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# ADB Health, Safety and Security (HSS)

## Awareness Training Course




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MODULE 2  
**HSS Risk  
Management**



Identify hazards and  
risks, assess their  
impact and how to  
control them

# Hazard

A **hazard** is anything that has the *potential* to cause harm.



**WORK SAFE  
STAY SAFE**

BEHAVIOUR  
KEY PERFORMANCE INDICATORS

**Video: Safety Culture HAZID**

**ADB**



# Hazard Wheel

A hazard wheel can help to identify hazards when performing an operation or task.



# Hazardous Event

For a hazard to cause harm, a hazardous event must happen.



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# Assessing Risks

We need to understand the *definition* of risk and be able to evaluate and reduce it.



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# Perception of Risk



Limited “Receptors” = Limited Risk



Add “Receptors” = Higher Risk

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# Risk

Risk is the combination of the likelihood of a hazardous event occurring, and the consequence.

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$





Risk Management

Following Through  
on Mitigation Plans

Identification  
of Hazard

Assessing Potential Consequences  
and Probabilities



HAZARD



RISK



SAFETY



SAFETY SYSTEMS  
OPERATIONAL EXCELLENCE



What is an obvious "Hazard"?

What is the "Risk"?



**SAFETY**



SAFETY SYSTEMS  
OPERATIONAL EXCELLENCE





Same  
"Hazard"...

Now what is  
the "Risk"?



**SAFETY**



SAFETY SYSTEMS  
OPERATIONAL EXCELLENCE



# Hazard Event Consequences



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# Exercise

Provide an example of how a person could be harmed for each hazard group.





No PPE

No Fall Protection

No Fall Protection

Power Lines

Chemical Storage

Scaffold Lacks Toe Boards

Dropped Objects

Poor Housekeeping





High Voltage

Hi Pressure Vessel

Poor Condition Scaffolding

No PPE (hardhat, fall protection)

