <li>gas will be monitored continually</li> </ul> </li> </ul>	<b>Line of Fire</b> <b>Keep yourself and others out of the line of fire</b>  <ul style="list-style-type: none"> <li>I position myself to avoid: <ul style="list-style-type: none"> <li>moving objects</li> <li>vehicles</li> <li>pressure releases</li> <li>dropped objects</li> </ul> </li> <li>I establish and obey barriers and exclusion zones</li> <li>I take action to secure loose objects and report potential dropped objects</li> </ul>
<b>Safe Mechanical Lifting</b> <b>Plan lifting operations and control the area</b>  <ul style="list-style-type: none"> <li>I confirm that the equipment and load have been inspected and are fit for purpose</li> <li>I only operate equipment that I am qualified to use</li> <li>I establish and obey barriers and exclusion zones</li> <li>I never walk under a suspended load</li> </ul>	<b>Work Authorisation</b> <b>Work with a valid permit when required</b>  <ul style="list-style-type: none"> <li>I have confirmed if a permit is required</li> <li>I am authorised to perform the work</li> <li>I understand the permit</li> <li>I have confirmed that hazards are controlled and it is safe to start</li> <li>I stop and reassess if conditions change</li> </ul>	<b>Working at Height</b> <b>Protect yourself against a fall when working at height</b>  <ul style="list-style-type: none"> <li>I inspect my fall protection equipment before use</li> <li>I secure tools and work materials to prevent dropped objects</li> <li>I tie off 100% to approved anchor points while outside a protected area</li> </ul>



Kearl Oil Sands

## Working at Height

Protect yourself  
against a fall when  
working at height



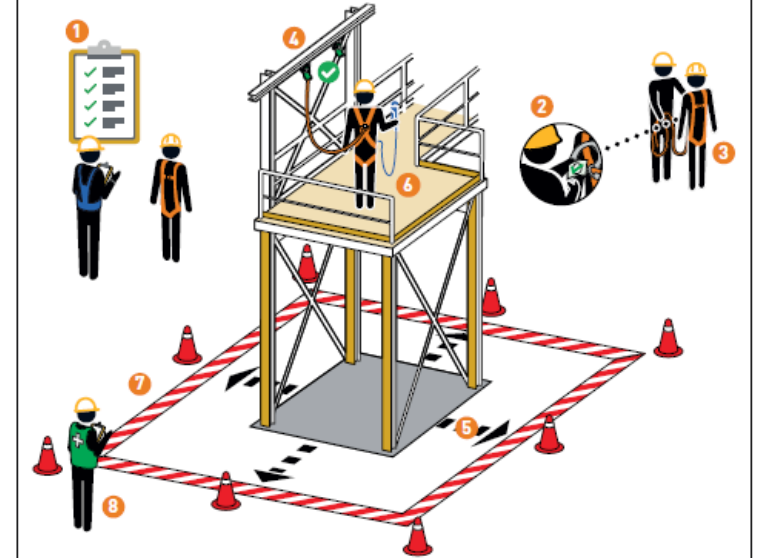
- I inspect my fall protection equipment before use
- I secure tools and work materials to prevent dropped objects
- I tie off 100% to approved anchor points while outside a protected area

## Working at Height

I will follow safe work practices when climbing, descending or working from ladders

### WHEN TO COMPLETE – Before the start of any WORKING AT HEIGHT activities

Confirm each control/safeguard below before starting work	Guidance for confirming each control/safeguard	Person(s) Performing Work	Start Veri
<b>I HAVE CONFIRMED:</b>			
<b>1</b> The hazards are identified, controlled, and it is safe to start	<ul style="list-style-type: none"> <li>• Complete a task risk assessment specific to the scope of work</li> <li>• Discuss hazards with the work team prior to the start of work</li> <li>• Check for simultaneous operations that may introduce additional hazards</li> </ul>		
<b>2</b> My fall protection equipment is: <ul style="list-style-type: none"> <li>• certified</li> <li>• inspected</li> <li>• rated</li> <li>• fit for the task</li> </ul>	<ul style="list-style-type: none"> <li>• Fall protection equipment includes fall arrest and/or fall restraint systems</li> <li>• Full body harness is load rated to support the weight of the worker</li> <li>• Check every strap, buckle, fitting, and/or grommet for signs of wear on fall protection harness</li> <li>• Fall arrest system contains a self-retracting lifeline or shock absorbing lanyard</li> <li>• Fall restraint contains a fixed lifeline configured to prevent the worker from reaching the edge and falling</li> <li>• Fall arrest is shorter than the potential fall distance</li> </ul> <p><i>Note: Stop and seek help if the fall protection equipment has excessive wear/damage</i></p>		
<b>3</b> The fall protection harness is adjusted to fit	<ul style="list-style-type: none"> <li>• Harness straps are not twisted</li> <li>• Harness body straps are adjusted for close body fit (i.e., no slack)</li> </ul> <p><i>Note: Use of body belts is not allowed</i></p>		
<b>4</b> The approved anchor point(s) are in place for 100% tie off	<ul style="list-style-type: none"> <li>• 100% tie off can occur outside of protected areas (such as an elevated work area not enclosed by hand rails)</li> <li>• The anchor point meets or exceeds design requirements</li> <li>• Pull on the connecting device to test if attachment is secure</li> </ul> <p><i>Note: Confirm anyone working at height is 100% tied off at all times (e.g., at least one hook must be anchored at all times)</i></p>		
<b>5</b> If a fall occurs, the fall path is clear	<ul style="list-style-type: none"> <li>• Fall protection is fit for purpose to protect the worker if they fall</li> <li>• Fall arrest distance is shorter than fall distance to first obstruction</li> <li>• If the worker is likely to swing, check that the path is free of obstructions</li> <li>• Mobile obstructions have been removed from fall path</li> </ul>		
<b>6</b> The tools/materials being used at height are secured	<ul style="list-style-type: none"> <li>• Tools used at heights have securing wire/lanyards/ethers</li> <li>• Tools are secured to prevent dropping</li> </ul> <p><i>Note: Worker will also complete a drop prevention program (e.g., work at height register)</i></p>		
<b>7</b> Barriers and drop/exclusion zones are in place	<ul style="list-style-type: none"> <li>• Identify drop/exclusion zones</li> <li>• Control access to drop/exclusion zones during work at height (e.g., attendant or physical barriers)</li> </ul>		
<b>8</b> The rescue plan is in place and is ready to be used	<ul style="list-style-type: none"> <li>• The work crew has discussed the rescue plan, including: <ul style="list-style-type: none"> <li>- is available</li> <li>- is aware of specific hazards related to this task</li> <li>- can execute the rescue plan</li> </ul> </li> </ul>		



I inspect my fall protection equipment before use

I tie off 100% to approved anchor points while outside a protected area

I secure tools and work materials to prevent dropped objects

I have validated prompt rescue capability when wearing fall protection

### Start work checks Working at height (WAH)

<b>Start work check</b> Crew members discuss and confirm critical life saving actions are in place prior to work.	With your supervisor's support, team members take actions needed to confirm the following life saving actions:
<b>Safe execution check</b> These life saving action checks are used to verify that LSA safeguards are healthy and remain effective throughout the task.	1. I inspect my fall protection equipment before use 2. I secure tools and work materials to prevent dropped objects 3. I tie off 100% to approved anchor points while outside a protected area 4. I have validated prompt rescue capability when wearing fall protection 5. I will follow safe work practices when climbing, descending or working from ladders  Stop and seek help if any of the above life saving actions are not in place (Stop work authority)

Kearl Oil Sands





## Safe Mechanical Lifting

### Plan lifting operations and control the area



- I confirm that the equipment and load have been inspected and are fit for purpose
- I only operate equipment that I am qualified to use
- I establish and obey barriers and exclusion zones
- I never walk under a suspended load

# Mechanical Lifting

## WHEN TO COMPLETE – Before the start of any MECHANICAL LIFTING activities

Confirm each control/safeguard below before starting work	Guidance for confirming each control/safeguard	Person(s) Performing Work	Start-Work Verifier
<b>I HAVE CONFIRMED:</b>			
<b>1</b> The lift has been planned	<ul style="list-style-type: none"> <li>The lift method, equipment, and number of people required has been assessed and determined</li> <li>When required, an approved lift plan or procedure is in place and has been reviewed by a competent person</li> <li>The lift has been assessed for: <ul style="list-style-type: none"> <li>load weight</li> <li>load size</li> <li>center of gravity (e.g., lifting point)</li> </ul> </li> <li>The lifting equipment's current capacity and condition has been assessed</li> <li>Equipment operator and lifting crew have discussed the written lift plan prior to lifting</li> </ul>		
<b>2</b> The hazards are identified and controlled	<ul style="list-style-type: none"> <li>Complete a task risk assessment specific to the scope of work</li> <li>Discuss hazards with the work team prior to the start of work</li> <li>Identify potential hazards and control measures to be implemented (e.g., barriers, exclusion zones, etc.)</li> <li>Consider how to apply "hands-free lifting" (e.g., use of push/pull and/or rigging)</li> </ul>		
<b>3</b> Workers involved with the lift are qualified to perform their task			
<b>4</b> The lifting equipment is stable and potential for unplanned movement has been assessed	<ul style="list-style-type: none"> <li>Lifting appliance is level and/or placed on stable ground</li> <li>Masting has been assessed for stability and is level for the lifting equipment</li> <li>Outriggers are deployed</li> <li>Loads have been assessed for stability, taking into account: <ul style="list-style-type: none"> <li>load securing</li> <li>workplace conditions</li> </ul> </li> </ul>		
<b>5</b> The lifting and rigging equipment is: <ul style="list-style-type: none"> <li>certified</li> <li>inspected</li> <li>rated for the lift</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturer's name clearly visible</li> <li>The rigging equipment has been inspected prior to lift</li> <li>The rigging equipment is rated for the lift</li> </ul> <p><b>Note:</b> If load chain does not exist, assume equipment is not rated for the lift; stop work and identify alternative lifting equipment that is rated for the load</p>		
<b>6</b> A communication plan and responsibilities are agreed to by the lift crew	<ul style="list-style-type: none"> <li>Communication method(s) (e.g., hand signals, radio) have been agreed to and used</li> <li>The signaler for the lift has been identified (bankman/dogman/operator)</li> </ul>		
<b>7</b> The load has been inspected prior to lift	<ul style="list-style-type: none"> <li>Every load has been inspected for integrity and stability (e.g., center of gravity)</li> <li>The load and its packaging can withstand the force/motion caused by the lift</li> <li>Loose objects have been secured or removed prior to lift</li> </ul>		
<b>8</b> Barriers and exclusion zones are in place	<ul style="list-style-type: none"> <li>barriers/obstacles</li> </ul>		

I understand the lift plan prior to starting work and keep hands off load unless authorized

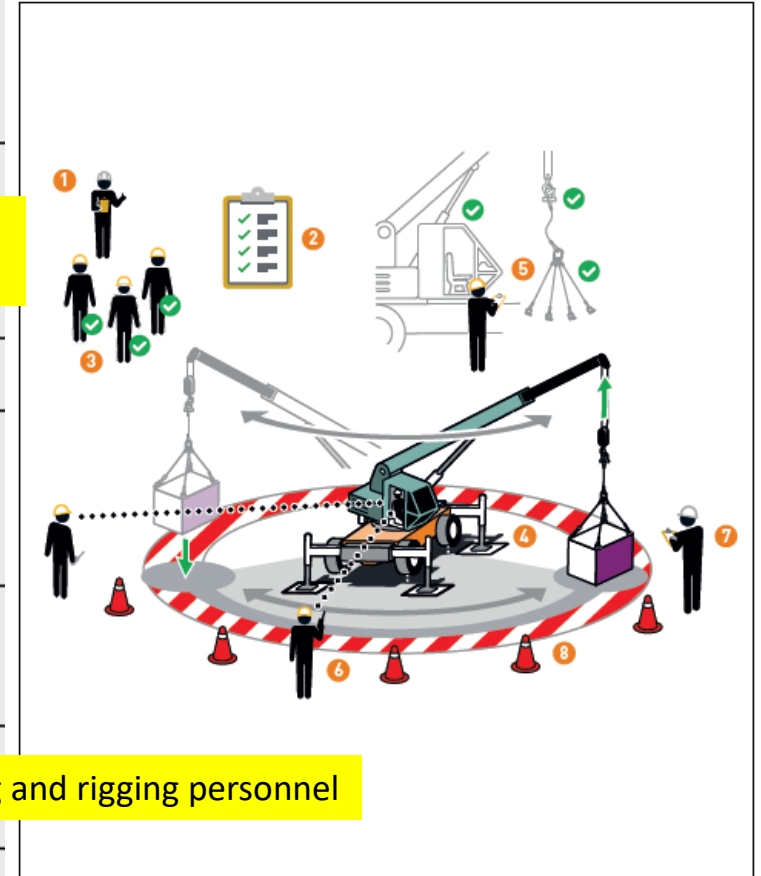
I only operate equipment I am qualified to use

I confirm that the equipment and load have been inspected and are fit for purpose

I establish and maintain communication with lifting and rigging personnel

I establish and obey barriers and exclusion zones

I never walk under a suspended load

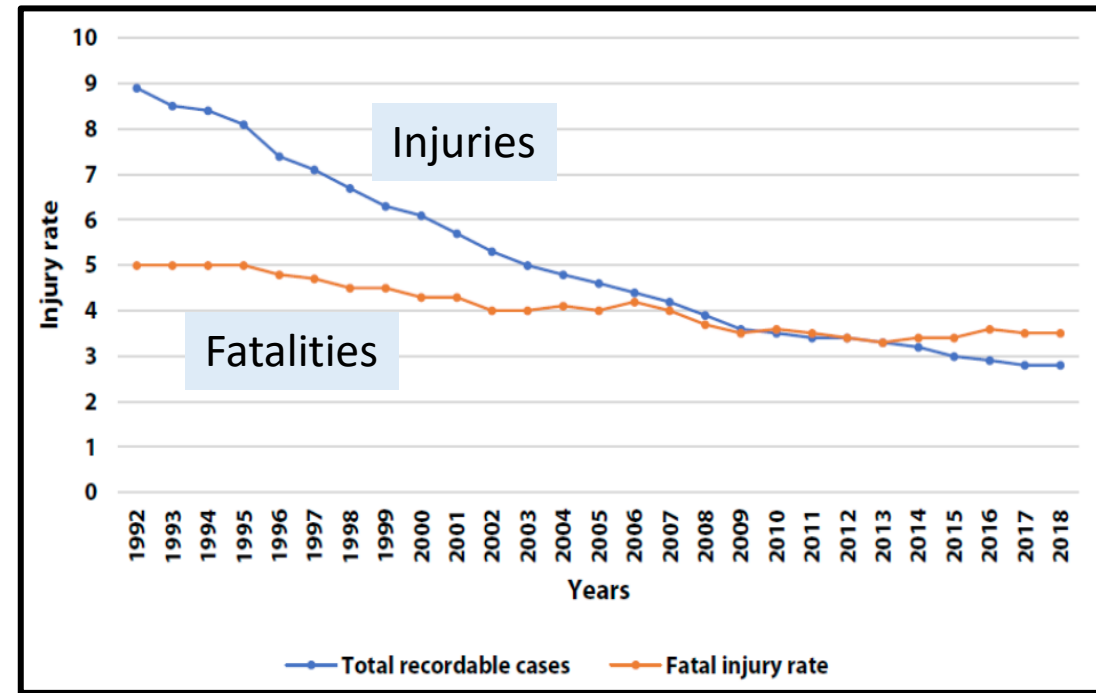
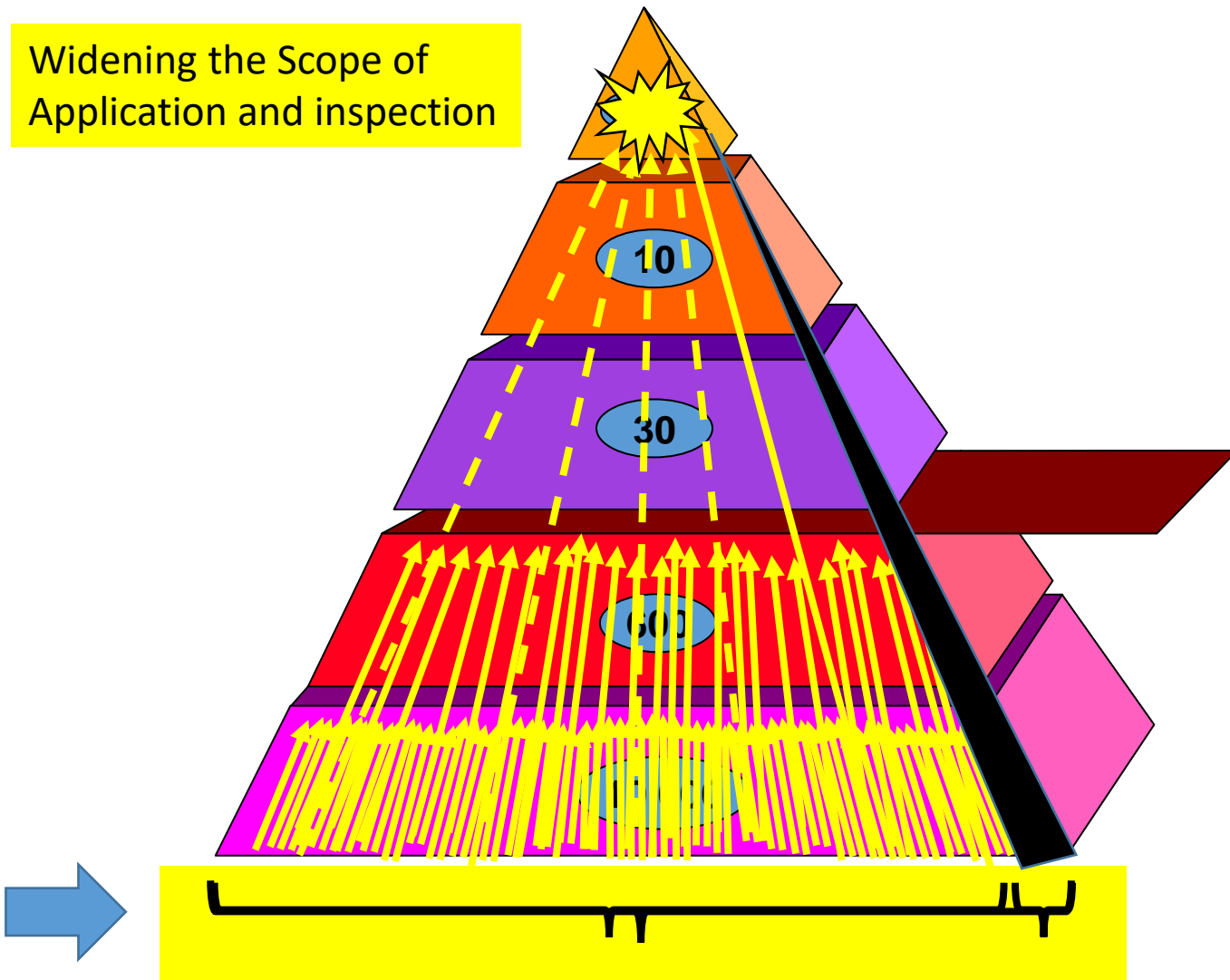


