

# My Safety Tip for this Conference .....

**If new to Townsville, beware of traffic when  
crossing roads and walking to your hotel  
and venue**

**Coach Service  
Traffic lights  
Zebra Crossings  
Footpaths**



# **Too Close for Comfort – The Case for Proximity Detection**



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**DEEDI**

**August 2009**

# Menu

## *Take Home Questions*

- ‘Making a Case for Proximity detection’
- Collective Industry Issue – Collective Solutions – Win/Win
- Incident and Accident Statistics
  - ...to raise awareness of vehicles interaction hazards
- Mention current technologies
- Raise awareness of current solutions used and challenge
  - ...Control Effectiveness of those solutions – robustness of your SHMS ... Additional Risk Controls
- Confirm Legislative requirements – ALARA
- What do the equipment OEMS do?
- What risk assessment method should I choose to move forward?
- DEEDI Workshops

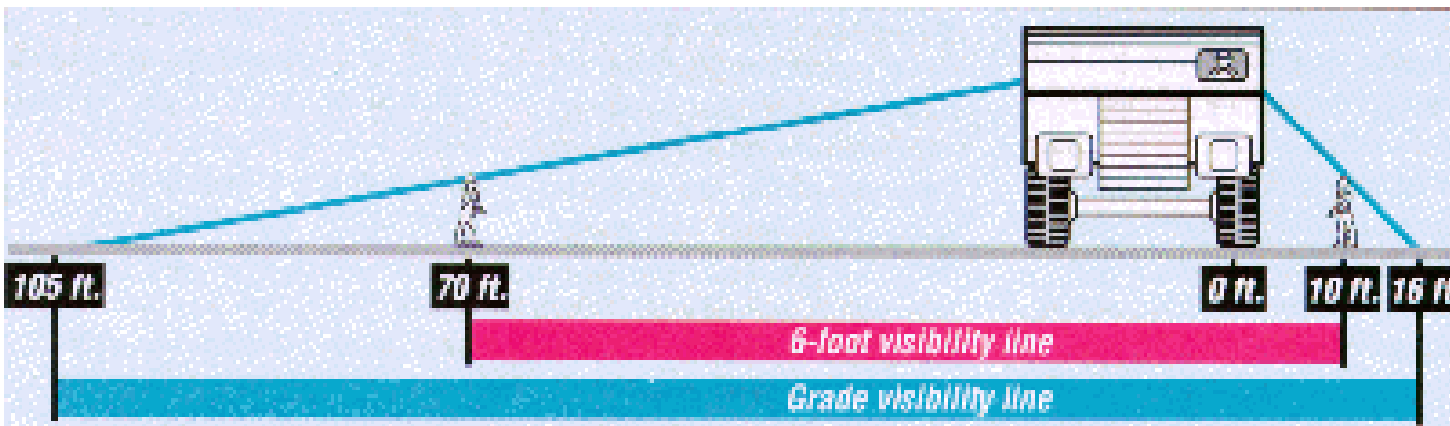
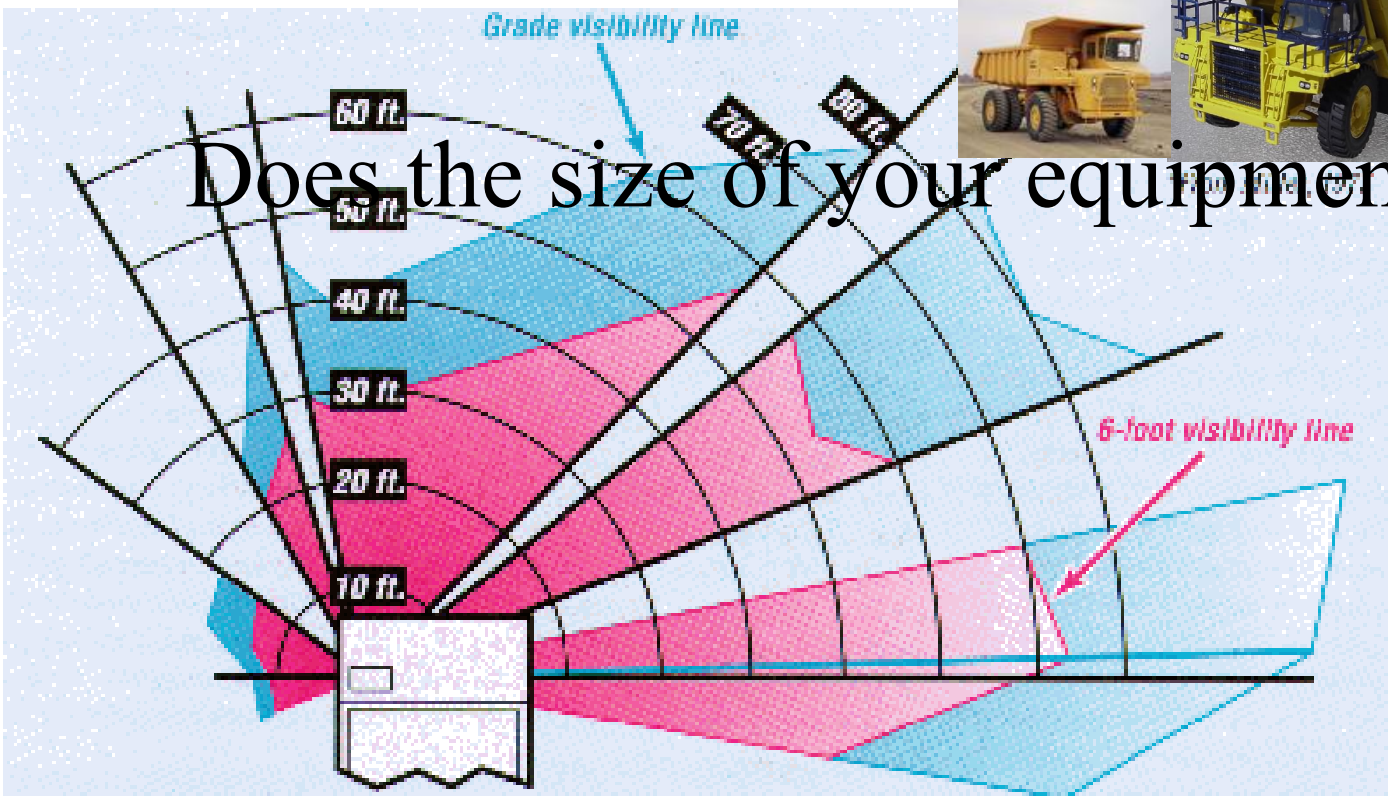