Poor Condition Ladder

Poor Condition Ladder

No PPE

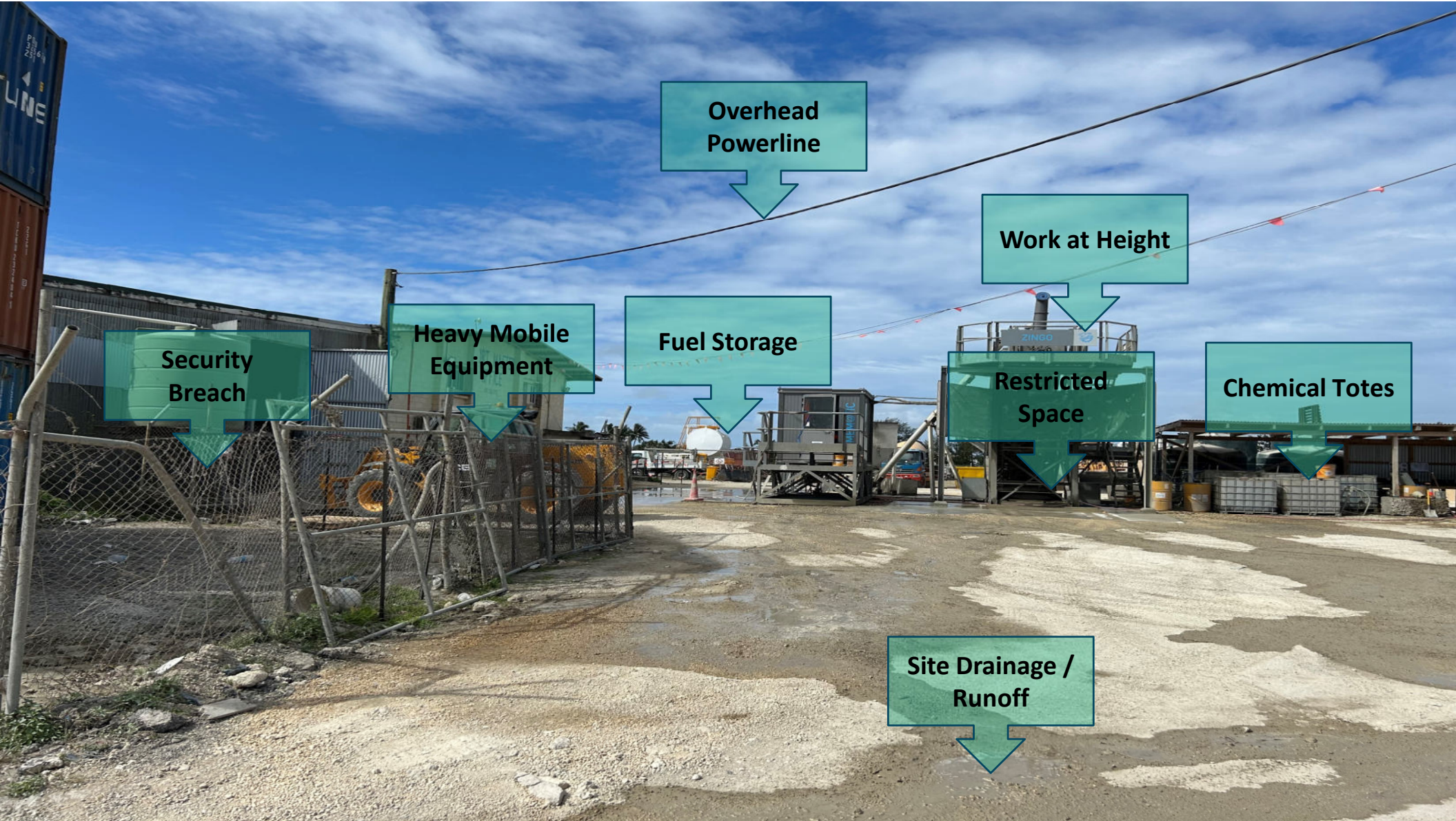
Worker Under Dropped Object Hazards

Unmarked / Unlabelled Drum

Chemicals

Loose Cables / Trip Hazards





Overhead  
Powerline

Work at Height

Security  
Breach

Heavy Mobile  
Equipment

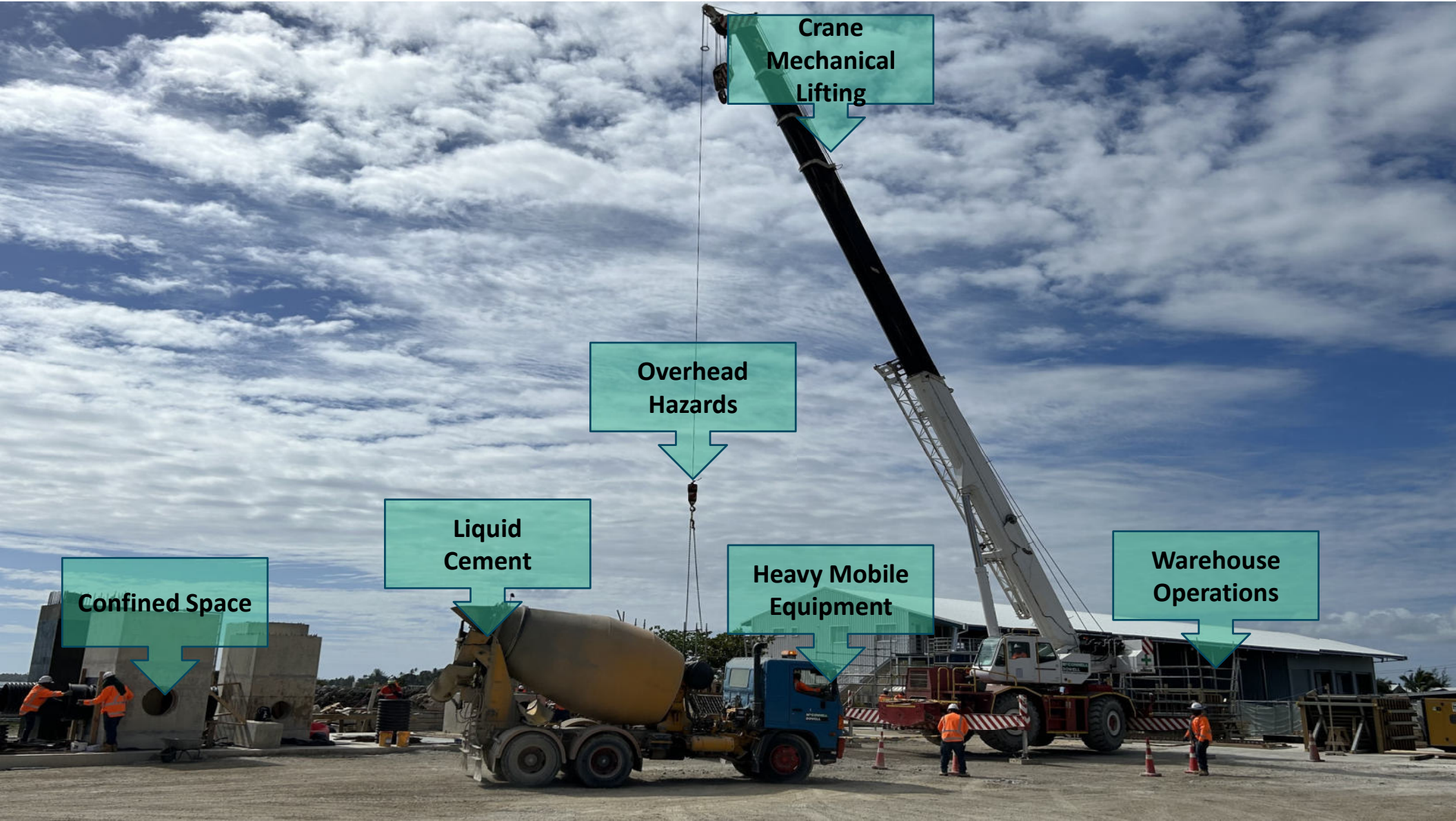
Fuel Storage

Restricted  
Space

Chemical Totes

Site Drainage /  
Runoff





**Crane  
Mechanical  
Lifting**

**Overhead  
Hazards**

**Liquid  
Cement**

**Heavy Mobile  
Equipment**

**Warehouse  
Operations**

**Confined Space**

# Risk Management

Identifying and evaluating risks, and identifying mitigation measures, to reduce risk to “**as low as reasonably practicable**” (ALARP).



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# High Level Hazards



### Hazards

- Fire
- Explosion
- Natural hazards
- Hazardous materials spill or release
- Terrorism
- Workplace violence
- Pandemic disease
- Utility outage
- Mechanical breakdown
- Supplier failure
- Cyber attack

Probability & Magnitude

Hazard Identification

### Assets at Risk

- People
- Property including buildings, critical infrastructure
- Supply chain
- Systems/equipment
- Information Technology
- Business operations
- Reputation of or confidence in entity
- Regulatory and contractual obligations
- Environment

Vulnerability

Vulnerability Assessment

### Impacts

- Casualties
- Property damage
- Business interruption
- Loss of customers
- Financial loss
- Environmental contamination
- Loss of confidence in the organization
- Fines and penalties
- Lawsuits

Impact Analysis





# Risk Assessment Process



Identify the hazard

1

What could go wrong

2

Evaluate the risk

3

Record your findings

4

Review your mitigation controls

5

# Using a Risk Matrix (Basic 3x3)

		Consequence		
		Slightly Harmful	Harmful	Extremely Harmful
Likelihood	Likely	Medium Risk	High Risk	Extreme Risk
	Unlikely	Low Risk	Medium Risk	High Risk
	Highly Unlikely	Negligible Risk	Low Risk	Medium Risk

# Risk Matrix (many styles = same principles – e.g., 5x5)

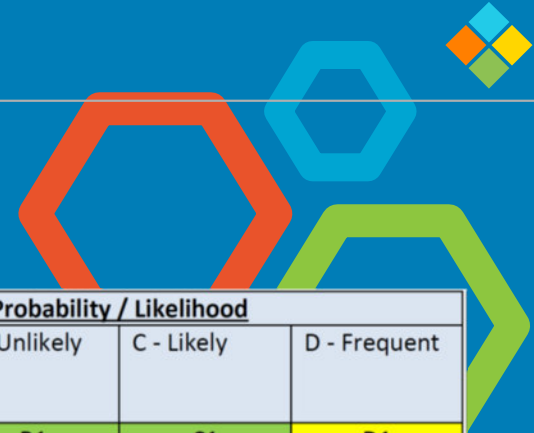
## Consequence

## Likelihood

	Insignificant	Minor	Moderate	Major	Catastrophic
Very Likely	Low-Medium	Medium	Medium-High	High	High
Likely	Low-Medium	Low-Medium	Medium	Medium-High	High
Possible	Low	Low-Medium	Medium	Medium-High	Medium-High
Unlikely	Low	Low-Medium	Low-Medium	Medium	Medium-High
Very Unlikely	Low	Low	Low-Medium	Medium	Medium



# SAMPLE Corporate Risk Matrix



## “PEAR” Principle

Consequence Severity	Health&Safety	Environment	Financial	Reputation	Probability / Likelihood			
					A - Remote	B - Unlikely	C - Likely	D - Frequent
<b>1- Minor</b>	-Minor Injury or illness -First Aid	-Minimal cleanup needed -Fully contained on site -Negligible impacts	Less than \$10,000	-No public disruption -No media attention	A1	B1	C1	D1
<b>2- Moderate</b>	-Medical Treatment -Restricted Work	-Some clean-up offsite -Localized impacts	\$10,000 to \$100,000	-Regulatory attention/letters -Minimal public disruption - Briefly in local media	A2	B2	C2	D2
<b>3- Major</b>	-Lost Time Incident (LTI) -Multiple injuries	-Widespread but recoverable -Short term impacts	\$ 100,000 to \$ 500,000	-Regulatory action/fines -Local public disruption -Prolonged local media attention	A3	B3	C3	D3
<b>4- Critical</b>	-Fatality -Permanent health impact -Long term disability	-Widespread and irreversible -Long term impacts	Over \$ 500,000	-Regulatory shutdown -Wide public disruption -Prolonged wide media attention	A4	B4	C4	D4