<b>Start work checks</b> <b>Lifting and rigging (L&amp;R)</b>	
<b>Start work check</b> Crew members discuss and confirm critical life saving actions are in place prior to work	With your supervisor's support, team members take actions needed to confirm the following life saving actions:
<b>Safe execution check</b> These life saving action checks are used to verify that LSA safeguards are healthy and remain effective throughout the task	<ol style="list-style-type: none"> <li>1. I confirm that the equipment and load have been inspected and are fit for purpose</li> <li>2. I only operate equipment that I am qualified to use</li> <li>3. I establish and obey barriers and exclusion zones</li> <li>4. I never walk under a suspended load</li> <li>5. I understand lift plan prior to starting work and keep hands off load unless authorized</li> <li>6. I establish and maintain communication with lifting and rigging personnel</li> </ol> <p>Stop and seek help if any of the above life saving actions are not in place (Stop work authority)</p>

Kearl Oil Sands

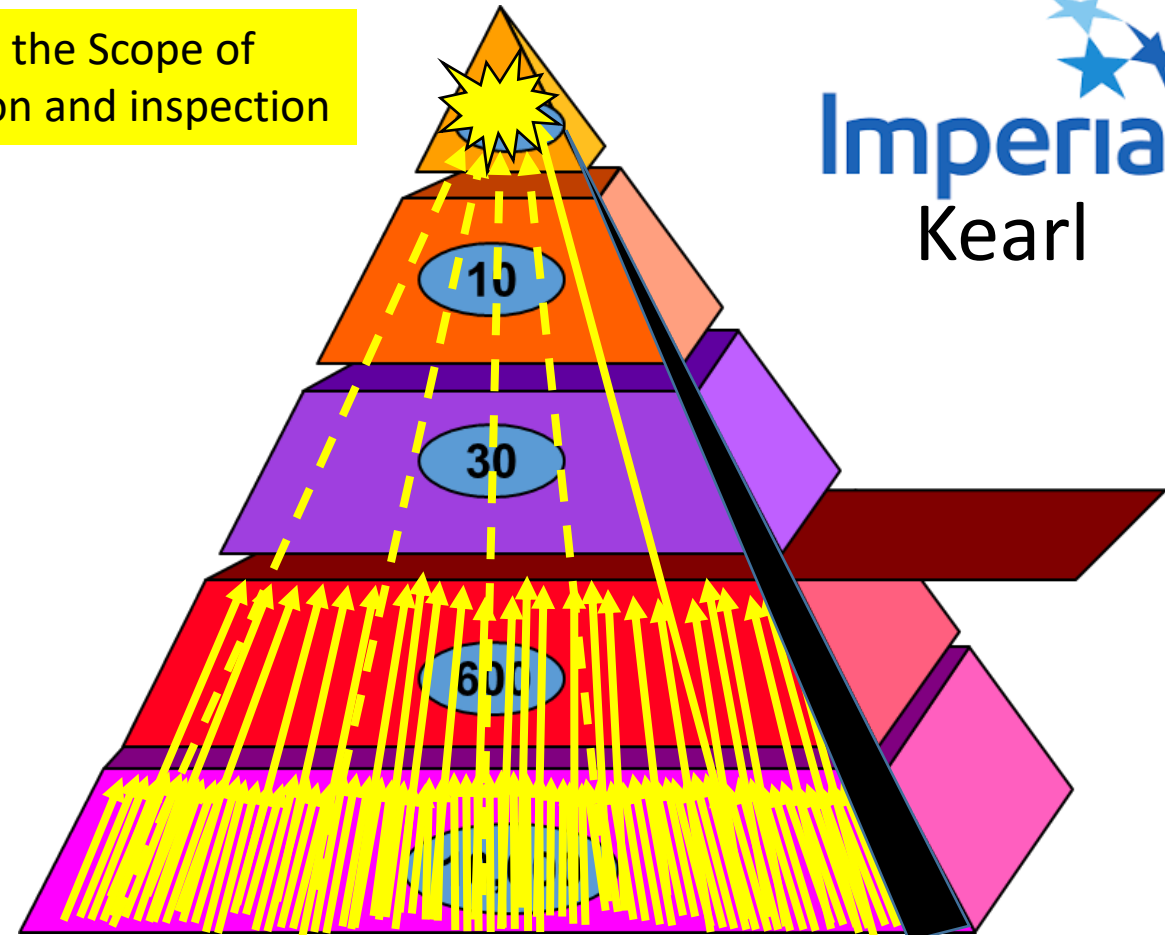


Widening the Scope of  
Application and inspection





Widening the Scope of Application and inspection



Working at Height

1. I will follow safe work practices when climbing, descending or working from ladders

2. I will inspect my fall protection equipment before use

3. I tie off 100% to approved anchor points while outside a protected area

4. I secure tools and work materials to prevent dropped objects

5. I have validated prompt rescue capability when wearing fall protection

6. I establish and clear exclusion zones

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88. I establish and clear exclusion zones

89. I establish and clear exclusion zones

90. I establish and clear exclusion zones

91. I establish and clear exclusion zones

92. I establish and clear exclusion zones

93. I establish and clear exclusion zones

94. I establish and clear exclusion zones

95. I establish and clear exclusion zones

96. I establish and clear exclusion zones

97. I establish and clear exclusion zones

98. I establish and clear exclusion zones

99. I establish and clear exclusion zones

100. I establish and clear exclusion zones

Line of Fire

WHEN TO COMPLETE – Before the start of any MECHANICAL LIFTING activities

Mechanical Lifting

WHEN TO COMPLETE – Before the start of any MECHANICAL LIFTING activities

Working at Height

I will follow safe work practices when climbing, descending or working from ladders

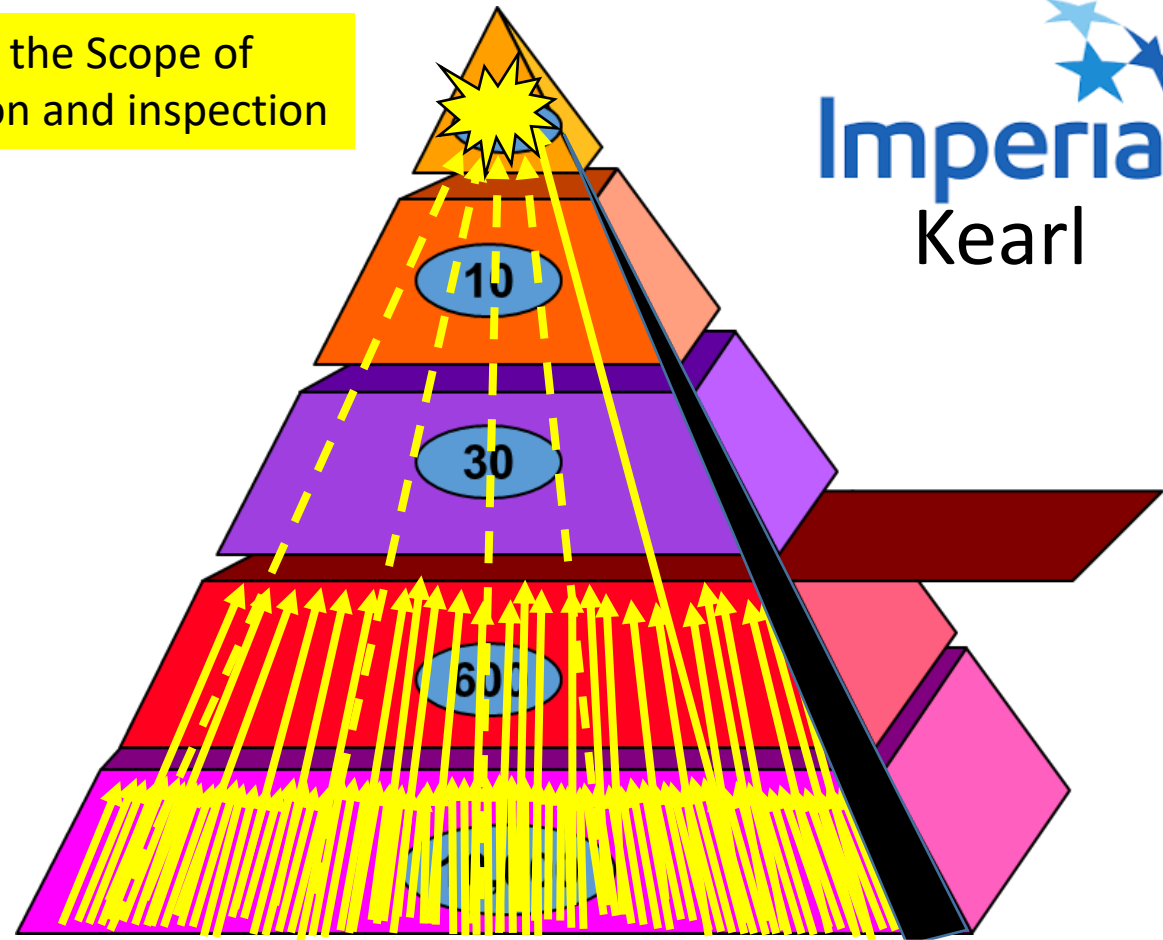
WHEN TO COMPLETE – Before the start of any WORKING AT HEIGHT activities

Confirm each control/safeguard below before starting work	Guidance for confirming each control/safeguard	Person(s) Performing Work	Start-Work Verifier
I HAVE CONFIRMED:			
1 The hazards are identified, controlled, and it is safe to start	<ul style="list-style-type: none"><li>Complete a task risk assessment specific to the scope of work</li><li>Discuss hazards with the work team prior to the start of work</li><li>Check for simultaneous operations that may introduce additional hazards</li></ul>		
2 My fall protection equipment is: <ul style="list-style-type: none"><li>certified</li><li>inspected</li><li>rated</li><li>fit for the task</li></ul>	<ul style="list-style-type: none"><li>Fall protection equipment includes full arrest and/or fall restraint systems</li><li>Full body harness is load rated to support the weight of the worker</li><li>Check every strap, buckle, lining, and/or component for signs of wear on fall protection harness</li><li>Fall arrest system contains a self-retracting lifeline or shock absorbing lanyard</li><li>Fall restraint contains a fixed lifeline configured to prevent the worker from reaching the edge and falling</li><li>Fall arrest is shorter than the potential fall distance</li></ul> <p><b>Note:</b> Size and work experience of the fall protection system must be appropriate for the task.</p>		
3 The fall protection harness is adjusted to fit	<ul style="list-style-type: none"><li>Harness straps are not twisted</li><li>Harness body straps are adjusted for close body fit (i.e., no slack)</li></ul> <p><b>Note:</b> Use of body belts is not allowed</p>		
4 The approved anchor point(s) are in place for 100% tie off	<ul style="list-style-type: none"><li>100% tie off can occur outside of protected areas (such as an elevated work area not enclosed by hand rails)</li></ul> <p><b>Note:</b> 100% tie off can occur outside of protected areas (such as an elevated work area not enclosed by hand rails)</p> <p><b>Note:</b> Confirm anyone working at height is 100% tied off at all times (e.g., at least one hook must be anchored at all times)</p>		
5 If a fall occurs, the fall path is clear	<ul style="list-style-type: none"><li>Fall protection is fit for purpose to protect the worker if they fall</li><li>Fall arrest distance is shorter than fall distance to first obstruction</li><li>If the worker is likely to swing, check that the path is free of obstructions</li><li>Mobile obstructions have been removed from fall path</li></ul>		
6 The tools/materials being used at height are secured	<ul style="list-style-type: none"><li>Tools used at heights have securing methods (e.g., lanyards, tool bags)</li></ul> <p><b>Note:</b> Confirm anyone working at height is 100% tied off at all times (e.g., at least one hook must be anchored at all times)</p>		
7 Barriers and drop/exclusion zones are in place	<ul style="list-style-type: none"><li>Identify drop/exclusion zones</li><li>Control access to drop/exclusion zones during work (e.g., attendant or physical barriers)</li></ul>		
8 The rescue plan is in place and is ready to be used	<ul style="list-style-type: none"><li>The rescue crew has discussed the rescue plan, including:<ul style="list-style-type: none"><li>is available</li><li>is aware of specific hazards related to this task</li><li>can execute the rescue plan</li></ul></li></ul>		

Confirm these controls/safeguards are in place and verified prior to starting work. Stop and seek help if anything changes.

Printed Name & Role	Signature	Date
Start-Work Verifier		

Widening the Scope of Application and inspection



Working at Height

When to Complete	When to Complete	When to Complete	When to Complete
Before the start of any MECHANICAL LIFTING activities	Before the start of any MECHANICAL LIFTING activities	Before the start of any MECHANICAL LIFTING activities	Before the start of any MECHANICAL LIFTING activities
1. I will follow safe work practices when climbing, descending or working from ladders	2. I will follow safe work practices when climbing, descending or working from ladders	3. I will follow safe work practices when climbing, descending or working from ladders	4. I will follow safe work practices when climbing, descending or working from ladders
5. I will follow safe work practices when climbing, descending or working from ladders	6. I will follow safe work practices when climbing, descending or working from ladders	7. I will follow safe work practices when climbing, descending or working from ladders	8. I will follow safe work practices when climbing, descending or working from ladders
9. I will follow safe work practices when climbing, descending or working from ladders	10. I will follow safe work practices when climbing, descending or working from ladders	11. I will follow safe work practices when climbing, descending or working from ladders	12. I will follow safe work practices when climbing, descending or working from ladders

Line of Fire

WHEN TO COMPLETE – Before the start of any MECHANICAL LIFTING activities

Mechanical Lifting

WHEN TO COMPLETE – Before the start of any MECHANICAL LIFTING activities

Working at Height

I will follow safe work practices when climbing, descending or working from ladders