Figure 2A.—Front view of vision limitations from the cab of a 150-ton rear-dump truck\*



Does the size of your equipment matter?



Figure 2B.—Plan view of vision limitations from the cab of a 150-ton rear-dump truck\*

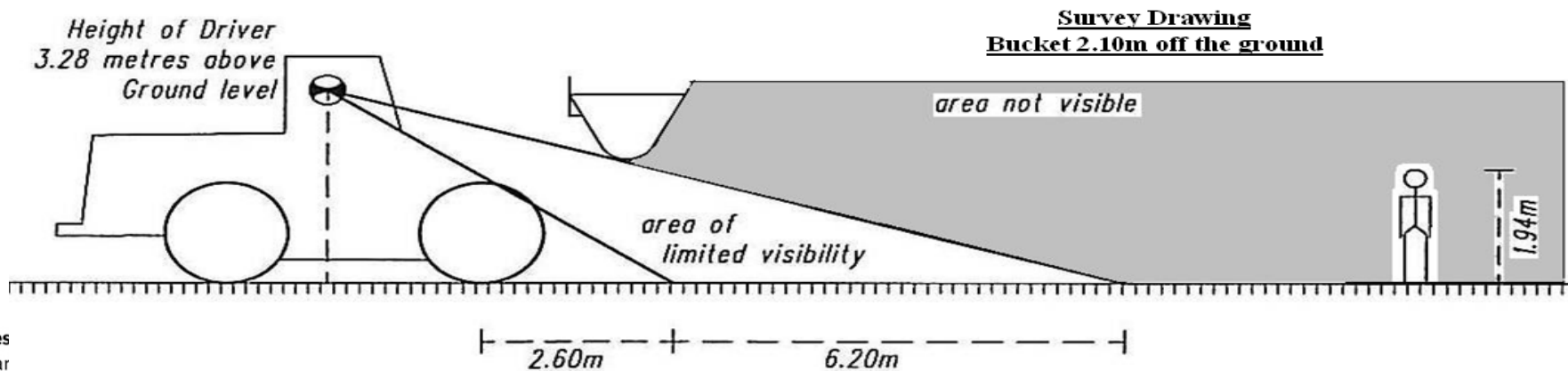




**Victim crushed between basket and  
back of tray 2008**



# Can the FEL Operator see you????



The following presentation is rated PG, it contains

**Parental  
guidance  
recommended**

Pictures

Graphs

Disturbing & Thought  
provoking

For a mature audience – you!