# Risk Management

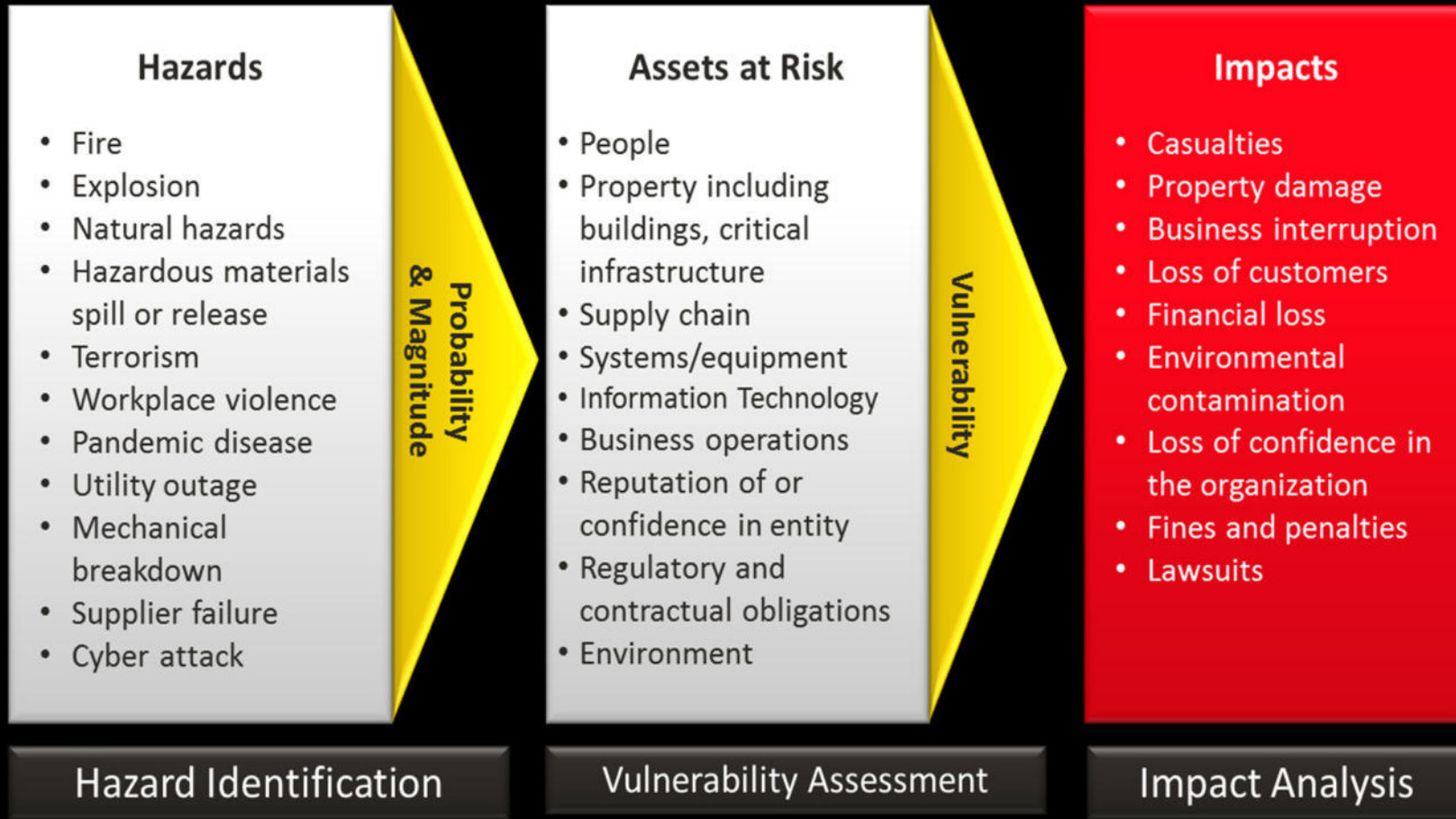
Identifying and evaluating risks, and identifying mitigation measures, to reduce risk to “**as low as reasonably practicable**” (ALARP).



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# High Level Hazards





# Risk Assessment Process



Identify the hazard

1

What could go wrong

2

Evaluate the risk

3

Record your findings

4

Review your mitigation controls

5

# Using a Risk Matrix (Basic 3x3)



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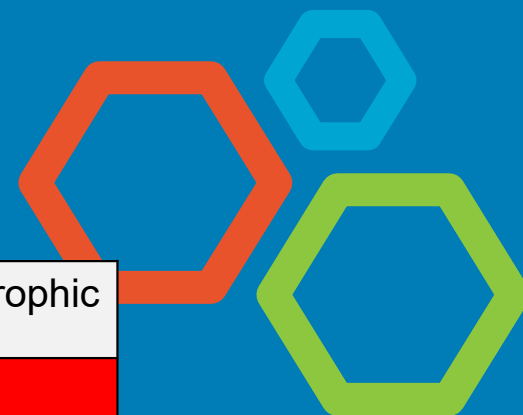


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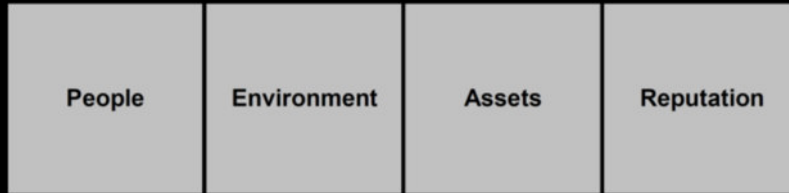
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## Likelihood

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## “PEAR” Principle

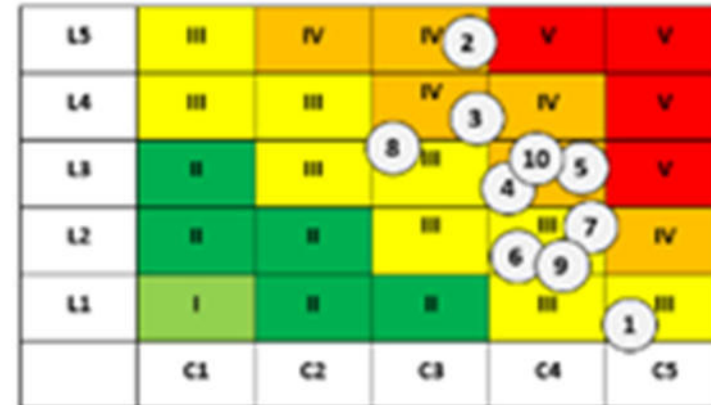
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# Corporate Risk Worksheet - Sample



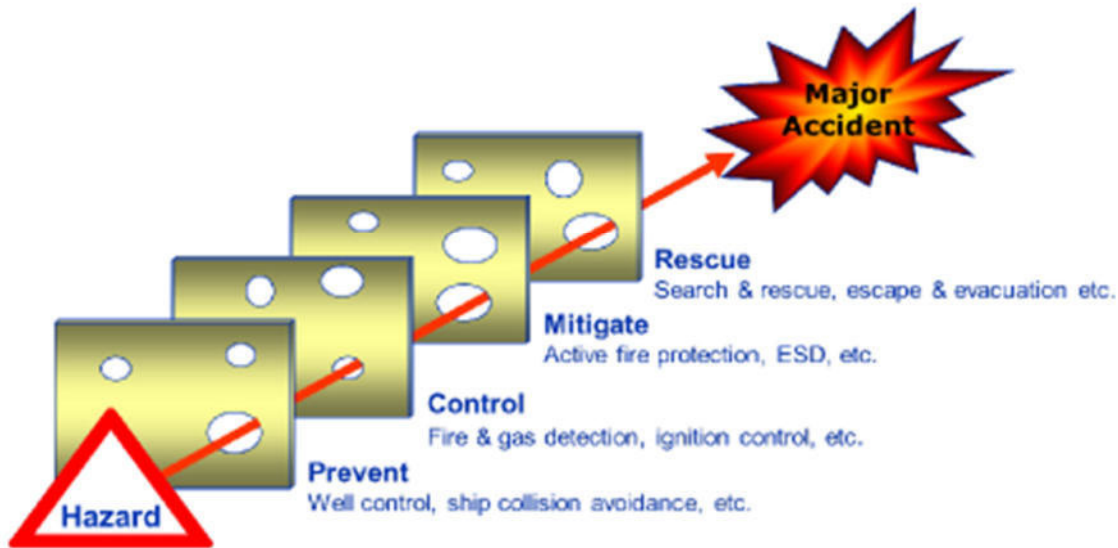
DRAFT		Consequence		Probability		Inherent Risk = before Mitigation	Mitigation (currently in place) that reduces the risk rating.	Note: The residual risk ratings below DO NOT APPLY unless all current mitigation and control measures are in place.			Recommendation: Mitigation which is required, to further reduce the risk to an acceptable level.	Company and/or individual responsible to ensure mitigation is in place prior to activity	Additional Notes
		ID	"What If" Risk Scenario	Hazards & Impacts (without mitigation)	Consequence	Probability	Inherent Risk	Current Mitigation/Controls	Consequence	Probability	Residual Risk	Additional Mitigation/Controls	Responsibility
L5	* What if personnel executing COVE work do not comply with Health & Safety (H&S) requirements, resulting in a serious incident or fatality?  (regardless of specific cause for purposes of this assessment)  Litigation, Fines/Penalties	People:	1-Critical	3-Likely	III	1. COVE Safety and Environmental Expectations  2. Marine Access Permits and Onshore Access Permits (incl SIMOPS considerations)  3. Operational Safety Plans for all marine and onshore operations that outline HSE requirements and identify PICs who are responsible to ensure HSE requirements are satisfied	1-Critical	3-Remote	III	1. Consider SIMOPS Risk Assessment  2. Conduct detailed Risk Assessment for subsea cable damage for future mooring operations and other subsea activities.  3. Liability Insurance coverage  4. Crisis communications planning  5. Consider specific CHS - Safety Culture training for key COVE personnel  6. Consider raising the bar for H&S standards as part of the "Fundy Standard" above minimum regulatory compliance (i.e. similar to say CNSOPB).	* Site/task-specific risks should be addressed through separate Task/Job Safety Analysis processes with specific Berth holders, including the various specific potential fatality scenario risks and control measures.		
		Environment:	3-N/A	3-N/A	III	<ul style="list-style-type: none"> <li>- Pre-operation planning sessions</li> <li>- Same-day toolbox meetings</li> <li>- Post operation review meetings for continuous improvement</li> <li>- Emergency Response Plans</li> </ul>	3-N/A	3-N/A	III				
		Assets:	1-Critical	3-Likely	III	4. Liability and Environmental Impairment Insurance coverage  5. JRCC	1-Critical	3-Remote	III				
		Reputation:	1-Critical	3-Likely	III		1-Critical	3-Remote	III				