WHEN TO COMPLETE – Before the start of any WORKING AT HEIGHT activities

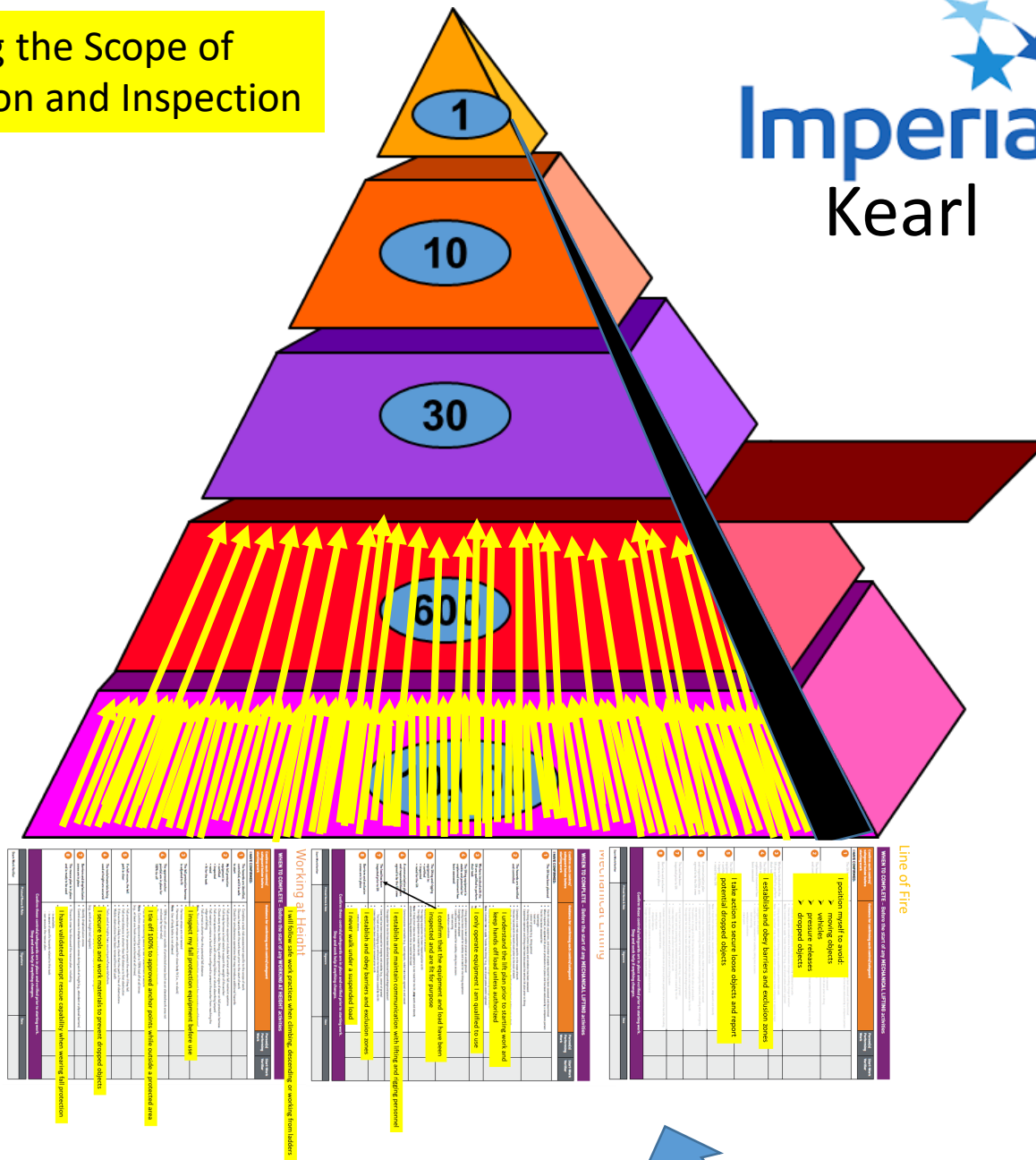
Confirm each control/safeguard below before starting work	Guidance for confirming each control/safeguard	Person(s) Performing Work	Start Work Verifier
I HAVE CONFIRMED:			
1 The hazards are identified, controlled, and it is safe to start	<ul style="list-style-type: none"><li>Complete a task risk assessment specific to the scope of work</li><li>Discuss hazards with the work team prior to the start of work</li><li>Check for simultaneous operations that may introduce additional hazards</li></ul>		
2 My fall protection equipment is: <ul style="list-style-type: none"><li>certified</li><li>inspected</li><li>rated</li><li>fit for the task</li></ul>	<ul style="list-style-type: none"><li>Fall protection equipment includes full arrest and/or fall restraint systems</li><li>Full body harness is load rated to support the weight of the worker</li><li>Check every strap, buckle, lining, and/or component for signs of wear on fall protection harness</li><li>Fall arrest system contains a self-retracting lifeline or shock absorbing lanyard</li><li>Fall restraint contains a fixed lifeline configured to prevent the worker from reaching the edge and falling</li><li>Full arrest is shorter than the potential fall distance</li></ul> <p><i>Note: Size and work experience of the fall protection equipment has been assessed and deemed suitable for the task.</i></p>		
3 The fall protection harness is adjusted to fit	<ul style="list-style-type: none"><li>Harness straps are not twisted</li><li>Harness body straps are adjusted for close body fit (i.e., no slack)</li></ul> <p><i>Note: Use of body belts is not allowed</i></p>		
4 The approved anchor point(s) are in place for 100% tie off	<ul style="list-style-type: none"><li>100% tie off can occur outside of protected areas (such as an elevated work area not enclosed by hand rails)</li></ul> <p><i>Note: 100% tie off can occur outside of protected areas (such as an elevated work area not enclosed by hand rails)</i></p> <p><i>Note: Confirm anyone working at height is 100% tied off at all times (e.g., at least one hook must be anchored at all times)</i></p>		
5 If a fall occurs, the fall path is clear	<ul style="list-style-type: none"><li>Fall protection is fit for purpose to protect the worker if they fall</li><li>Fall arrest distance is shorter than fall distance to first obstruction</li><li>If the worker is likely to swing, check that the path is free of obstructions</li><li>Mobile obstructions have been removed from fall path</li></ul>		
6 The tools/materials being used at height are secured	<ul style="list-style-type: none"><li>Tools used at heights have securing methods (e.g., lanyards, tool bags)</li></ul> <p><i>Note: Confirm anyone working at height is 100% tied off at all times (e.g., at least one hook must be anchored at all times)</i></p>		
7 Barriers and drop/exclusion zones are in place	<ul style="list-style-type: none"><li>Identify drop/exclusion zones</li><li>Control access to drop/exclusion zones during work (e.g., attendant or physical barriers)</li></ul>		
8 The rescue plan is in place and is ready to be used	<ul style="list-style-type: none"><li>The rescue crew has discussed the rescue plan, including:<ul style="list-style-type: none"><li>is available</li><li>is aware of specific hazards related to this task</li><li>can execute the rescue plan</li></ul></li></ul>		

Confirm these controls/safeguards are in place and verified prior to starting work. Stop and seek help if anything changes.

Printed Name & Role	Signature	Date
Start Work Verifier		



## Widening the Scope of Application and Inspection



## Line of Fire

**WHEN TO COMPLETE** – Before the start of any MECHANICAL LIFTING activities

## Mechanical Lifting

**WHEN TO COMPLETE** – Before the start of any MECHANICAL LIFTING activities

## Working at Height

I will follow safe work practices when climbing, descending or working from ladders

**WHEN TO COMPLETE** – Before the start of any **WORKING AT HEIGHT** activities

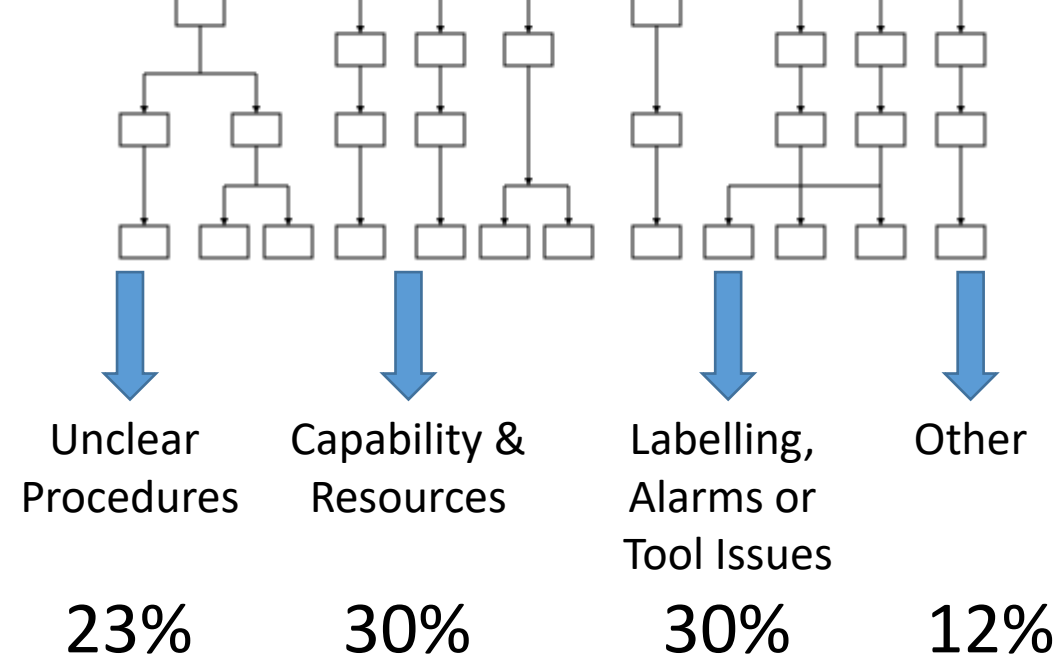
Controls each control/safeguard below before starting work		Evidence for confirming each control/safeguard		Person(s) Performing Work	Start-Work Verifier
I HAVE CONFIRMED:					
1	The hazards are identified, controlled, and it is safe to start	<ul style="list-style-type: none"> <li>Complete a task risk assessment specific to the scope of work</li> <li>Discuss hazards with the work team prior to the start of work</li> <li>Check for simultaneous operations that may introduce additional hazards</li> </ul>			
2	My fall protection equipment is: <ul style="list-style-type: none"> <li>certified</li> <li>inspected</li> <li>rated</li> <li>fit for the task</li> </ul>	<ul style="list-style-type: none"> <li>Fall protection equipment includes full arrest and/or fall restraint systems</li> <li>Full body harness is load rated to support the weight of the worker</li> <li>Check every strap, buckle, fitting, and/or grammer for signs of wear on fall protection harness</li> <li>Fall arrest system contains a self-retracting lifeline or shock absorbing lanyard</li> <li>Fall restraint contains a fixed lifeline configured to prevent the worker from reaching the edge and falling</li> <li>Fall arrest is shorter than the potential fall distance</li> </ul> <p><i>Note: Use and work assessments if the fall protection equipment has excessive wear/damage</i></p>			
3	The fall protection harness is adjusted to fit	<ul style="list-style-type: none"> <li>Harness straps are not twisted</li> <li>Harness body straps are adjusted for close body fit (i.e., no slack)</li> </ul> <p><i>Note: Use of body belts is not allowed</i></p>			
4	The approved anchor point(s) are in place for 100% tie off	<ul style="list-style-type: none"> <li>100% tie off can occur outside of protected areas (such as an elevated work area not enclosed by hand rails)</li> </ul> <p><i>Note: Use of snap hooks, carabiners, and lanyards is permitted</i></p>			
5	If a fall occurs, the fall path is clear	<ul style="list-style-type: none"> <li>Fall protection is fit for purpose to protect the worker if they fall</li> <li>Fall arrest distance is shorter than fall distance to first obstruction</li> <li>If the worker is likely to swing, check that the path is free of obstructions</li> <li>Mobile obstructions have been removed from fall paths</li> </ul>			
6	The tools/materials being used at height are secured	<ul style="list-style-type: none"> <li>Tools used at heights have securing methods and/or others</li> </ul>			
7	Barriers and drop/exclusion zones are in place	<ul style="list-style-type: none"> <li>Identify drop/exclusion zones</li> <li>Control access to drop/exclusion zones during work at height (e.g., attendant or physical barriers)</li> </ul>			
8	The rescue plan is in place and is ready to be used	<ul style="list-style-type: none"> <li>The work crew has discussed the rescue plan, including:</li> </ul>			
<p>I have validated prompt rescue capability when wearing fall protection</p> <ul style="list-style-type: none"> <li>is available</li> <li>is aware of specific hazards related to this task</li> <li>can execute the rescue plan</li> </ul>					
<p>Confirm these controls/safeguards are in place and verified prior to starting work. Stop and seek help if anything changes.</p>					
Printed Name & Role		Signature		Date	
Start-Work Verifier					

**A New Paradigm – Life Saving Rules**  
**Start Work Checks Identify SIF Exposures**  
**and Support Control Verification**

# And when the control isn't in place.....Context Dependent



## Moving From Life Saving Rules to Life Saving Choices



A New Paradigm – Life Saving Rules  
Start Work Checks Identify SIF Exposures  
and Support Control Verification

Variance is a source of learning to  
identify causal roots and provide a  
source of trending to drive strategy



## How It was Done

# Safety in the Morning

## Generic Safety Share

## Talk of safety –what did people see – quota

## Work permit for all

# Authorization

## Trigger plans (fall protection, etc.)

## Develop JSA – stored

## Supervisor sign-off on JSA

## Includes reviewing life saving rule list

## Above 2 often done in the shack – paper intensive

## In field – stop and think before work cards and questions

## In good teams cycle in on critical focus areas

## Then field confirmation

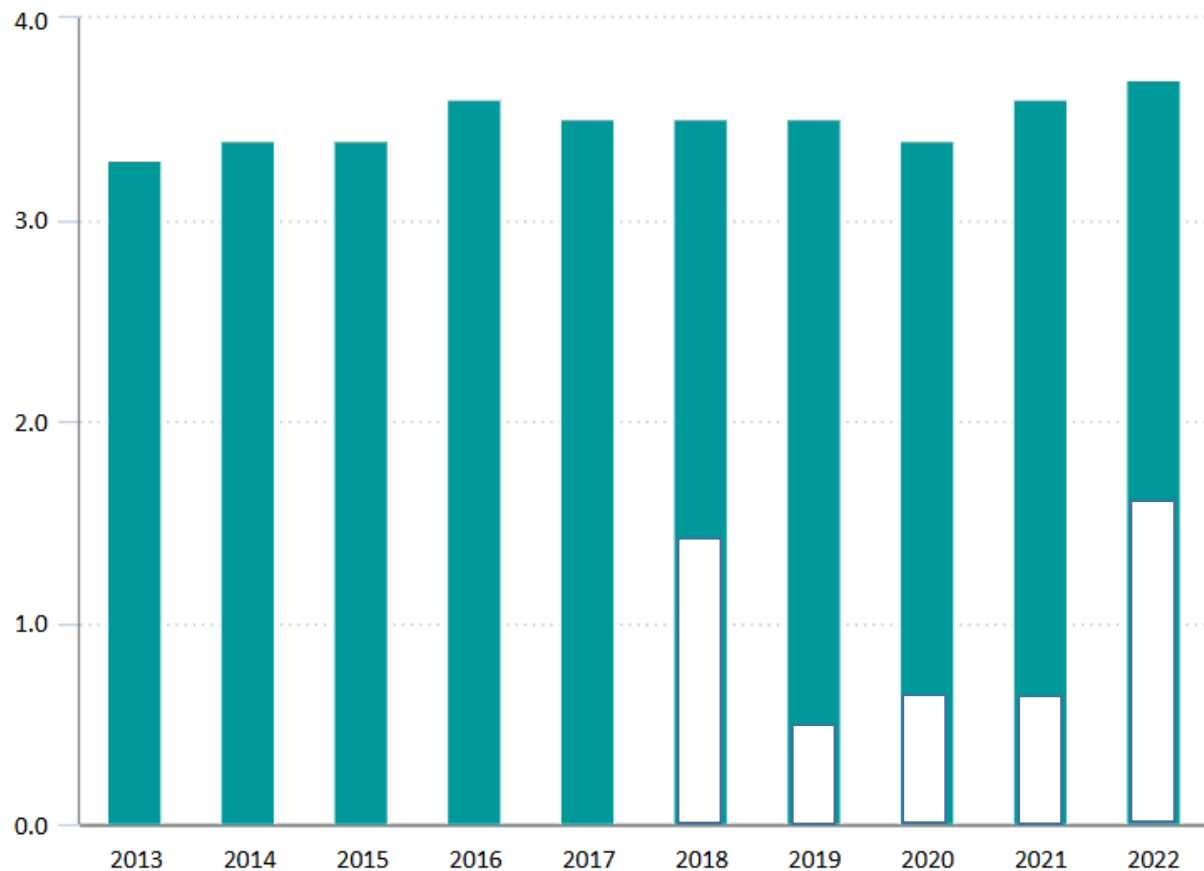
Everybody gets a permit

Page 1 of 33

## Encyclopedic JSA

[illegible]

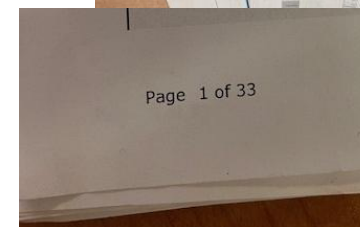
## How It was Done



Source: U.S. Bureau of Labor Statistics.



Everybody gets a permit



## Encyclopedic JSA

[illegible]



Innovation in Industry....