Sorry, no nudity



# Open Cut 2009







Open Cut 2009





**UG 2009**





**UG 2009**













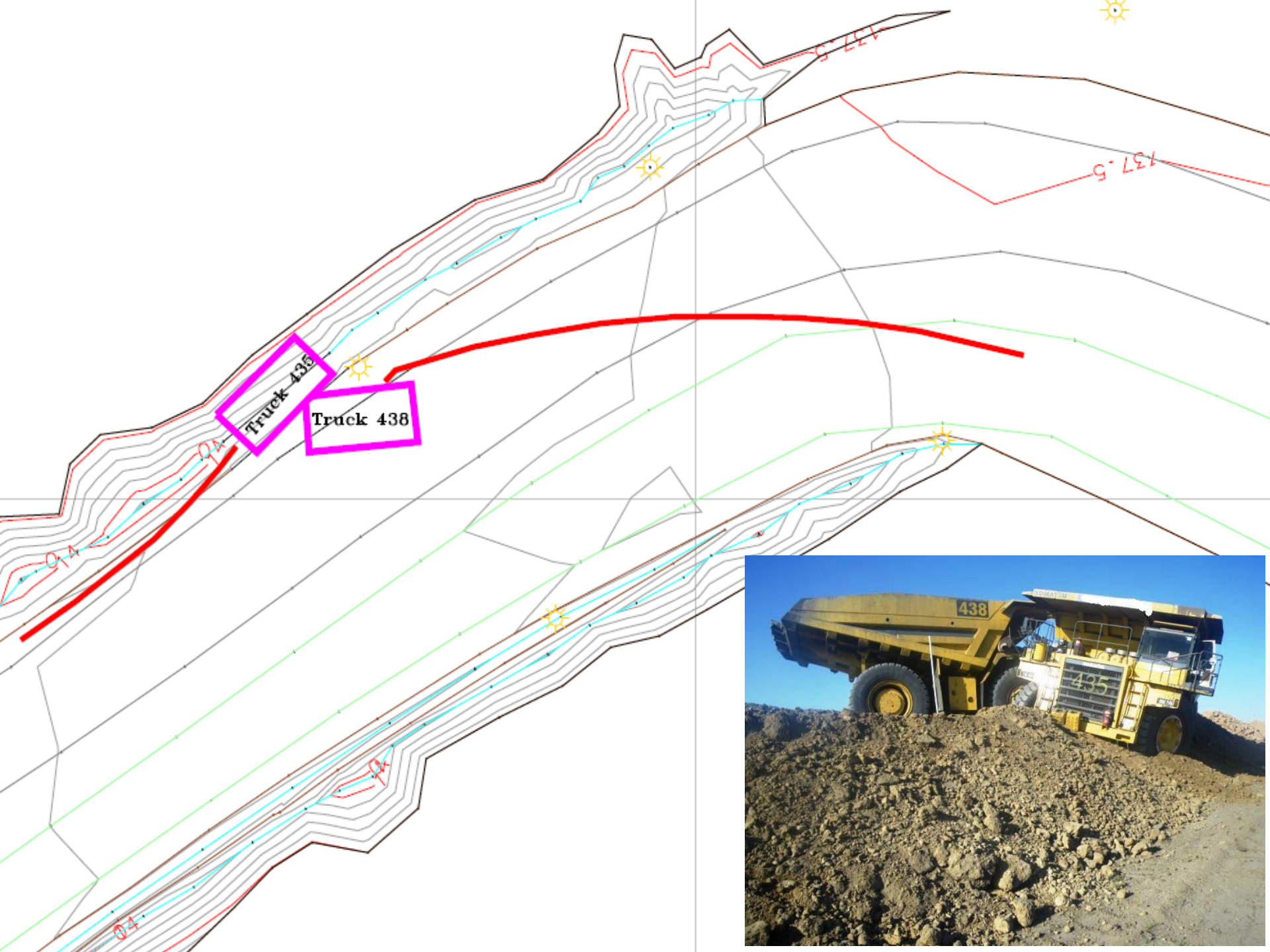