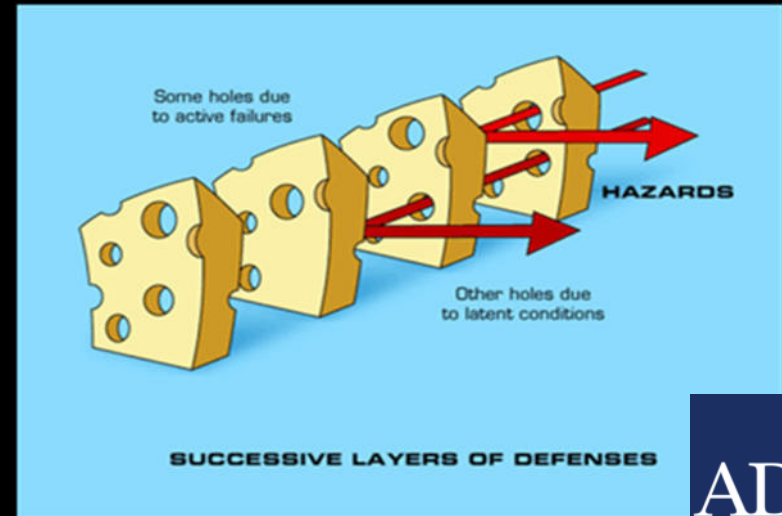
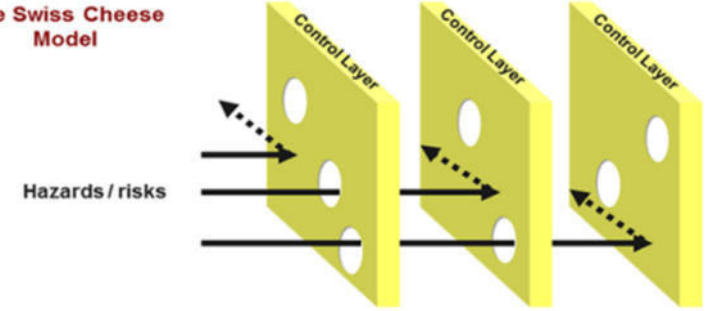