To change from something established



# PSMS Personnel Safety Management System

## Exxon Personal Safety Management System

- Life-saving rules and actions with Start Work Checks
- Human Performance
- Culture of Health
- Training





# Life after with PSMS

## Safety in the Morning

## Generic Safety Share

## Talk of safety –what did people see – quota

## Work permit

## Authorization

## Trigger plan

## Develop JSA

## Supervisor s

## Includes rev

## Above 2 often done in the shack – paper intensive

## In field – stop and think before work cards and questions

## All In good teams cycle in on critical focus areas

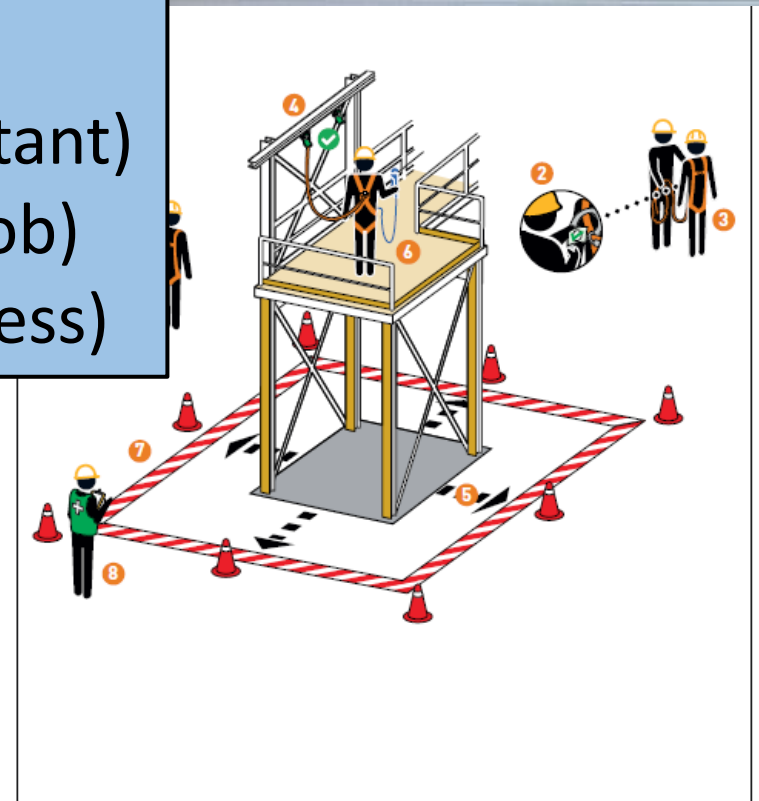
## Then field confirmation on controls

### Making Systems Real.....

- Relevant (Part of the Job at Hand)
- Targeted (Primary Focus on the Important)
- Action (Controls in Place or Stop the Job)
- User Oriented (Set People Up for Success)

Start work checks  
**Working at height (WAH)**

<b>Start work check</b> Crew members discuss and confirm critical life saving actions are in place prior to work.	<b>With your supervisor's support, team members take actions needed to confirm the following life saving actions:</b>
<b>Safe execution check</b> These life saving action checks are used to verify that LSA safeguards are healthy	<ol style="list-style-type: none"><li>1. I inspect my fall protection equipment before use</li><li>2. I secure tools and work materials to prevent dropped objects</li><li>3. I tie off 100% to approved anchor points while outside a protected area</li><li>4. I have validated prompt rescue capability when wearing fall protection</li><li>5. I will follow safe work practices when climbing, descending or working from ladders</li></ol>
	<b>Stop and seek help if any of the above life saving actions are not in place (Stop work authority)</b>



# The Design View

Environment, Health and Safety  
Management System (SMS)

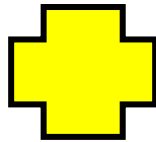
➤ Program Management and

## Making Cultures Real.....

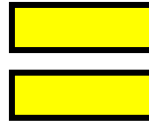
- Values Based (Safety a Moral Imperative)
- Care (People Matter)
  - HOP (Human and Organization Performance)
  - Psychological Safety
- People as Solutions (Capacity to Contribute)

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➤ Program Promotion



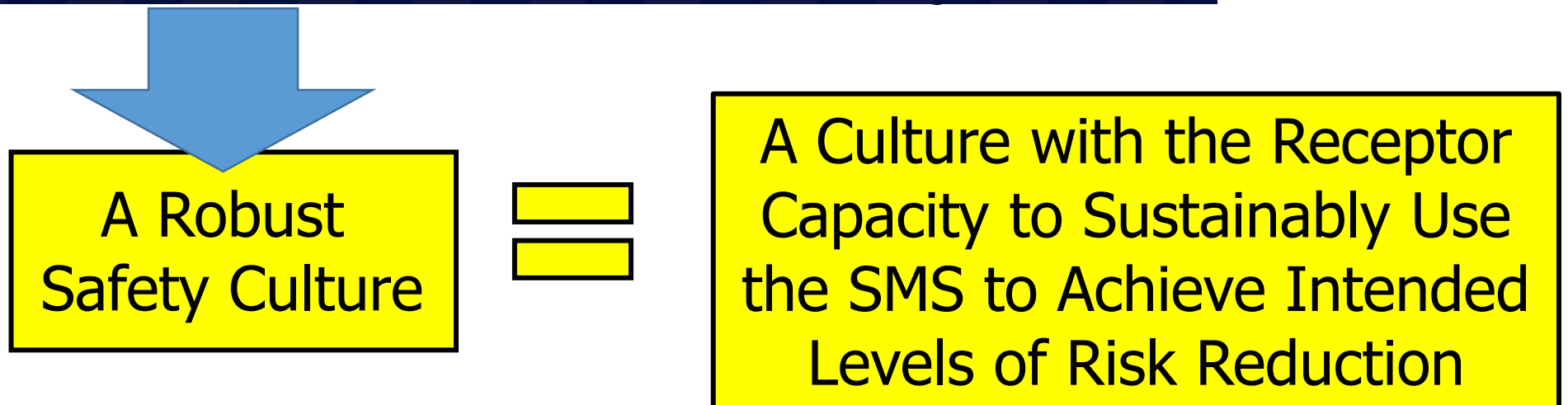
A Robust  
Safety Culture



A Culture with the Receptor  
Capacity to Sustainably Use  
the SMS to Achieve Intended  
Levels of Risk Reduction

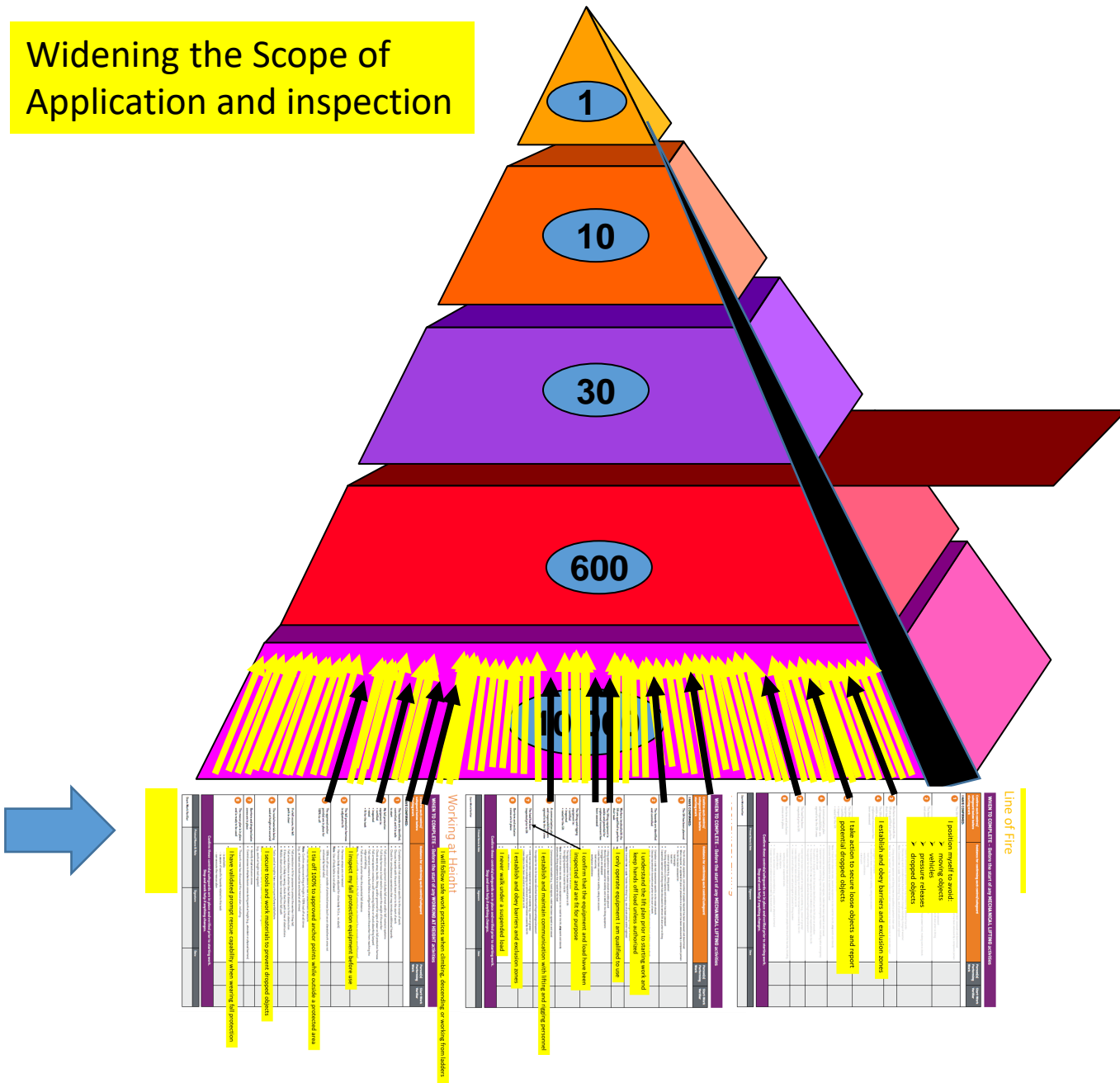
# The Design View

Environment, Health and Safety  
Management System (SMS)

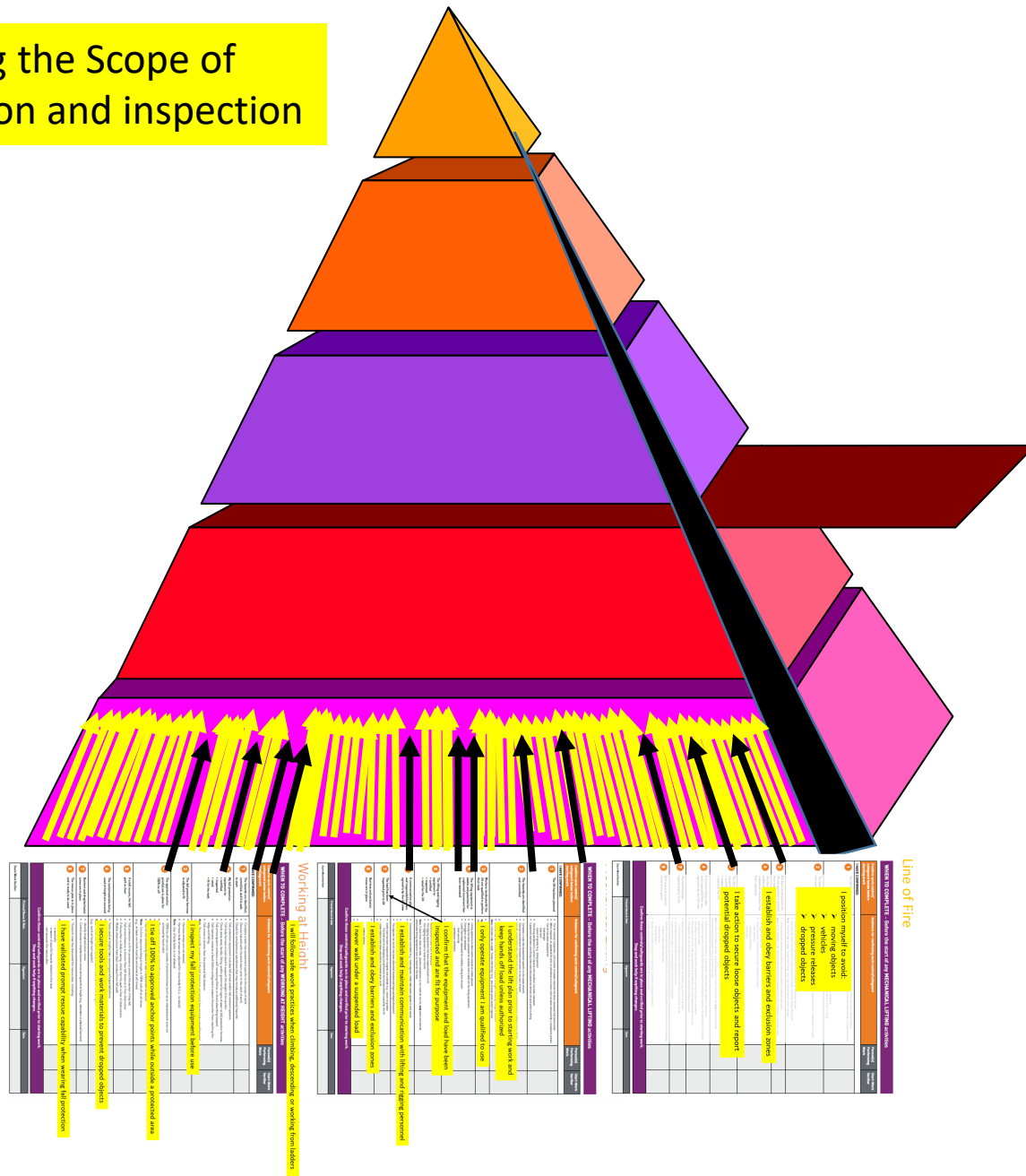




Widening the Scope of Application and inspection



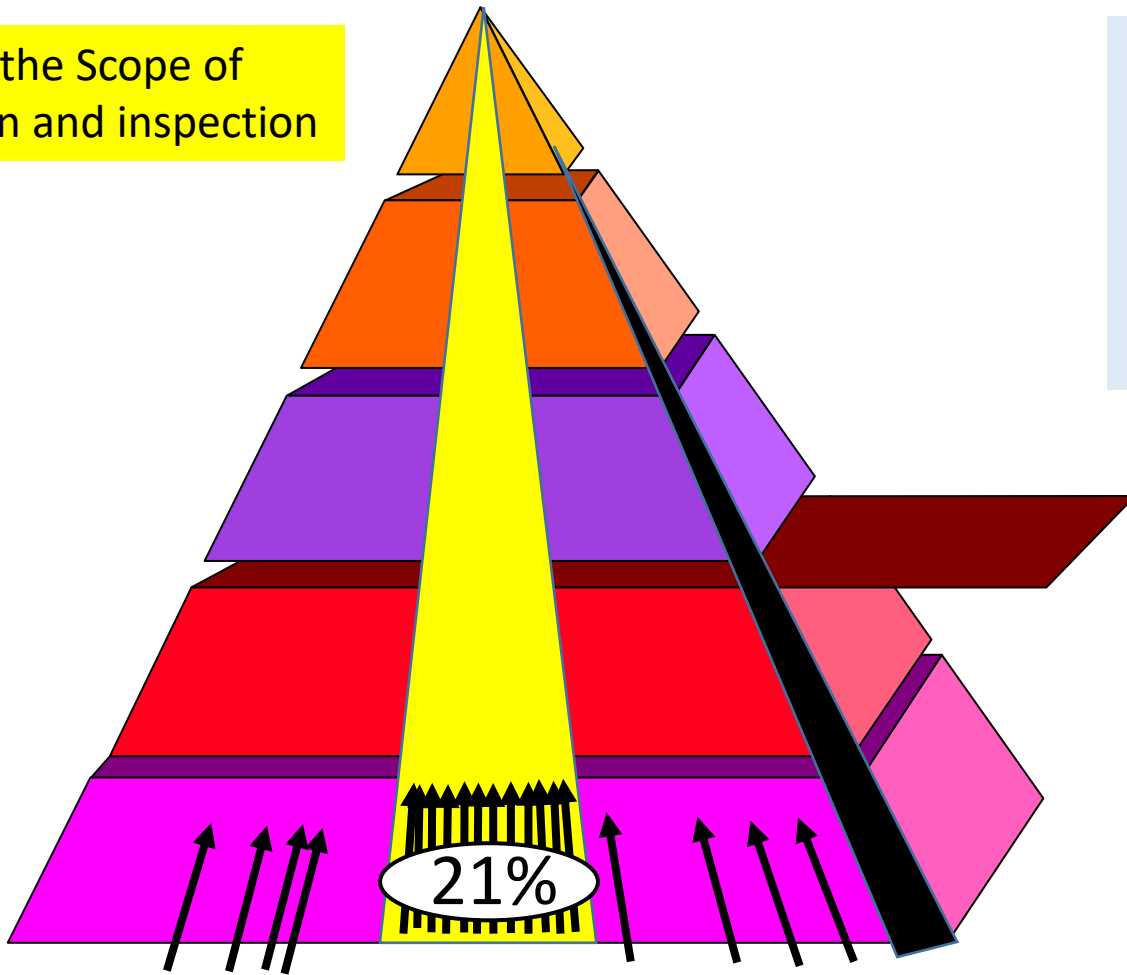
## Widening the Scope of Application and inspection