**19 August 2009**

**Mines and Energy**

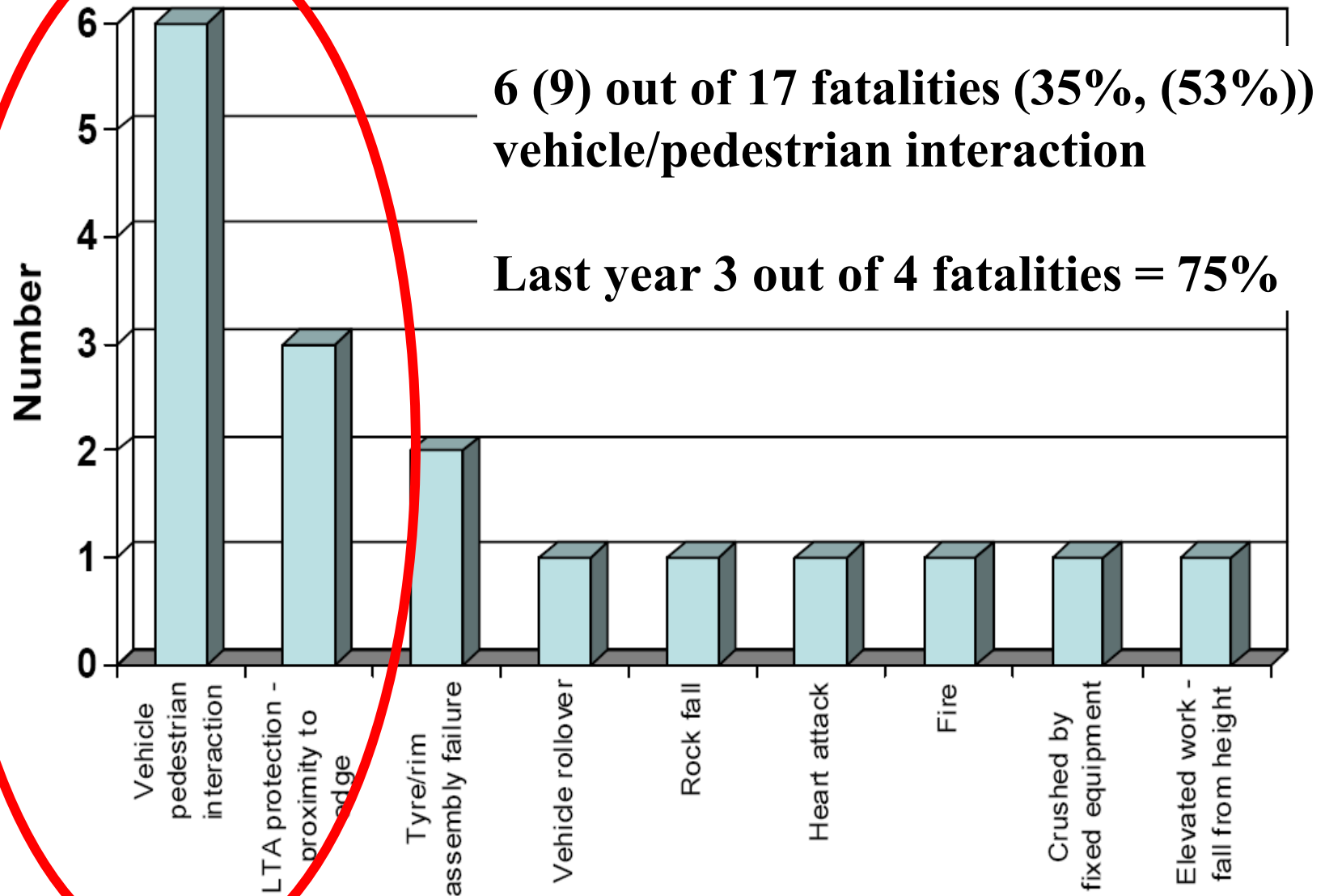
Department of Employment, Economic Development and Innovation