## Swiss Cheese Risk Model

- Layers of protection needed for Emergency Prevention & Response



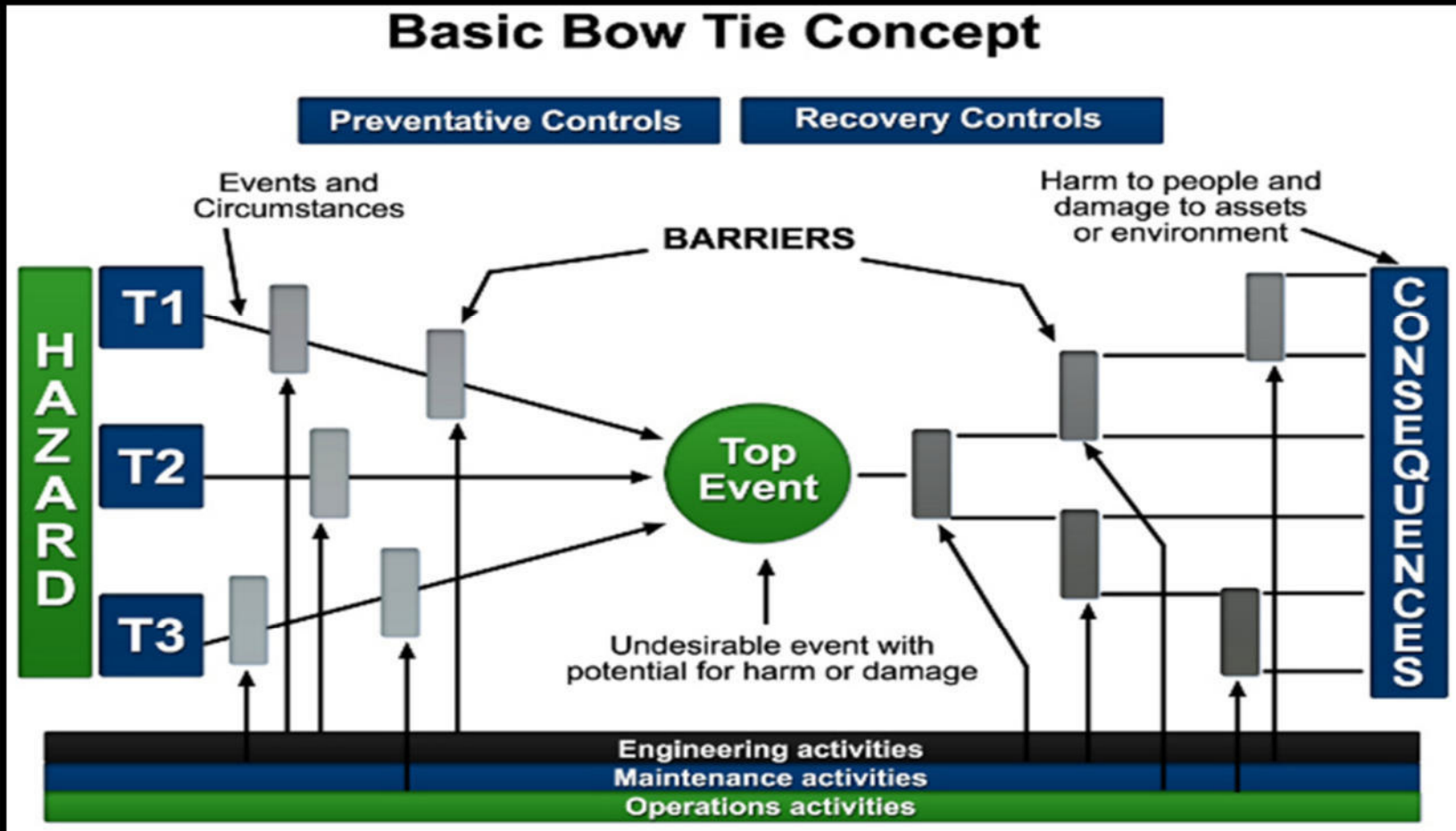
The Swiss Cheese Model



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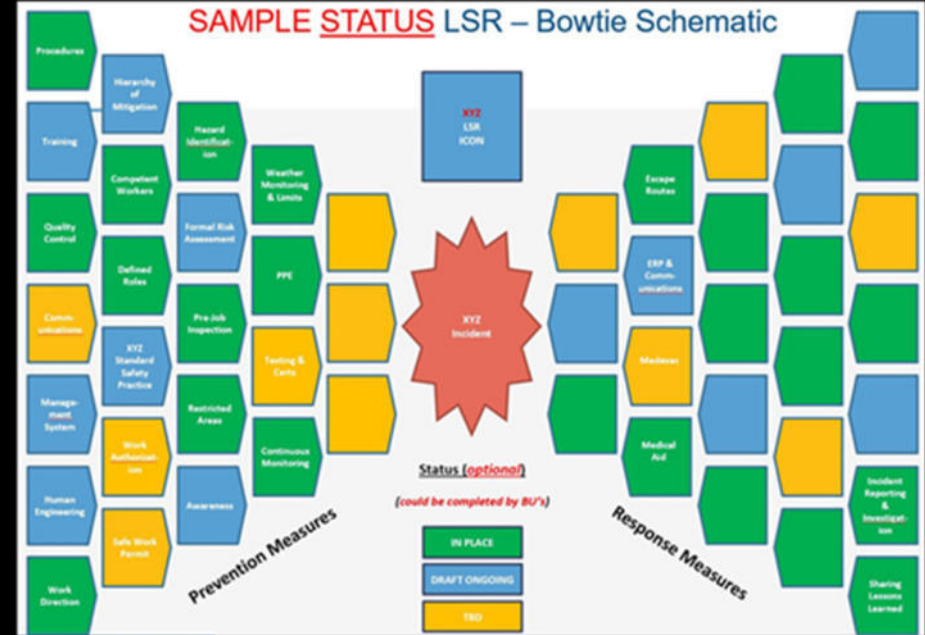
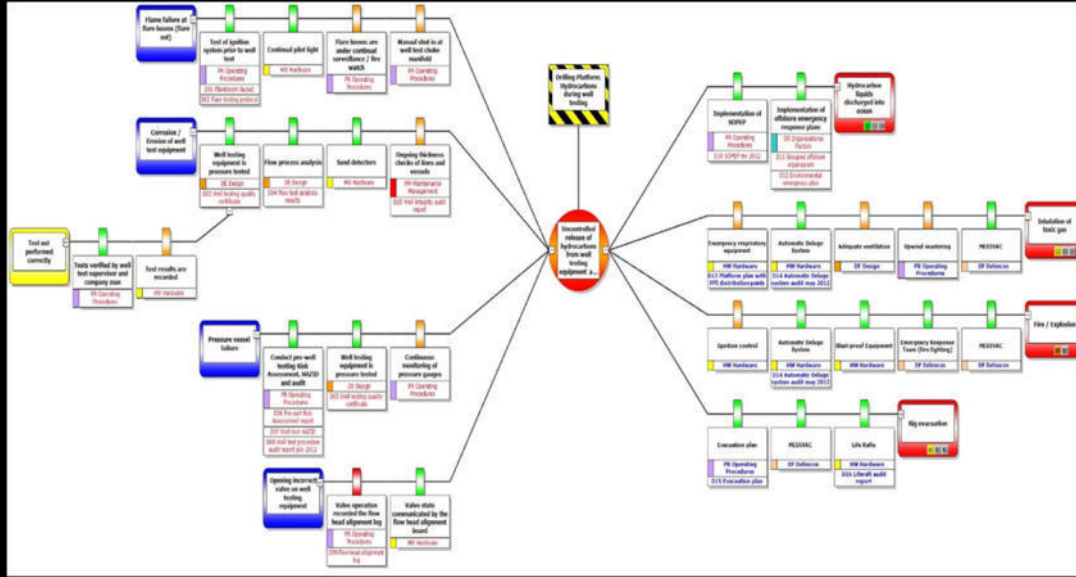






**Discussion - House Fire**  
- List out examples for "Prevention & Response"





## Discussion – House Fire - List out examples for “Prevention & Response”





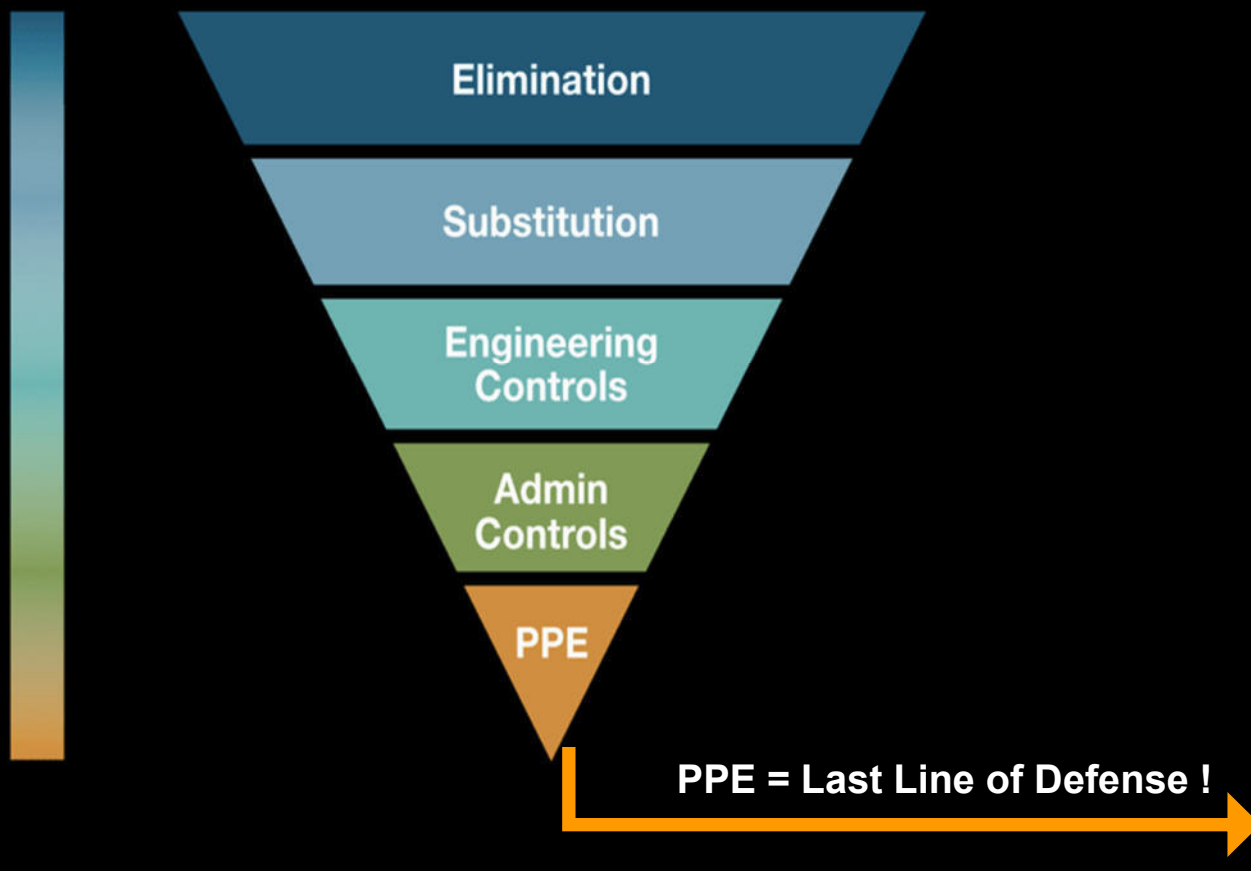
# Hierarchy of Controls



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# ADB Hierarchy of Controls



# Using a Risk Matrix (Basic 3x3)



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# Typical Life-Saving Rules

Other LSR online video summaries from IOGP

Links to all LSR videos (1-2 minutes each)

- Youtube:
  - <https://www.youtube.com/playlist?list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov>
- Vimeo: (show Energy Isolation & Work at Heights)
  - <https://vimeo.com/showcase/5939420>