**CIM** Health & Safety  
**ICM** Society

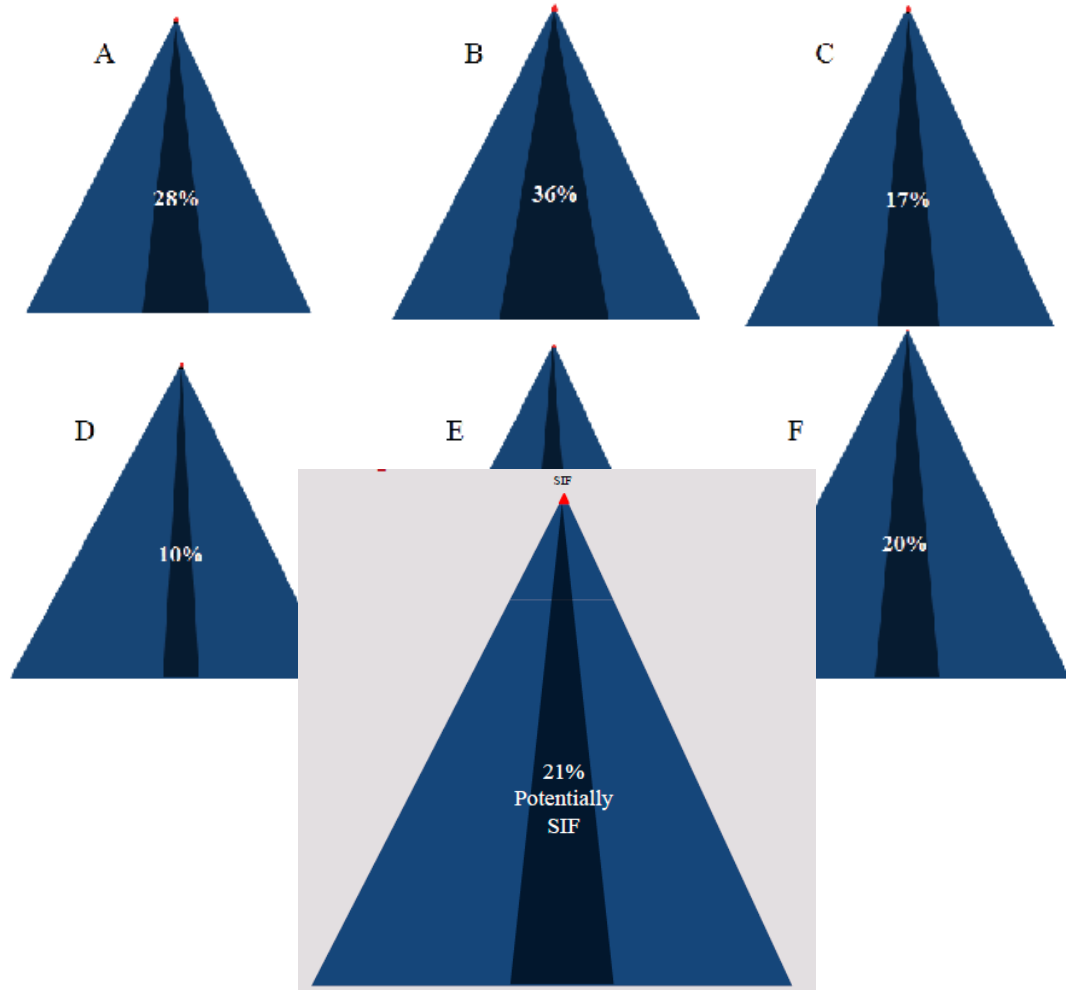


Widening the Scope of  
Application and inspection



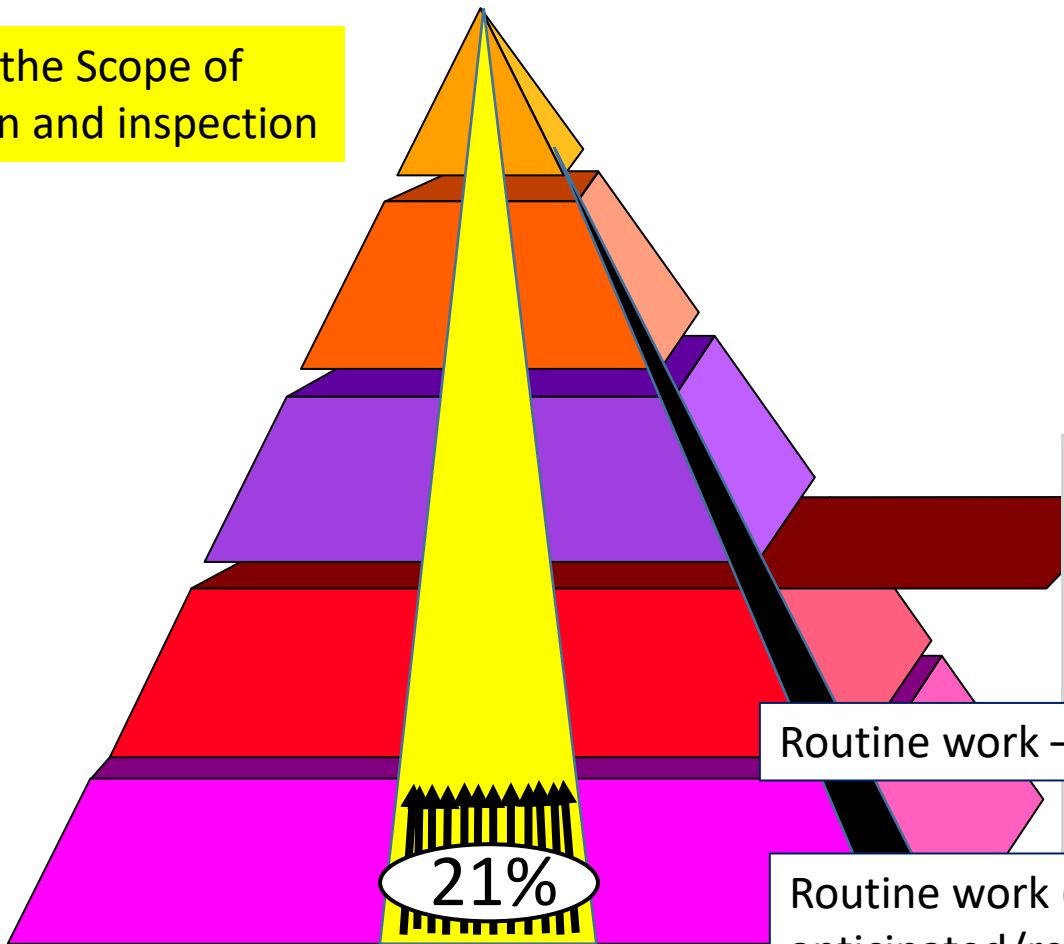
## Multinational Organization Study

- Ore Mining
- Crude Petroleum
- Natural Gas Extraction
- Industrial Gas Mfg.
- Organic Chemical Mfg.
- Marine Cargo Shipping
- Grain Farming





Widening the Scope of Application and inspection



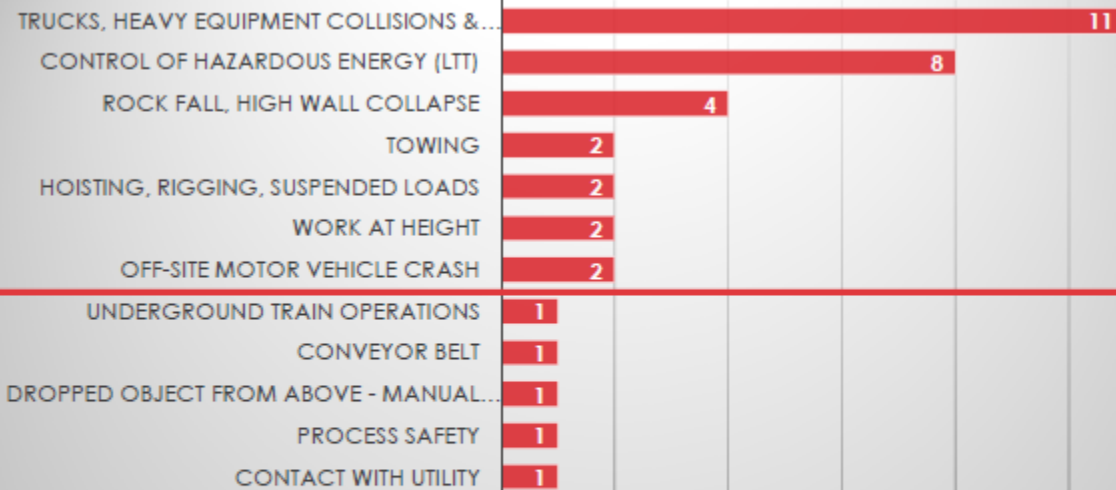
- ### Multinational Organization Study
- Ore Mining
  - Crude Petroleum
  - Natural Gas Extraction
  - Industrial Gas Mfg.
  - Organic Chemical Mfg.
  - Marine Cargo Shipping
  - Grain Farming

Injury Cause Themes		
Theme	SIF or SIF potential incident (n = 55)	Non-SIF potential incident (n = 35)
Performing a routine operation/production or a maintenance/repair task that is prevented by an effective pre-task risk assessment (PTRA) process	42%	0%
Performing a routine operation/production or a maintenance/repair task that is not prevented by an effective pre-task risk assessment (PTRA) process	29%	17%
Performing a routine operation/production or a maintenance/repair task that is not prevented by an effective pre-task risk assessment (PTRA) process	11%	74%

Routine work – breakdown in life saving choices program

Routine work (nonLSC) – change from normal not anticipated/recognized/controlled – PTRA likely prevent

Routine work (nonLSC & where PTRA not normally used) - other human factors



79%



## SIF Precursor Formula

**SIF Precursors are Discoverable by Analysis, Detectable in the Field**

**SIF Risk Situations**

### SIF Risk Profile

- Pareto Analysis
- 81% Routine Work



**SIF Critical Controls & Protection Systems**

### Breakdowns

- Non-conformance
- Ineffective Design
- Not in Place



**Persistence in the Work Environment**

### Culture & Leadership

- Don't See
- See but Don't Recognize
- Recognize but Don't Act
- Organizational Issues Beyond Control of On-The-Ground Persons

## Critical Controls Management Construct



### SIF Work Scenario Identified

Protection at 100% Level

- Behaviors/Practices
- Conditions/Set-Up

Identified Protection

- Safety Critical
- No Exceptions



### SIF Work Verifications

- Test for Implementation and Understanding
- Work Stopped Until Protection in Place

Report on Compliance and Effectiveness



### SIF Work Reviews

Senior Management and Executive

- Bias/Urgency for Action
- Otherwise We Choose to Operate with High Risks in Evidence





## Critical Risk: Entanglement and Crushing

## Critical Control Checklist (CCC)

Date:  /  /

Shift:  Day / Night

Duration:

Work Team:

Operation:

Task:

### Blocking for Maintenance Work

Yes No NA

How you followed the procedure on how to perform effective mechanical blocking?

☐ ☐ ☐

Are the mechanical blocks certified and safe for use?

☐ ☐ ☐

Have you checked that the number and type of mechanical blocks to be installed match the requirements of the procedure?

☐ ☐ ☐

### Equipment Isolation and Lockout

Yes No NA

Has an approved Isolation Matrix/Procedure been executed?

☐ ☐ ☐

Have all energy sources associated with the Equipment been isolated, de-energized and locked/tagged out as required by the Isolation Matrix/Procedure?

☐ ☐ ☐

Has the 'Try Step' for isolation of process flows been conducted as required by the Isolation Matrix/Procedure?

☐ ☐ ☐

Do the number of locks described in the plan match the locks used in the field isolation process?

☐ ☐ ☐

Has the isolation been field verified by doing a 'walk down' of involved personnel?

☐ ☐ ☐

### Guards, Barriers and Barricades

Yes No NA

Are guards, barriers and/or barricades installed on the moving parts of fixed equipment?

☐ ☐ ☐

Are guards, barriers and/or barricades secure and robust enough to provide adequate protection in the event of an incident?

☐ ☐ ☐

Have you tested all deadman switches, emergency stops and pull cords to ensure they are functional prior to work commencing?

☐ ☐ ☐

### Verification of Zero Energy

Yes No NA

Have you checked the matrix to ensure that a zero energy verification been done for all types of energy identified in the risk assessment including bleeder valves, drain points, vent ports, pushbutton starters and ignition key slots?

☐ ☐ ☐



## Critical Risk: Entanglement and Crushing

**Cementation**  
WE BUILD MINES. SAFELY.

**CRITICAL RISK MANAGEMENT ~ SHIFT PLANNING**

Date: Aug 4 / 21 Shift: D/S

Review of Previous Shift	Heading	Task	Crew	Critical Risks	Critical Controls	Comments
What went well? Breakthrough hole accurate Communication at Raise Successful engine pull	100 Level	Rehab	D/S	Falls of Ground Working @ Heights Release of Energy	Sealing Awareness to LAF Railings Guards in Place Barricades Sealing Inspections	Whip Checks on Hoses
What did not go well? Lacking reamer bits Lagging through quickly	100- Sump	Long Hole	D/S	Entanglement Fall of Ground	Guards in Place Barricades Housekeeping Fall Protection	
What can be improved? Central Communication	Raise	Inject	D/S	Working at Heights Falling Objects	Barricades Housekeeping Fall Protection	
	Shop	Misc.	D/S	Fire	Maintenance Pre-ops Extinguishers	
	Site Wide		D/S	Thermal → Heat	Hydrated Ventilation Breaks Air Cond.	Nursing Station
	Raise/Surface		D/S	Wildlife	Air Hoses Housekeeping	Reporting Site Wide
	Raise	Running cable	D/S	Vehicle Impact	High Vis Comms Traffic Management	

Do the number of locks described in the plan match the locks used in the field isolation process? ☐ ☐ ☐

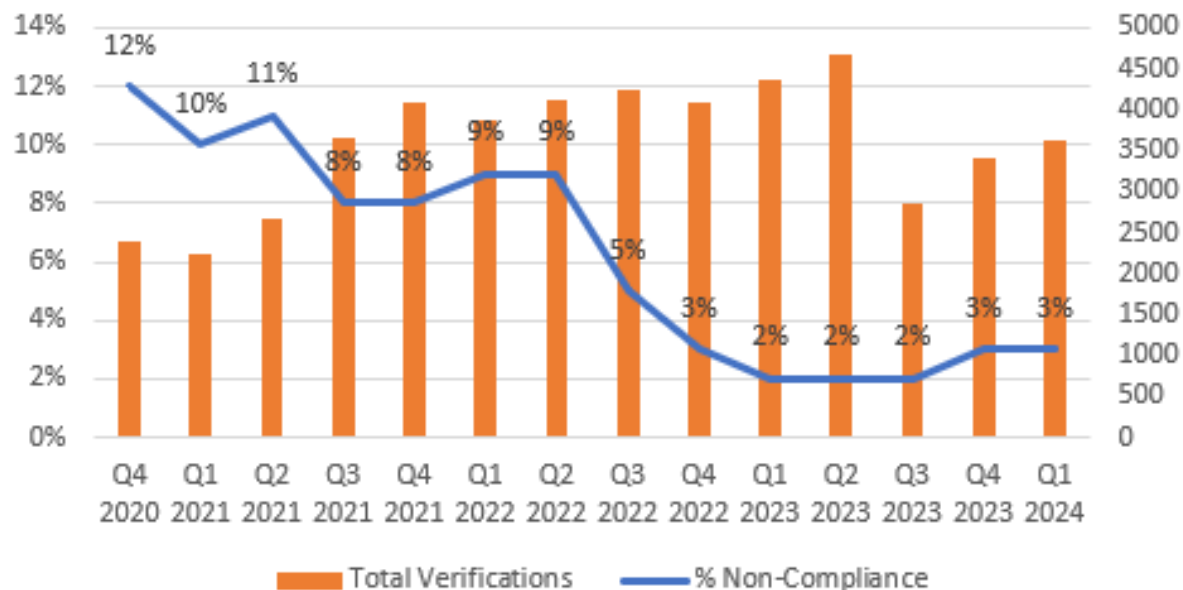
## Critical Control Checklist (CCC)

TASK	LOCATION	EMERGENCY NUMBER
Headframe mode	S.S. head frame	1-306-364-7001
Rescue plan for area and scope reviewed and understood: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A		MUSTER POINT 3
Fall protection plan completed, reviewed and understood: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A		EMERGENCY MEETING POINT (EMPL LOCATION) 3
<b>CRITICAL RISK MANAGEMENT (CRIM) ICONS</b> 	<b>CRITICAL RISK</b> <ul style="list-style-type: none"> <li>- falling objects</li> <li>- lifting operations</li> <li>- trigger</li> <li>- falls from heights</li> <li>- impact of persons</li> <li>- miss communication</li> <li>- size / hot work</li> </ul>	<b>CRITICAL CONTROLS</b> <ul style="list-style-type: none"> <li>- Exclusion and drop zones</li> <li>- tool hangers</li> <li>- tool / material storage at heights</li> <li>- 2 means of communication</li> <li>- 100% tie off / inspect fall pro!</li> <li>- use spotters / signal man for equip. operators</li> <li>- Hot work permit / fire watch</li> <li>- Remove combustibles / fire blanket</li> </ul>
<b>TASK STEPS</b> <ul style="list-style-type: none"> <li>- Raise galloway</li> <li>- Rig steel beam</li> <li>- cut steel beam</li> <li>- transfer beam to trigger</li> <li>- slow down bucket well to ground crew</li> </ul>	<b>HAZARDS</b> <ul style="list-style-type: none"> <li>- miss communication</li> <li>- ensure proper belt / tool / comms</li> <li>- rigging structure</li> <li>- steel getting hung up on structure</li> <li>- miss communication</li> <li>- dropped objects</li> <li>- falls from heights</li> <li>- Hot work</li> </ul>	<b>CONTROLS</b> <ul style="list-style-type: none"> <li>- ensure proper belts / radio comms are used</li> <li>- inspect all rigging / destroy damaged rigging</li> <li>- spotters on steel w/ nopt revealing through bucket well / constant communication when in motion</li> <li>- tool / material storage</li> <li>- 100% tie off / inspect fall pro!</li> <li>- Hot work permit / fire blanket / fire watch</li> </ul>
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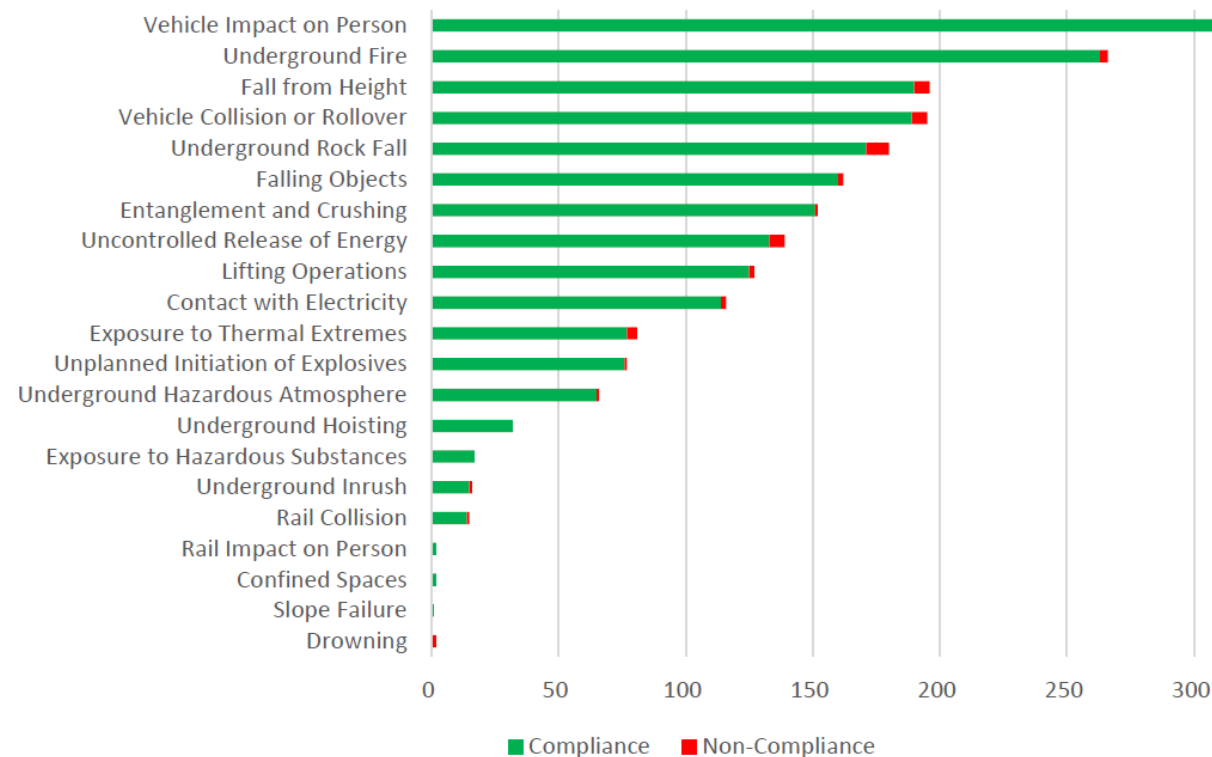




### % Non-Compliance Over Time

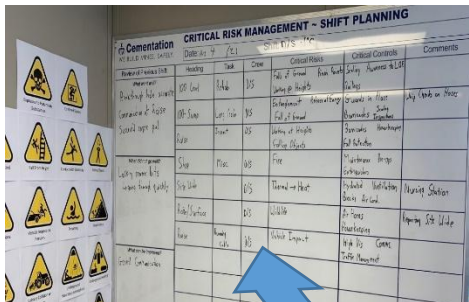
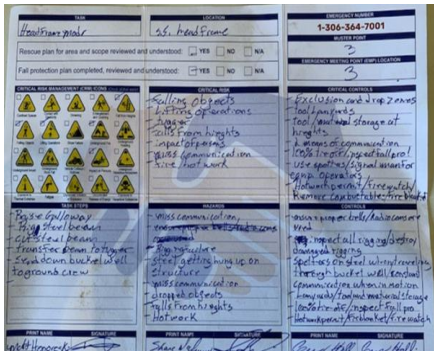
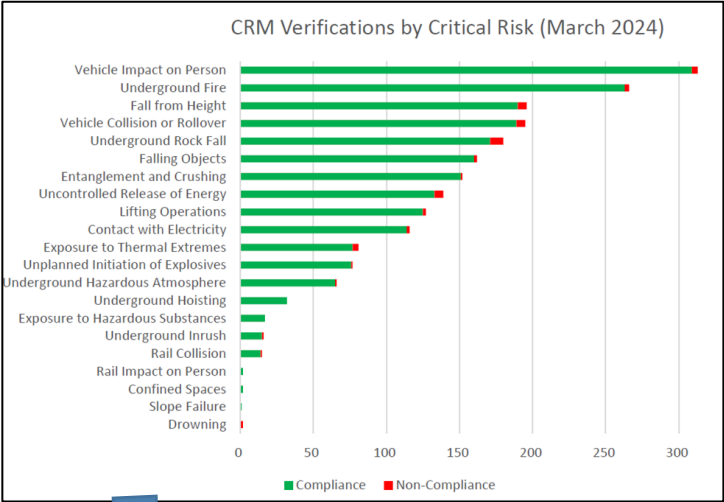
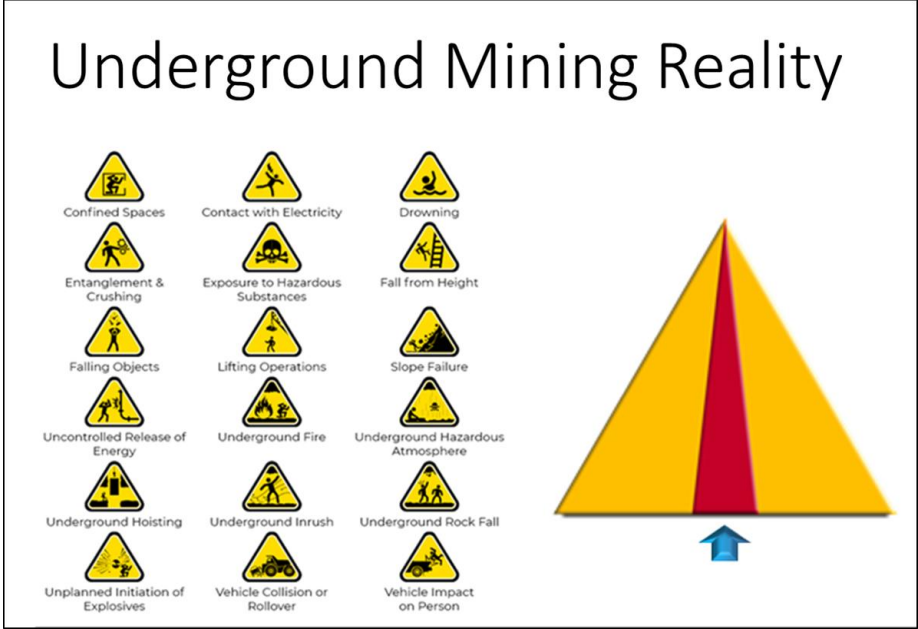
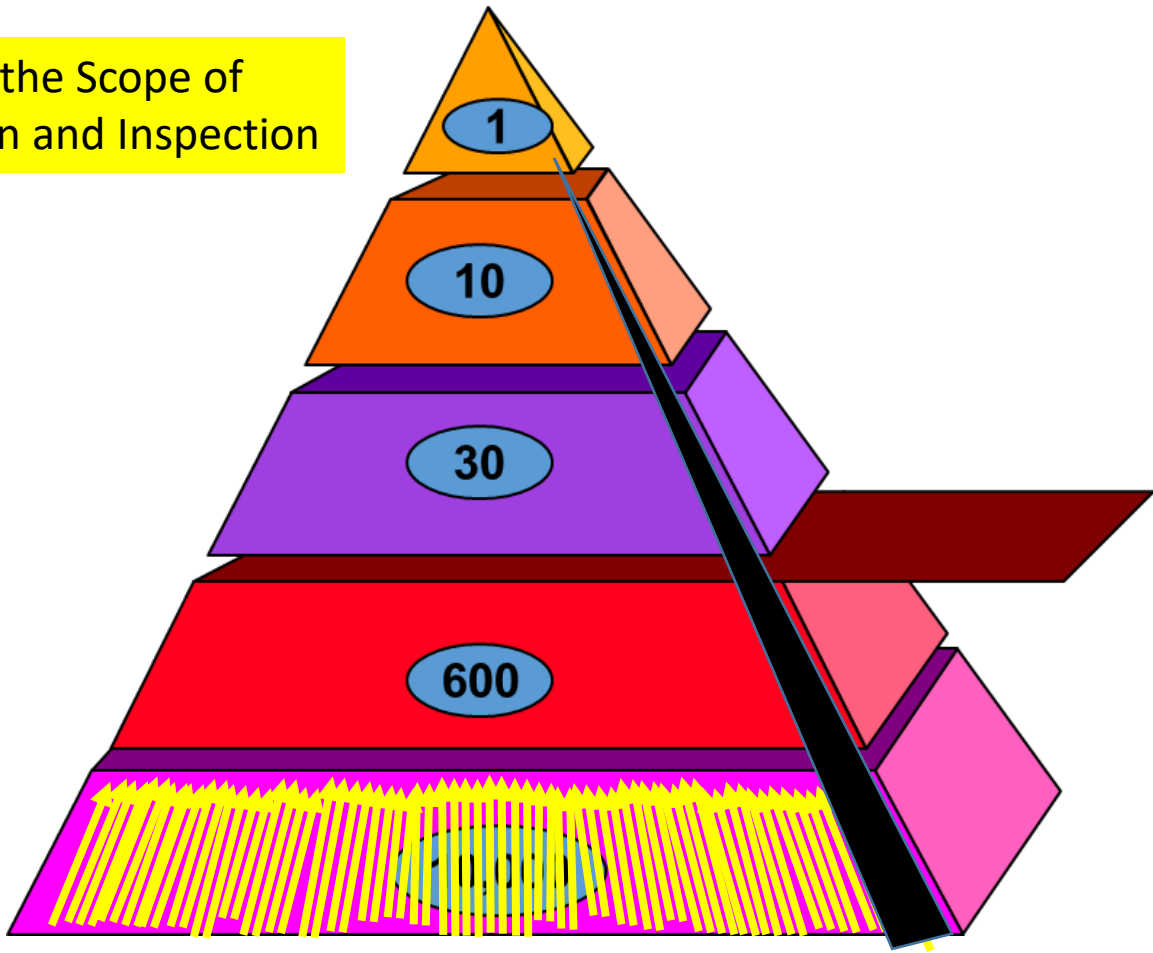


### CRM Verifications by Critical Risk (March 2024)





# Widening the Scope of Application and Inspection



## From Field to Board Room



## Critical Controls Framework for Management

Policy

Standards

Controls Management

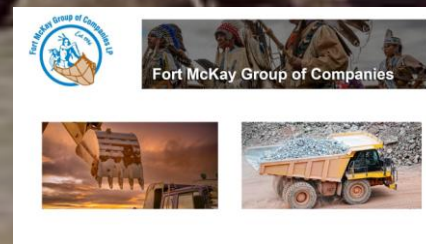
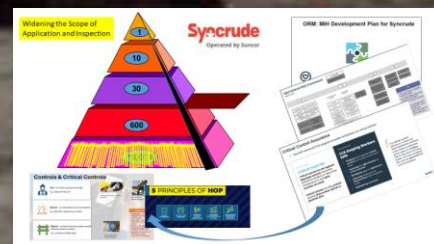
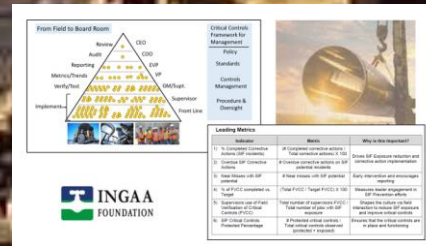
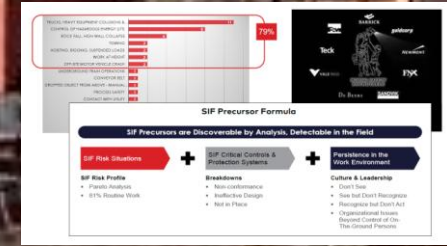
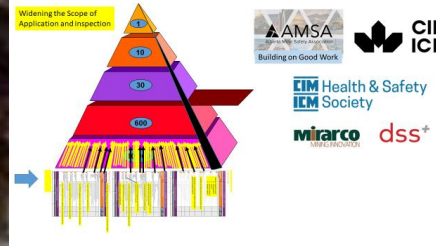
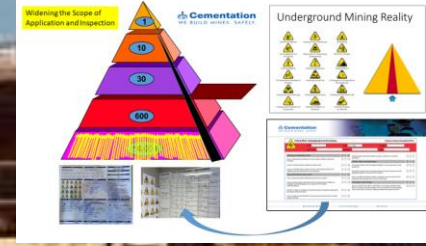
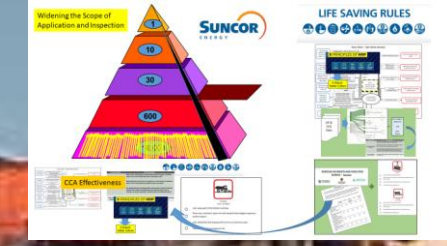
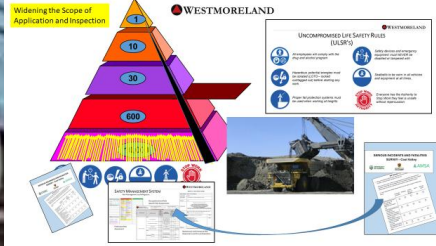
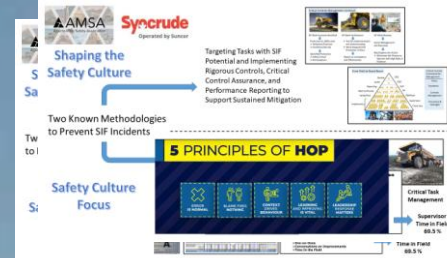
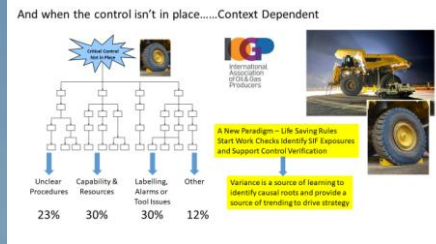
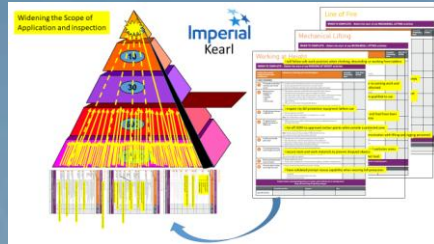
Procedure & Oversight