# Office Safety - Controls

## Ergonomic Safety



### OFFICE HEALTH HAZARDS

ENSURE PROPER POSITIONING

The diagram illustrates the correct office posture with the following specifications:

- VIEWING DISTANCE 18-24"
- VIEWING ANGLE
- WRIST BEND 20°
- WRIST STRAIGHT
- SEAT BACK ANGLE 90°
- KNEE ANGLE 90°
- FEET ON FLOOR

### OFFICE SYNDROME

- EYE HYPEREMIA
- HEADACHE
- SHOULDER PAIN
- BACKACHE
- NECK PAIN
- TUNNEL SYNDROME

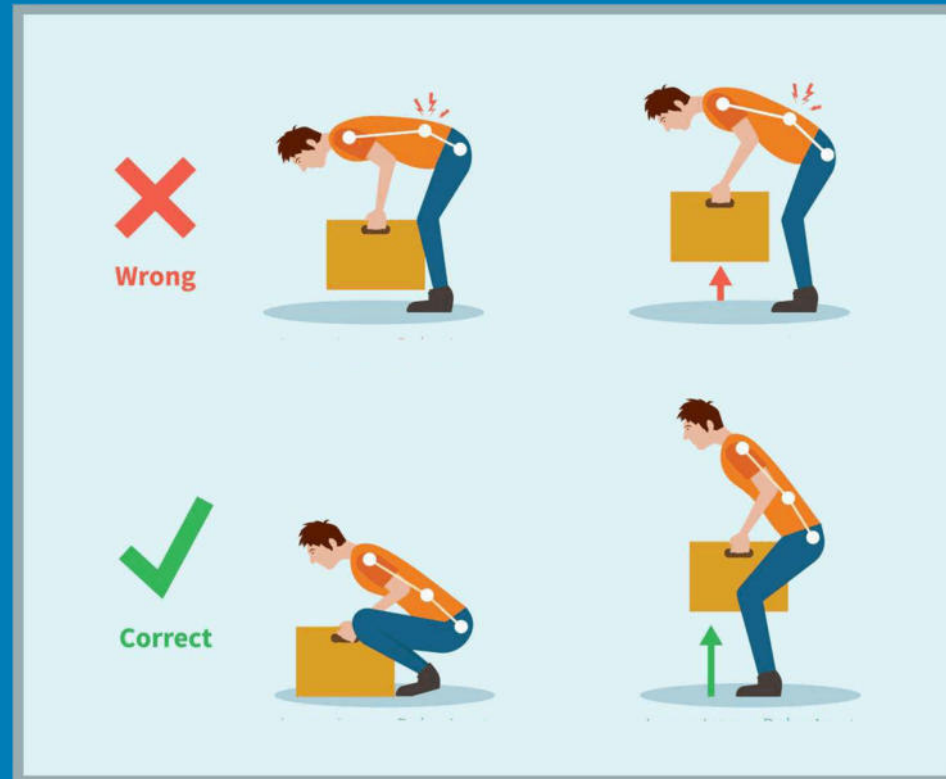
dreamstime.com

ID 149360419 © Moneti

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# Office Safety - Controls



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## the fire triangle

Fire needs three things to exist; Oxygen, ignition and fuel.  
Eliminate one and a fire will not occur.

Air contains approximately 21% oxygen

Ignition comes in two forms, either from spark or temperature, & are treated differently

Fuel can come in the form of flammable liquid, gas or vapour or combustible dust

When the fuel and air (oxygen) are mixed in the correct proportion it can be ignited by either a spark or heat – all Certified Electrical equipment is designed to remove one element of the fire triangle to prevent an explosion

Coex Training

## FIRE EXTINGUISHING METHODS

<b>Cooling</b>		<b>Isolating flammable material</b>
<b>Cutting off oxygen supply</b>		<b>Anticatalytic activity</b>



<https://www.youtube.com/watch?v=yodLMfOZNvA>





# Example of Controls for Fire Protection



Symbols found on fire extinguishers and what they mean.

	Water (Red)	Foam Spray (Cream)	ABC Powder (Blue)	Carbon Dioxide (Black)	Wet Chemical (Yellow)
<b>Class A</b> Wood, Textiles & Paper	✓	✓	✓	✗	✓
<b>Class B</b> Flammable Liquids	✗	✓	✓	✓	✗
<b>Class C</b> Flammable Gases	✗	✗	✓	✗	✗
<b>Class D</b> Electrical Contact	✗	✗	✓	✓	✗
<b>Class F</b> Cooking Oils and Fats	✗	✗	✗	✗	✓

DRY POWDER	FIRE HOSE REEL	FOAM SPRAY	WATER	CO <sub>2</sub>
<ul style="list-style-type: none"> <li>USE ON: Wood, Paper and Textiles</li> <li>USE ON: Flammable Liquids</li> <li>USE ON: Gaseous Fires</li> <li>USE ON: Live Electrical Equipment</li> </ul>	<ul style="list-style-type: none"> <li>USE ON: Wood, Paper and Textiles</li> <li>DO NOT USE ON: Live Electrical Equipment</li> <li>DO NOT USE ON: Flammable Liquids</li> <li>DO NOT USE ON: Flammable Metal Fires</li> </ul>	<ul style="list-style-type: none"> <li>USE ON: Wood, Paper and Textiles</li> <li>USE ON: Flammable Liquids</li> <li>DO NOT USE ON: Live Electrical Equipment</li> <li>DO NOT USE ON: Flammable Metal Fires</li> </ul>	<ul style="list-style-type: none"> <li>USE ON: Wood, Paper and Textiles</li> <li>DO NOT USE ON: Live Electrical Equipment</li> <li>DO NOT USE ON: Flammable Liquids</li> <li>DO NOT USE ON: Flammable Metal Fires</li> </ul>	<ul style="list-style-type: none"> <li>USE ON: Flammable Liquids</li> <li>USE ON: Live Electrical Equipment</li> <li>DO NOT USE ON: Wood, Paper and Textiles</li> <li>DO NOT USE ON: Flammable Metal Fires</li> <li>DO NOT: Hold horn when operating</li> </ul>



<https://www.youtube.com/watch?v=yodLMfOZNvA>

RISK MANAGEMENT  
OPERATIONAL EXCELLENCE





# Signage & Barricades



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# Engineering Design Hazards / Failures