## Leading Metrics

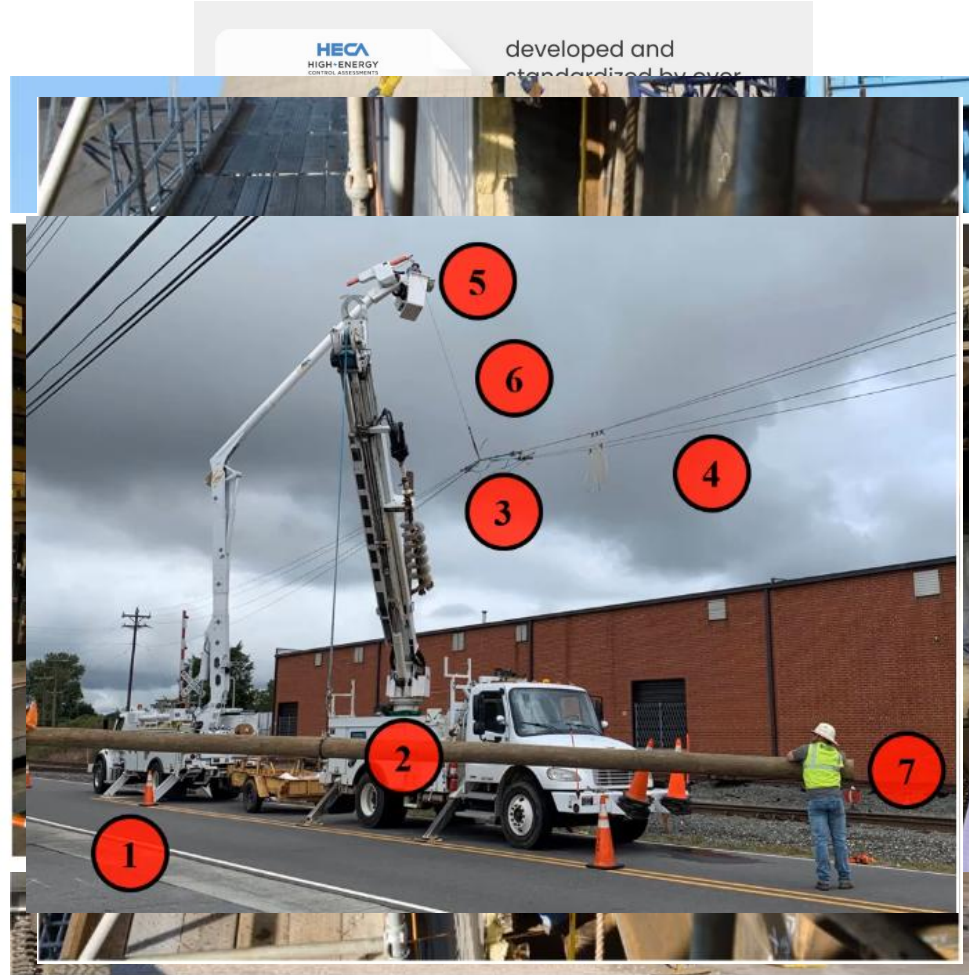
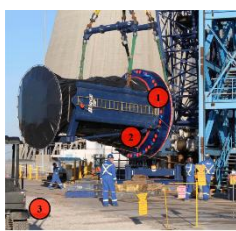
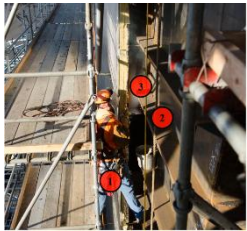
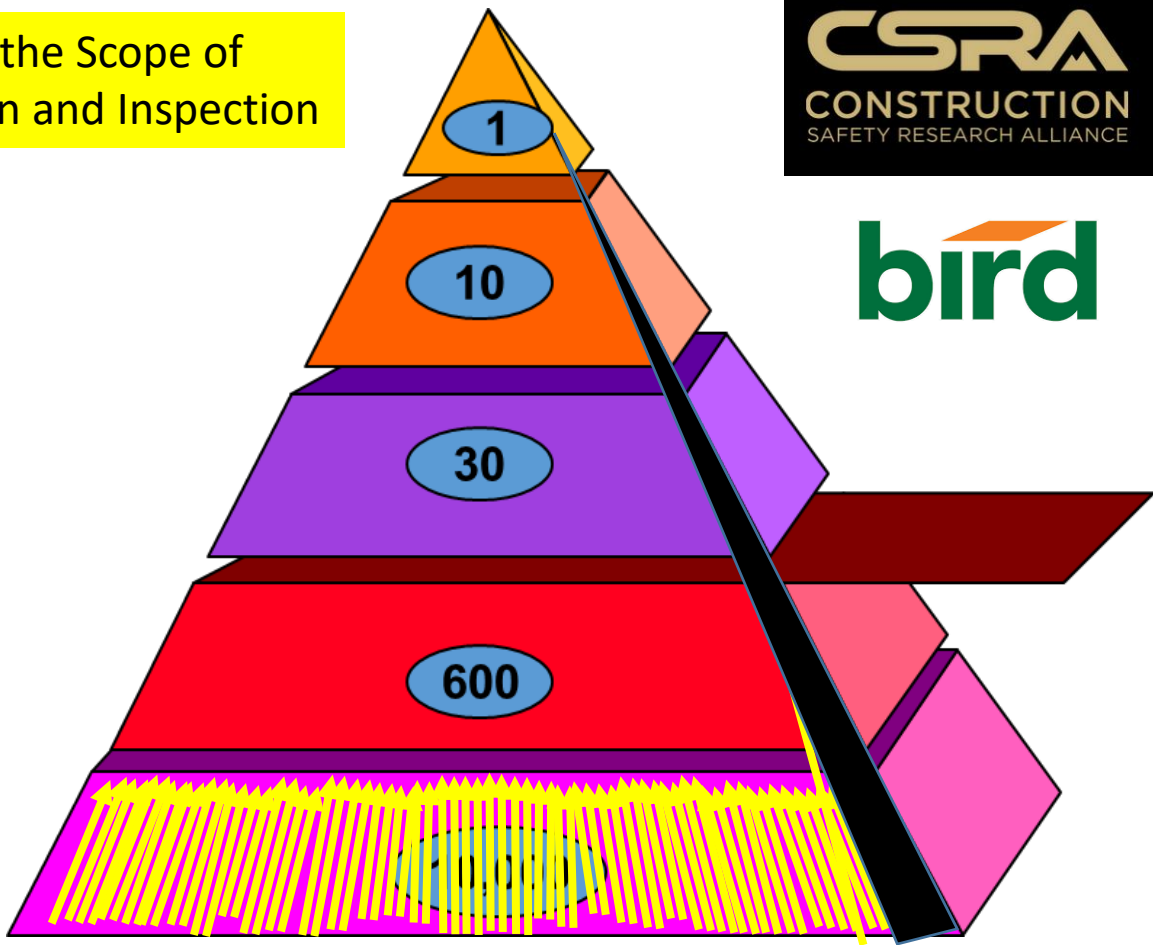
Indicator	Metric	Why is this Important?
1) % Completed Corrective Actions (SIF incidents)	$(\# \text{ Completed corrective actions} / \text{Total corrective actions}) \times 100$	Drives SIF Exposure reduction and corrective action implementation
2) Overdue SIF Corrective Actions	# Overdue corrective actions on SIF potential incidents	
3) Near Misses with SIF potential	# Near misses with SIF potential	Early intervention and encourages reporting
4) % of FVCC completed vs. Target	$(\text{Total FVCC} / \text{Target FVCC}) \times 100$	Measures leader engagement in SIF Prevention efforts
5) Supervisors use of Field Verification of Critical Controls (FVCC)	Total number of supervisors FVCC / Total number of jobs with SIF exposure	Shapes the culture via field interaction to reduce SIF exposure and improve critical controls
6) SIF Critical Controls Protected Percentage	$\# \text{ Protected critical controls} / \text{Total critical controls observed (protected + exposed)}$	Ensures that the critical controls are in place and functioning



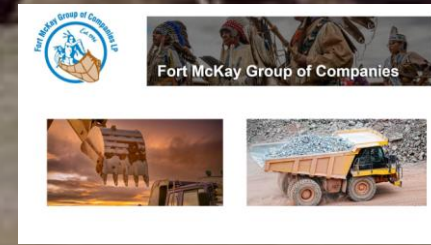
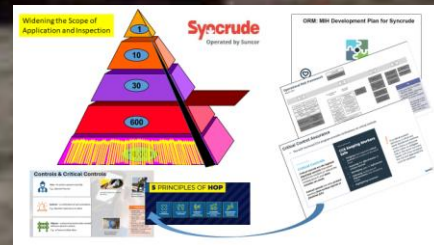
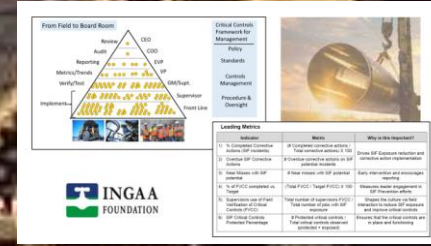
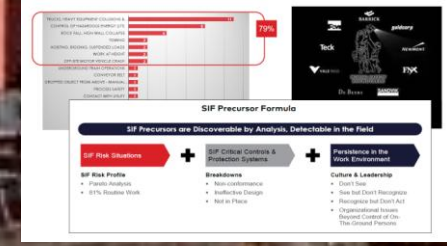
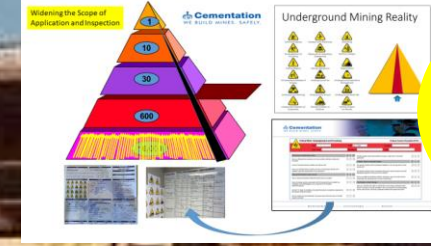
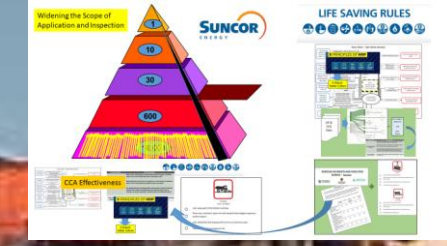
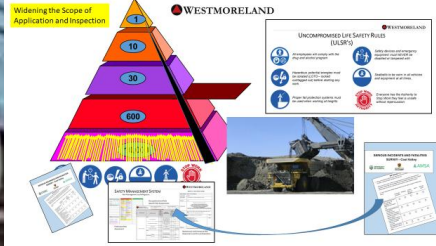
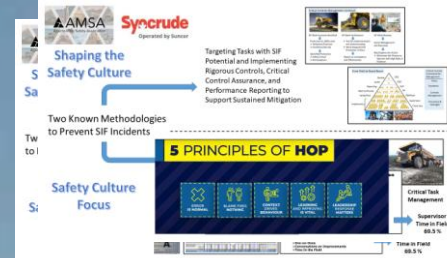
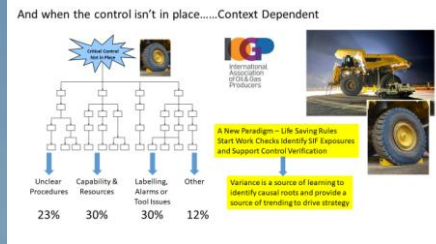
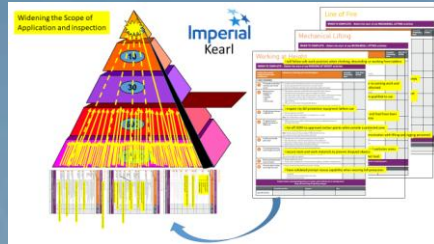




Widening the Scope of Application and Inspection

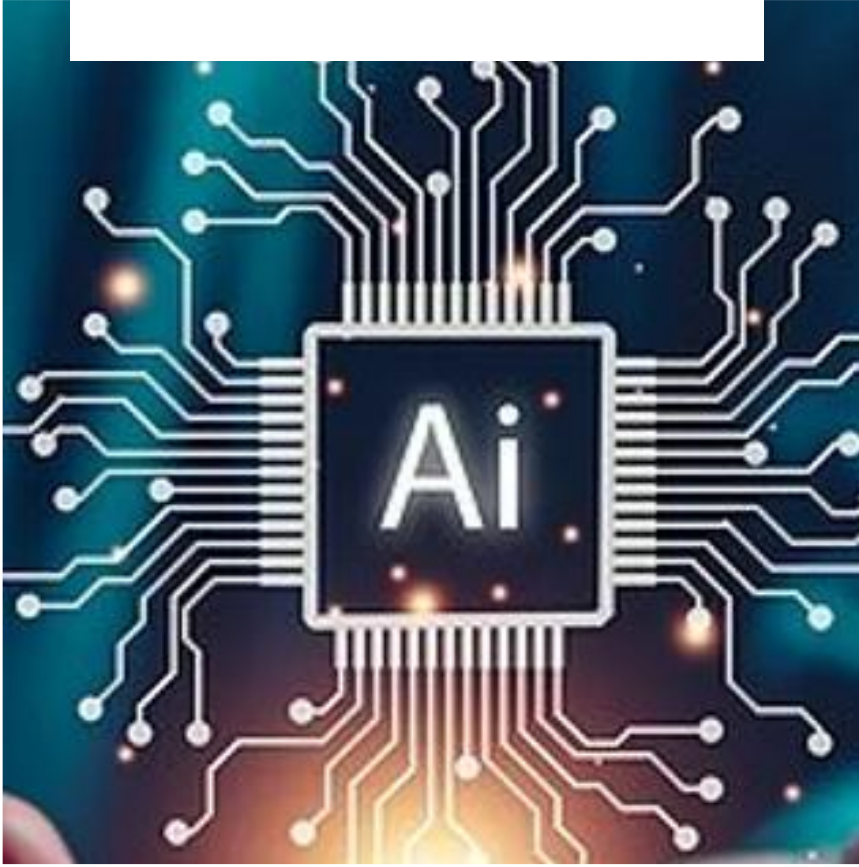
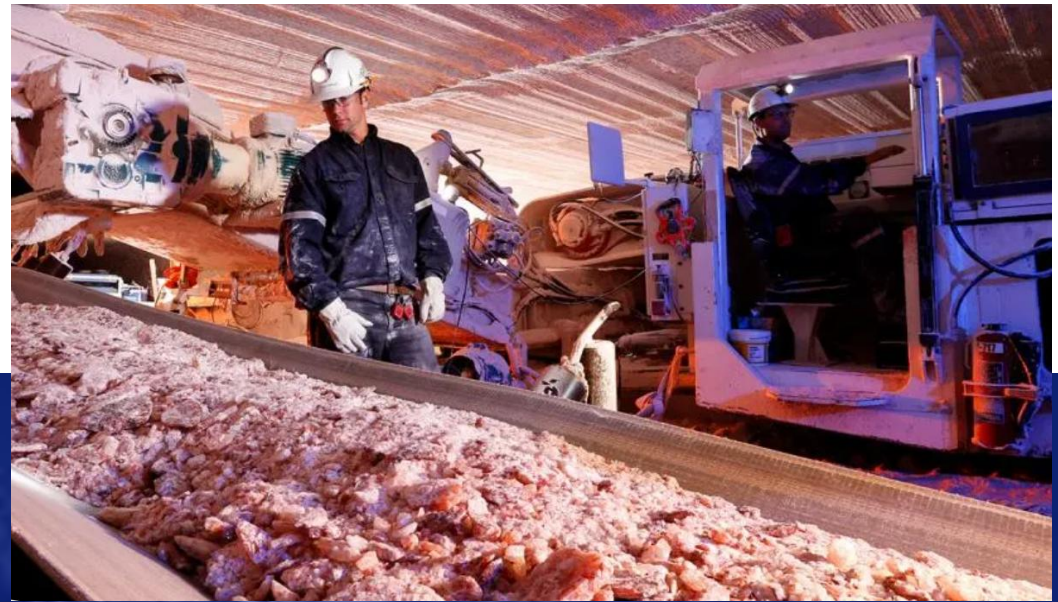








**Nutrien**<sup>TM</sup>







NAME: ELEKTRICIAN  
DATE: SEPTEMBER 9th 2024  
TIME: 2:45 AM.

WHAT HAPPENED? I WAS TROUBLESHOOTING THE BORER. THEY CALLED ME AND SAID THEY WERE CUTTING AT BORER #15 AND LOST POWER. WHEN I ARRIVED I INSPECTED THE CABLES AND NOTICED THE 4160 V PLUG WAS DAMAGED AND FLASHED OVER. I REPAIRED THE PLUG AND TESTED GOOD TO GO. SOMEONE SAW THE FLASH AND HAD THEIR EYES GOT CHECKED AND HAD TO GET EYES LOOK AT A DOCTOR



Legend: User Selected AI Suggestion

AI Enabled	Non-AI ETQ Workflow
<input type="checkbox"/> Injury/Illness	<input type="checkbox"/> Crop Claim or Customer Complaint
<input type="checkbox"/> Substance Release/Spill	<input type="checkbox"/> Operational Incident
<input type="checkbox"/> Animal Welfare Incident	<input type="checkbox"/> Product Stewardship
<input type="checkbox"/> Security Related	<input type="checkbox"/> Report Only
<input type="checkbox"/> Vehicle Involved	<input type="checkbox"/> Regulatory Action, Third Party Inquiry, or Environmental Event (Leak, Release/Spill)
<input checked="" type="checkbox"/> PSM	<input type="checkbox"/> Regulatory Activity (Visit, Investigation, etc.)
<input type="checkbox"/> Property Damage (excluding registered vehicles)	<input type="checkbox"/> Process Safety Event (PSE)

Flags

PSIF ☒ Details Mobile Equipment ☒ Details

value: True(original: Yes)  
Details: Arc flash occurred with voltage greater than 30VAC, and a worker was injured (eye injury) as a result of the flash



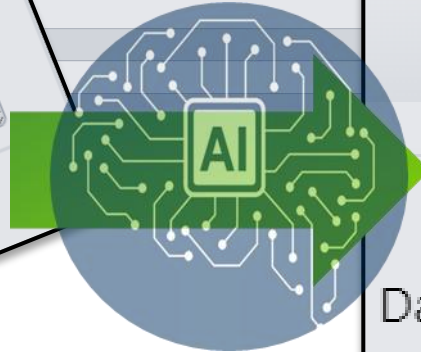
Flash Report Description

ai suggestion  
An electrician responded to a power loss at Borer #15, found and repaired a damaged 480V plug. A bystander experienced eye discomfort after witnessing the electrical flash and was advised to consult a doctor.

Incident Summary

ai suggestion  
An electrician was called to troubleshoot power loss at Borer #15. They inspected the cables and found a damaged 480V plug that had flashed over. The plug was repaired and tested. A bystander who witnessed the flash reported eye discomfort and was advised to seek medical attention.

back send to etq



Flags

PSIF ☒ Details

value: True(original: Yes)  
Damaged 13.8kV cable, which is greater than 13.8kV, potentially exposing workers to a higher voltage than the cable is rated for.

Photos taken on a SIF in a Routine tour

## AI Identified Hazards

1. Asbestos Warning:

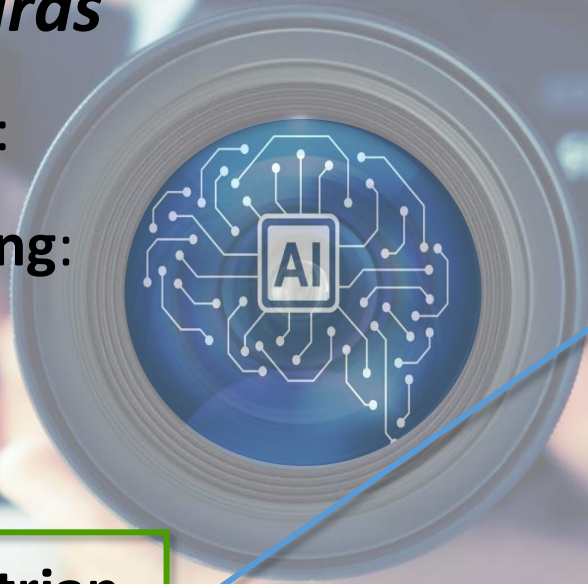
2. Noise Level Warning:

3. Trip Hazard:

4. Restricted Access:

5. Vehicle and Pedestrian Interaction:

6. Signage Visibility:



### 1. Vehicle and Pedestrian Interaction:

1. **Hazard:** The proximity of the door to the roadway where vehicles are present can lead to potential accidents.
2. **Mitigation:** Install barriers or guardrails to separate pedestrian walkways from vehicle paths. Implement clear signage to alert drivers of pedestrian areas and vice versa. Consider adding speed bumps or other traffic calming measures to reduce vehicle speed in the area.

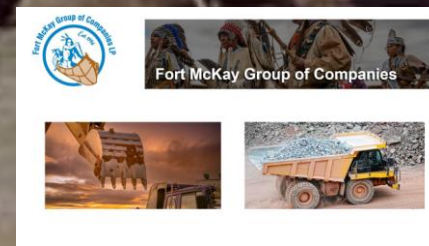
*AI Identified Hazards and mitigations*



*Door and Roadway Hazard*











## **SIF Prevention and Critical Controls Management**



# Systemic Comprehensive Management System

## Environment, Health and Safety Management System (SMS)

- Program Management and Leadership;
- Hazard Management;
- Training and Competency;
- Inspections and Maintenance;
- Incident Management;
- Emergency Preparedness;
- Contractor Management;
- Environmental Management;
- Program Evaluation
- Program Promotion

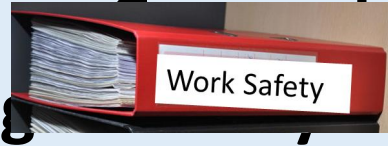


Work Safety





# Systemic Comprehensive Management System Management System



# Management System



## Environment, Health and Safety Management System (SMS)

- Program Management and Leadership;
- Hazard Management;
- Training and Competency;
- Inspections and Maintenance;
- Incident Management;
- Emergency Preparedness;
- Contractor Management;
- Environmental Management;
- Program Evaluation
- Program Promotion





## Systemic Comprehensive Management System



Robust Safety Culture



Safety is a Value (DNA)



Safety – from Words to Action  
– Making Safety Real



Safety is an Imperative



Courage to Care

Courage to Confront

Courage to Change



# Systemic Comprehensive Management System



# Robust Safety Culture

## Critical Controls Management Construct



### SIF Work Scenario Identified

Protection at 100% Level

- Behaviors/Practices
- Conditions/Set-Up

Identified Protection

- Safety Critical
- No Exceptions



### SIF Work Verifications

- Test for Implementation and Understanding
- Work Stopped Until Protection in Place

Report on Compliance and Effectiveness



### SIF Work Reviews

Senior Management and Executive

- Bias/Urgency for Action
- Otherwise We Choose to Operate with High Risks in Evidence

...e (DNA)

...rds to Action  
...afety Real

...operative

...re  
...Confront  
...to Change





# Systemic Comprehensive Management System



# Robust Safety Culture



## Critical Controls Management Construct



### SIF Work Scenario Identified

Protection at 100% Level

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- Otherwise We Choose to Operate with High Risks in Evidence





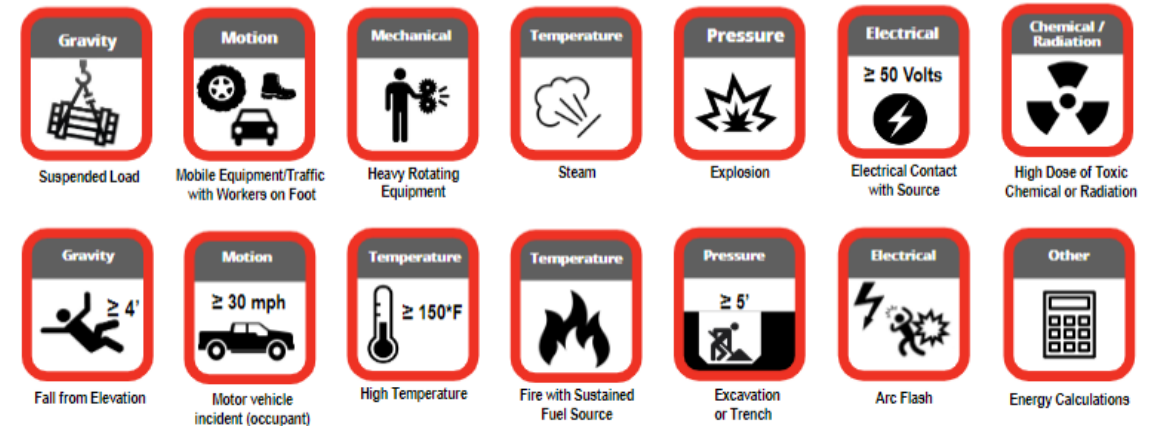
# Systemic Comprehensive Management System



# Robust Safety Culture



## Common High Energy Hazards



## 16 Global Fatality Risks in Mining

- Event in a confined space
- Contact with electricity
- Fall from height
- Uncontrolled release of energy
- Fall of ground – surface
- Fall of ground – underground

- Vehicle/pedestrian interaction – underground
- Vehicle/pedestrian interaction – surface
- Vehicle interaction – offsite
- Vehicle collision (heavy and light) – surface
- Heavy Vehicle event – rollover, over edge

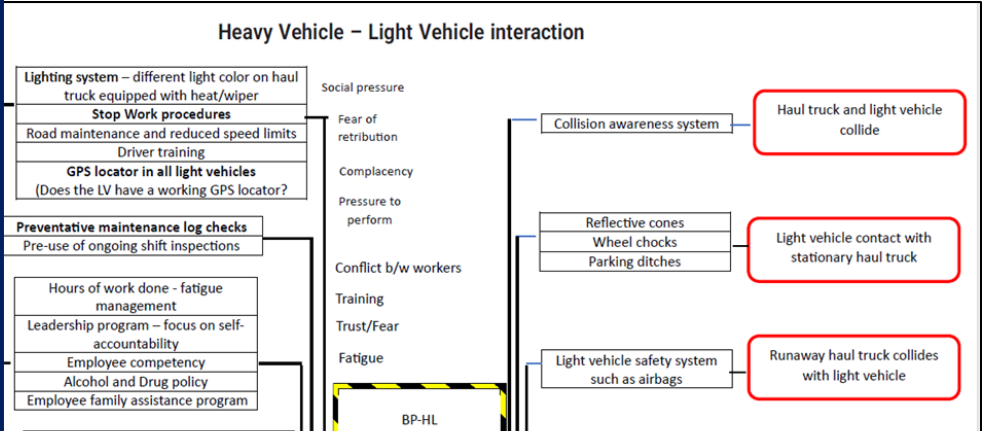
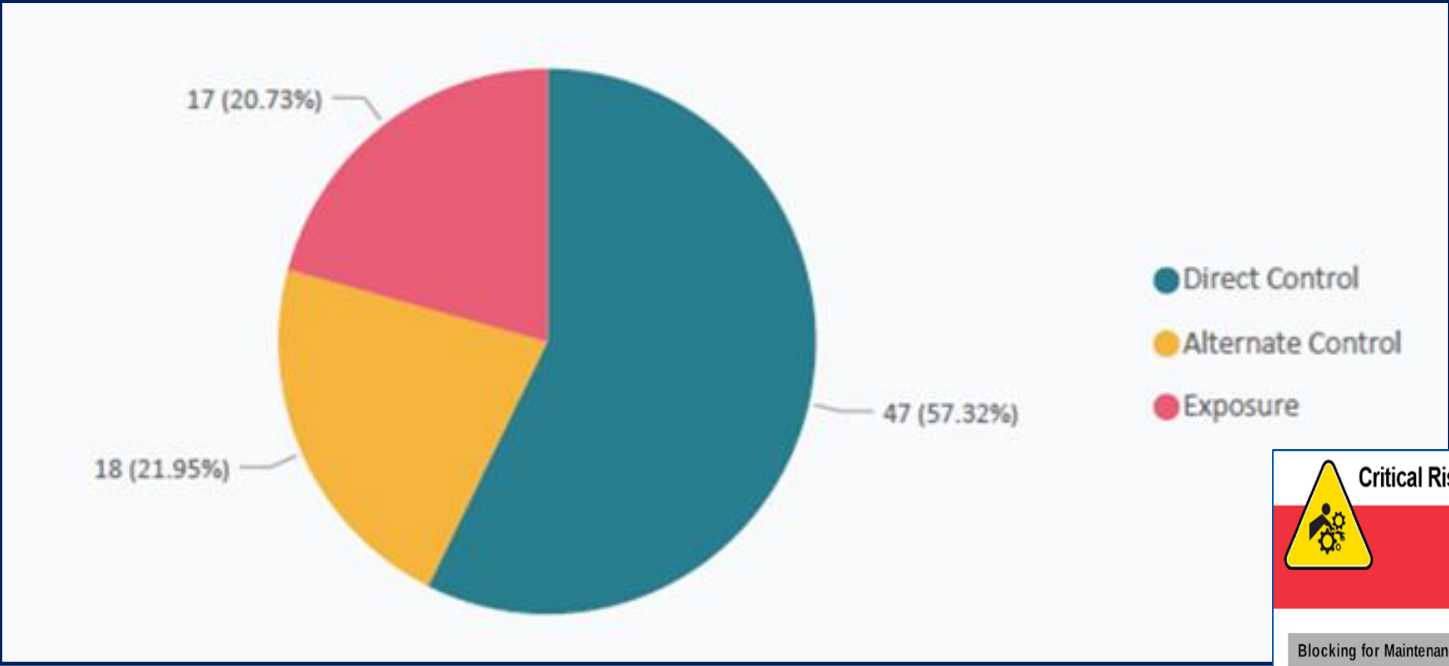
- Uncontrolled load during lifting
- Entanglement in rotating equipment
- Underground fire and explosion
- Incident during tire handling
- Struck by falling object



# Systemic Comprehensive Management System



# Robust Safety Culture



# Identification

**Cementation**  
WE BUILD MINES. SAFELY.

**Underground Mining Reality**

RESPONSIBLE ACCOUNTABLE RESULTS

**Critical Risk: Entanglement and Crushing**

**Critical Control Checklist (CCC)**

Date:

Shift:

Duration:

Work Team:

Operation:

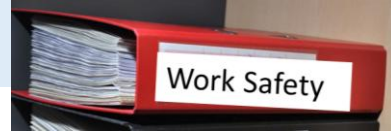
Task:

<b>Blocking for Maintenance Work</b>	Yes	No	NA	Has the isolation been field verified by doing a 'walk down' of involved personnel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How you followed the procedure on how to perform effective mechanical blocking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Guards, Barriers and Barricades</b>	Yes	No	NA
Are the mechanical blocks certified and safe for use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are guards, barriers and/or barricades installed on the moving parts of fixed equipment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you checked that the number and type of mechanical blocks to be installed match the requirements of the procedure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are guards, barriers and/or barricades secure and robust enough to provide adequate protection in the event of an incident?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Equipment Isolation and Lockout</b>	Yes	No	NA	Have you tested all deadman switches, emergency stops and pull cords to ensure they are functional prior to work commencing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has an approved Isolation Matrix/Procedure been executed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Verification of Zero Energy</b>	Yes	No	NA
Have all energy sources associated with the Equipment been isolated, de-energized and locked/tagged out as required by the Isolation Matrix/Procedure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you checked the matrix to ensure that a zero energy verification been done for all types of energy identified in the risk assessment including bleeder valves, drain points, vent ports, pushbutton starters and ignition key slots?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has the 'Try Step' for isolation of process flows been conducted as required by the Isolation Matrix/Procedure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Do the number of locks described in the plan match the locks used in the field isolation process?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				





# Systemic Comprehensive Management System



# Robust Safety Culture



Widening the Scope of Application and Inspection



## Identification Critical Controls







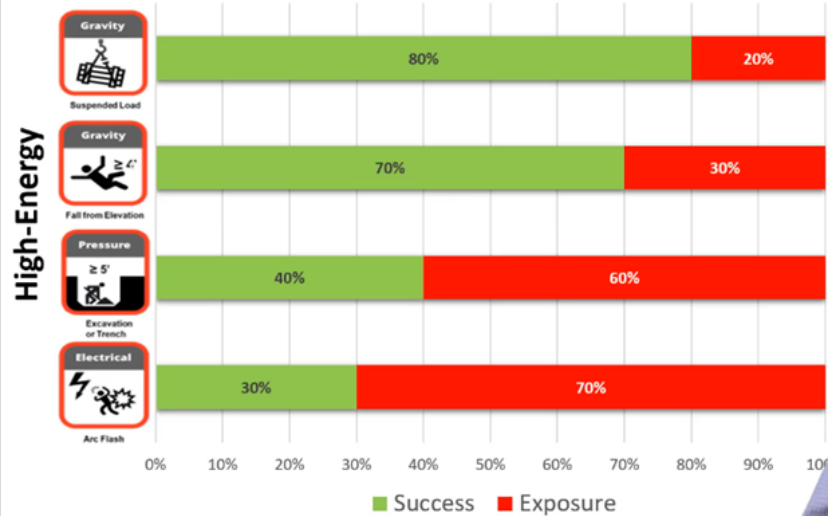
# Systemic Comprehensive Management System



# Robust Safety Culture



## Learning to prevent SIF together



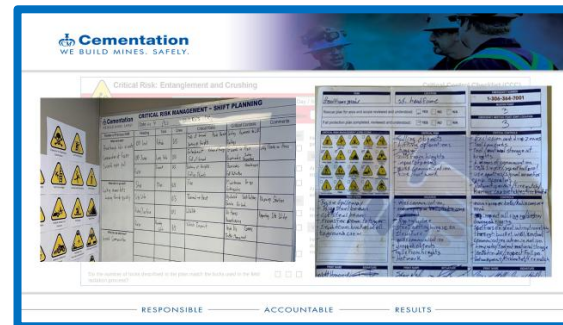
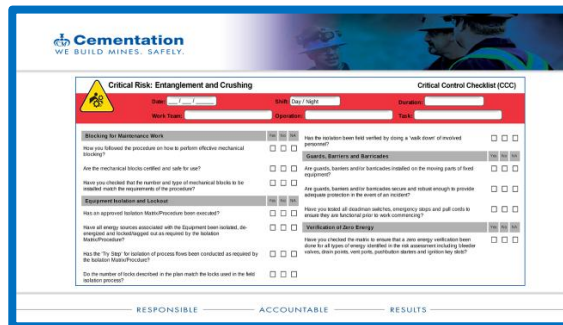
## Leading Metrics

Indicator	Metric	Why is this Important?
1) % Completed Corrective Actions (SIF incidents)	(# Completed corrective actions / Total corrective actions) X 100	Drives SIF Exposure reduction and corrective action implementation
2) Overdue SIF Corrective Actions	# Overdue corrective actions on SIF potential incidents	
3) Near Misses with SIF potential	# Near misses with SIF potential	Early intervention and encourages reporting
4) % of FVCC completed vs. Target	(Total FVCC / Target FVCC) X 100	Measures leader engagement in SIF Prevention efforts
5) Supervisors use of Field Verification of Critical Controls (FVCC)	Total number of supervisors FVCC / Total number of jobs with SIF exposure	Shapes the culture via field interaction to reduce SIF exposure and improve critical controls
6) SIF Critical Controls Protected Percentage	# Protected critical controls / Total critical controls observed (protected + exposed)	Ensures that the critical controls are in place and functioning

## Identification

## Critical Controls

## Integration

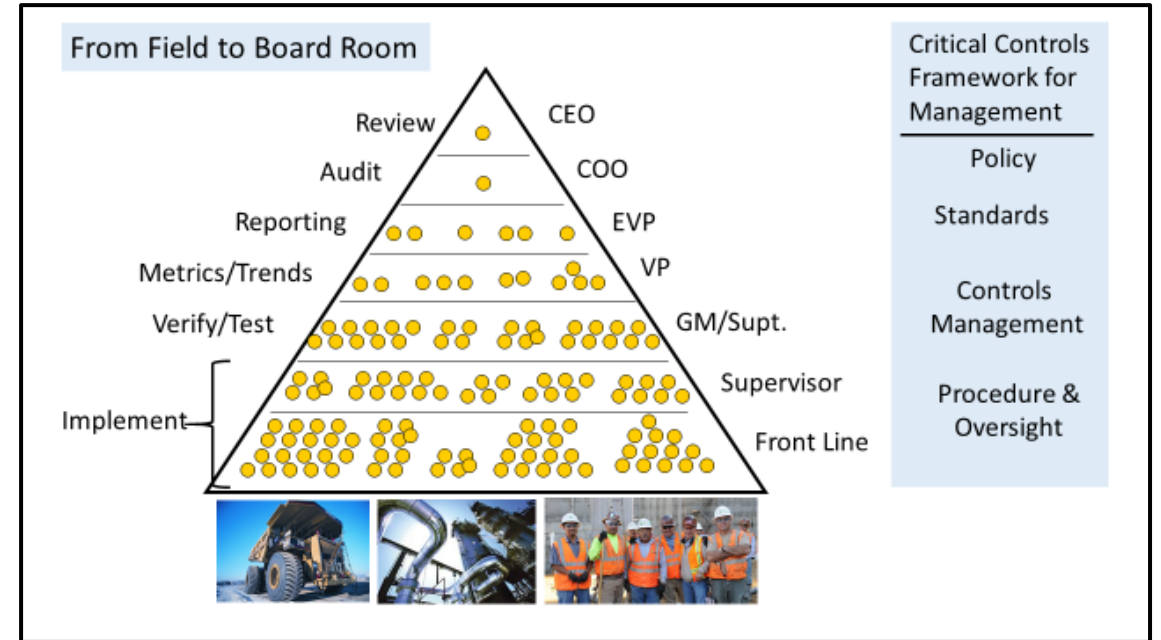




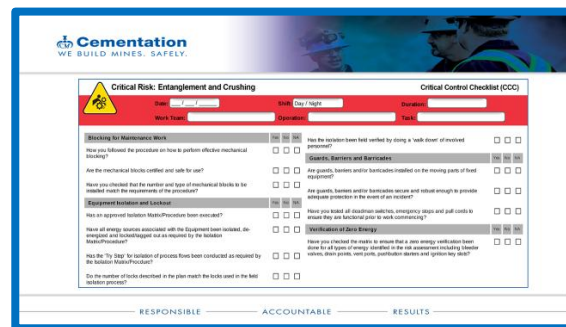
# Systemic Comprehensive Management System



# Robust Safety Culture



## Identification      Critical Controls      Integration      Status/Verification





# Thank You!

David and Joan Lynch  
School Of Engineering  
Safety and Risk Management

Collaboration