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# Engineering Controls



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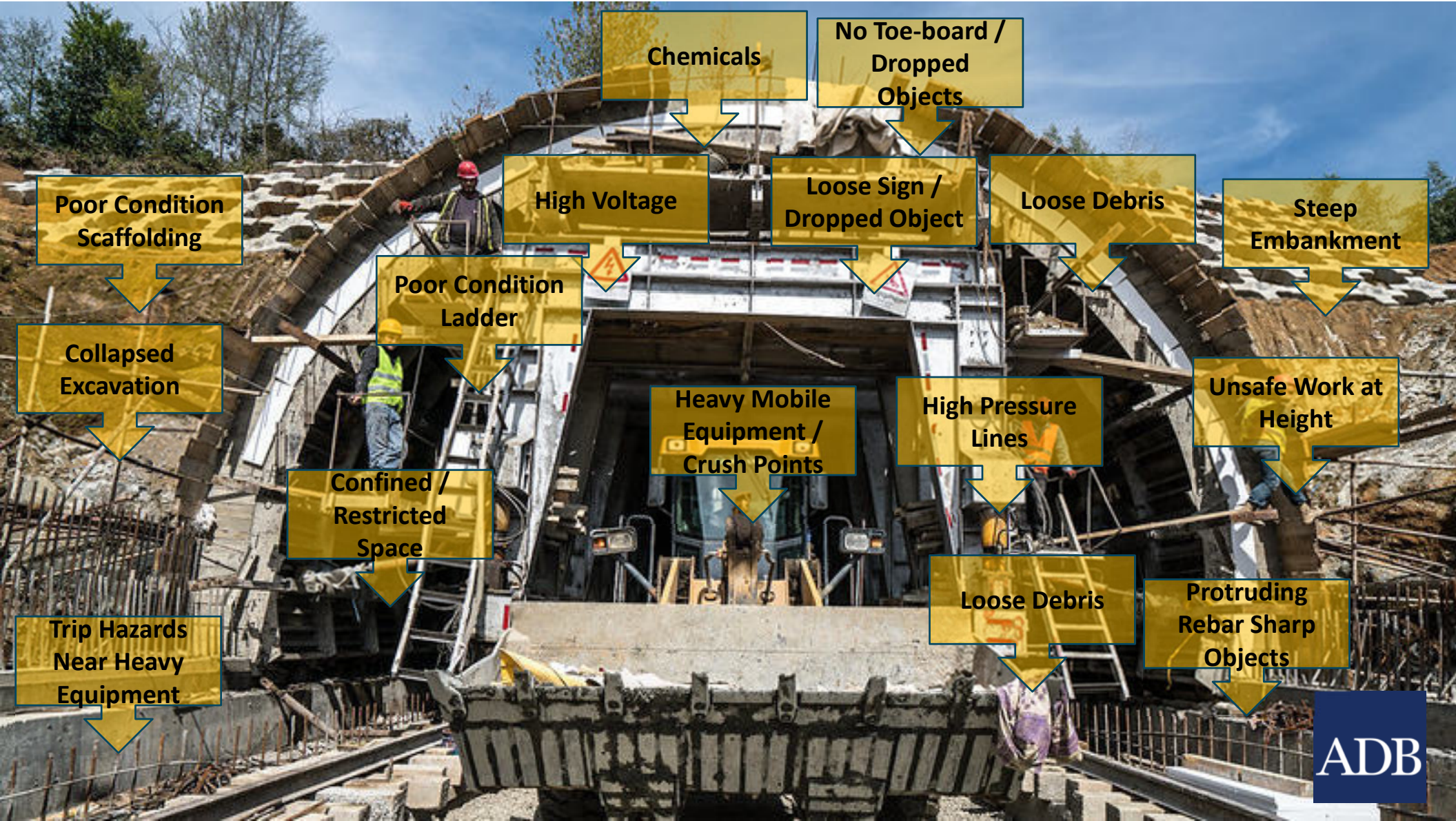
# Signage & Barricades



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Chemicals

No Toe-board /  
Dropped  
Objects

Poor Condition  
Scaffolding

High Voltage

Loose Sign /  
Dropped Object

Loose Debris

Steep  
Embankment

Poor Condition  
Ladder

Collapsed  
Excavation

Heavy Mobile  
Equipment /  
Crush Points

High Pressure  
Lines

Unsafe Work at  
Height

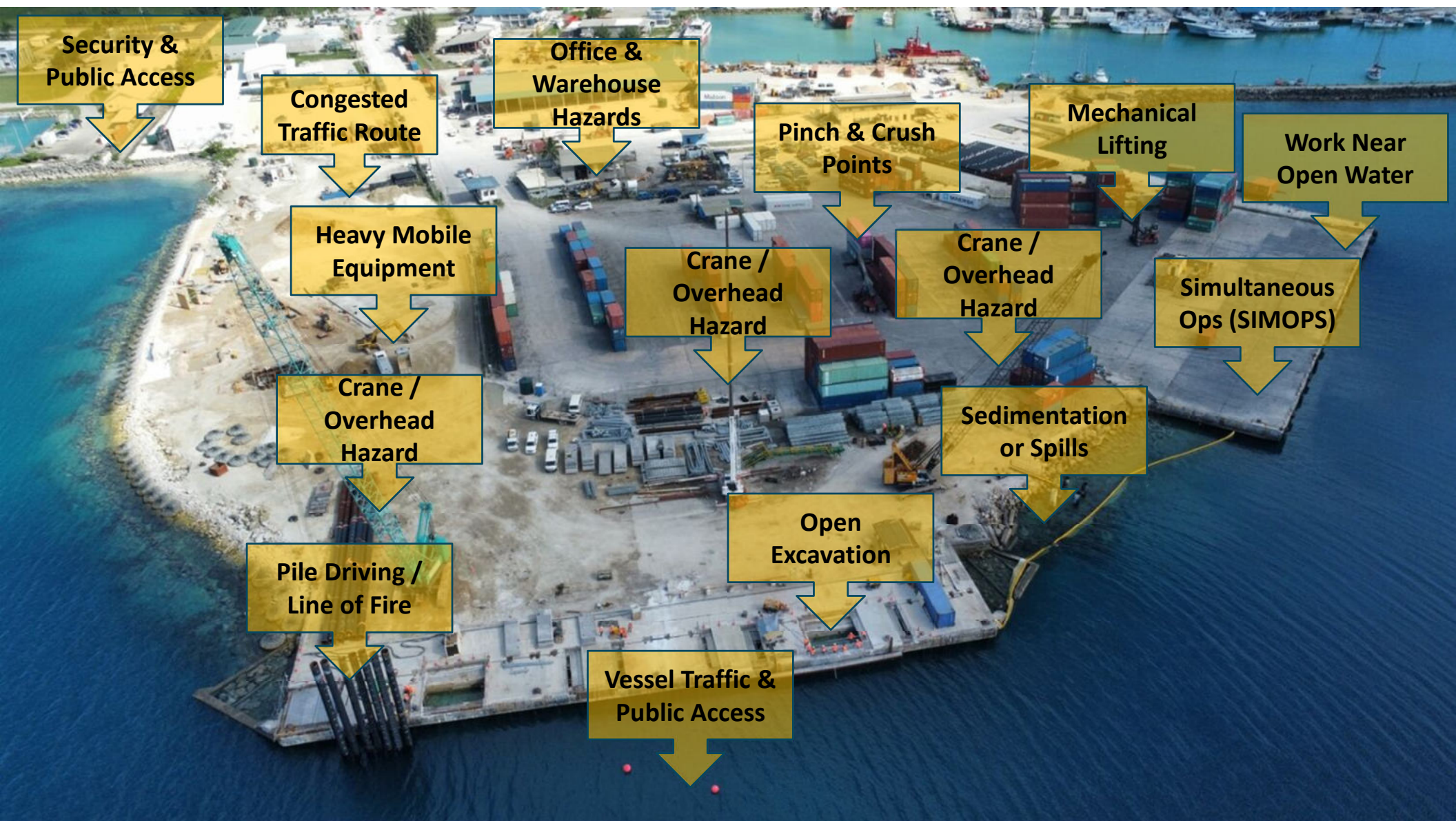
Confined /  
Restricted  
Space

Trip Hazards  
Near Heavy  
Equipment

Loose Debris

Protruding  
Rebar Sharp  
Objects





**Security & Public Access**

**Congested Traffic Route**

**Office & Warehouse Hazards**

**Pinch & Crush Points**

**Mechanical Lifting**

**Work Near Open Water**

**Heavy Mobile Equipment**

**Crane / Overhead Hazard**

**Crane / Overhead Hazard**

**Simultaneous Ops (SIMOPS)**

**Crane / Overhead Hazard**

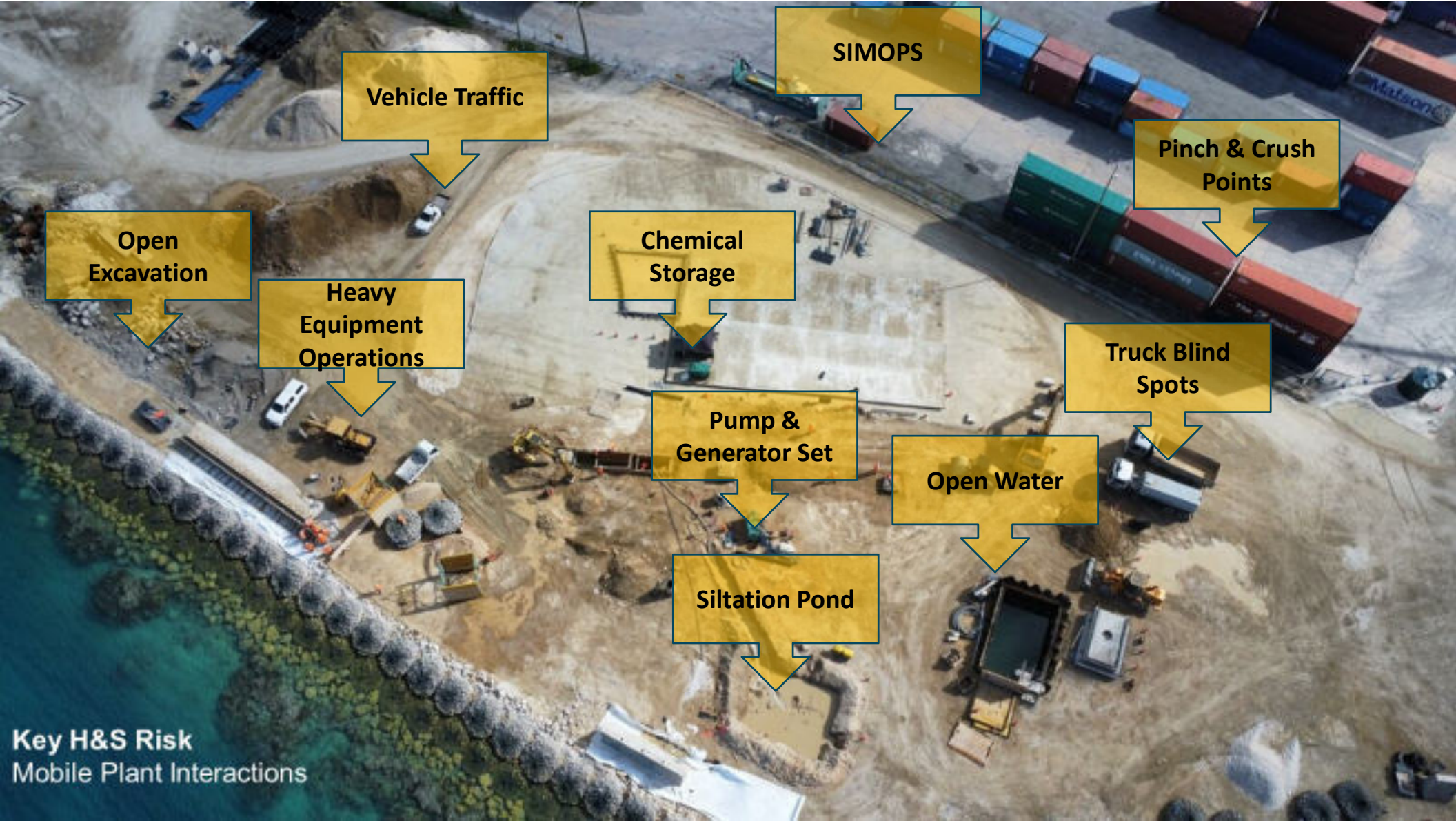
**Sedimentation or Spills**

**Pile Driving / Line of Fire**

**Open Excavation**

**Vessel Traffic & Public Access**





Vehicle Traffic

SIMOPS

Pinch & Crush Points

Open Excavation

Heavy Equipment Operations

Chemical Storage

Pump & Generator Set

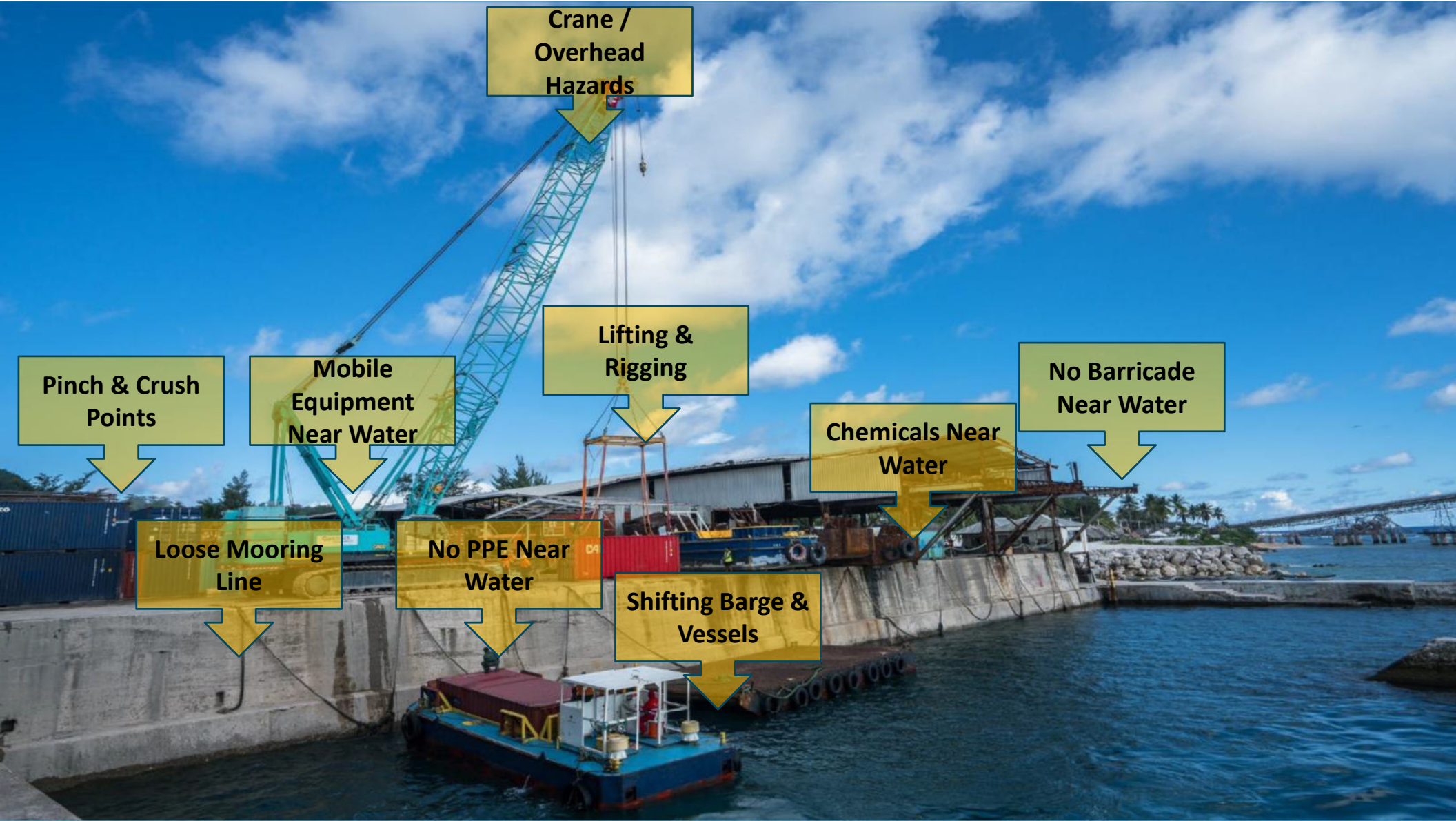
Truck Blind Spots

Open Water

Siltation Pond

Key H&S Risk  
Mobile Plant Interactions





**Crane /  
Overhead  
Hazards**

**Pinch & Crush  
Points**

**Mobile  
Equipment  
Near Water**

**Lifting &  
Rigging**

**Chemicals Near  
Water**

**No Barricade  
Near Water**

**Loose Mooring  
Line**

**No PPE Near  
Water**

**Shifting Barge &  
Vessels**



# Summary

- risk management applies across all sectors
- hierarchy of controls to minimize or eliminate a hazard
- all personnel are responsible for assessing and addressing risks
- this includes the Contractor supply chain !