# Queensland Fatalities 2004 - May 2009

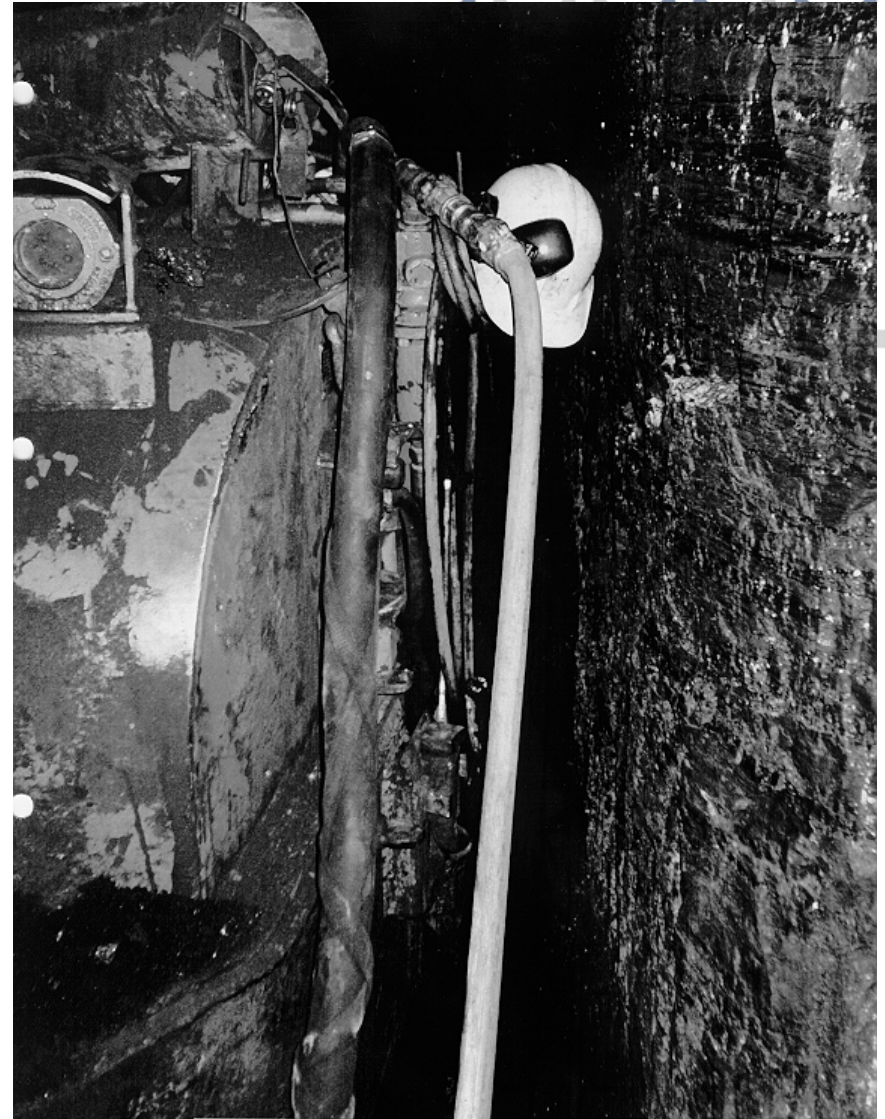




# Workplace 'Design' Issues

**Mines and Energy**

Department of Employment, Economic Development and Innovation



PHOTOGRAPH NO. 11

Pinch Point - After "Initial Machine Movement"

- Helmet Placed at Pinch point

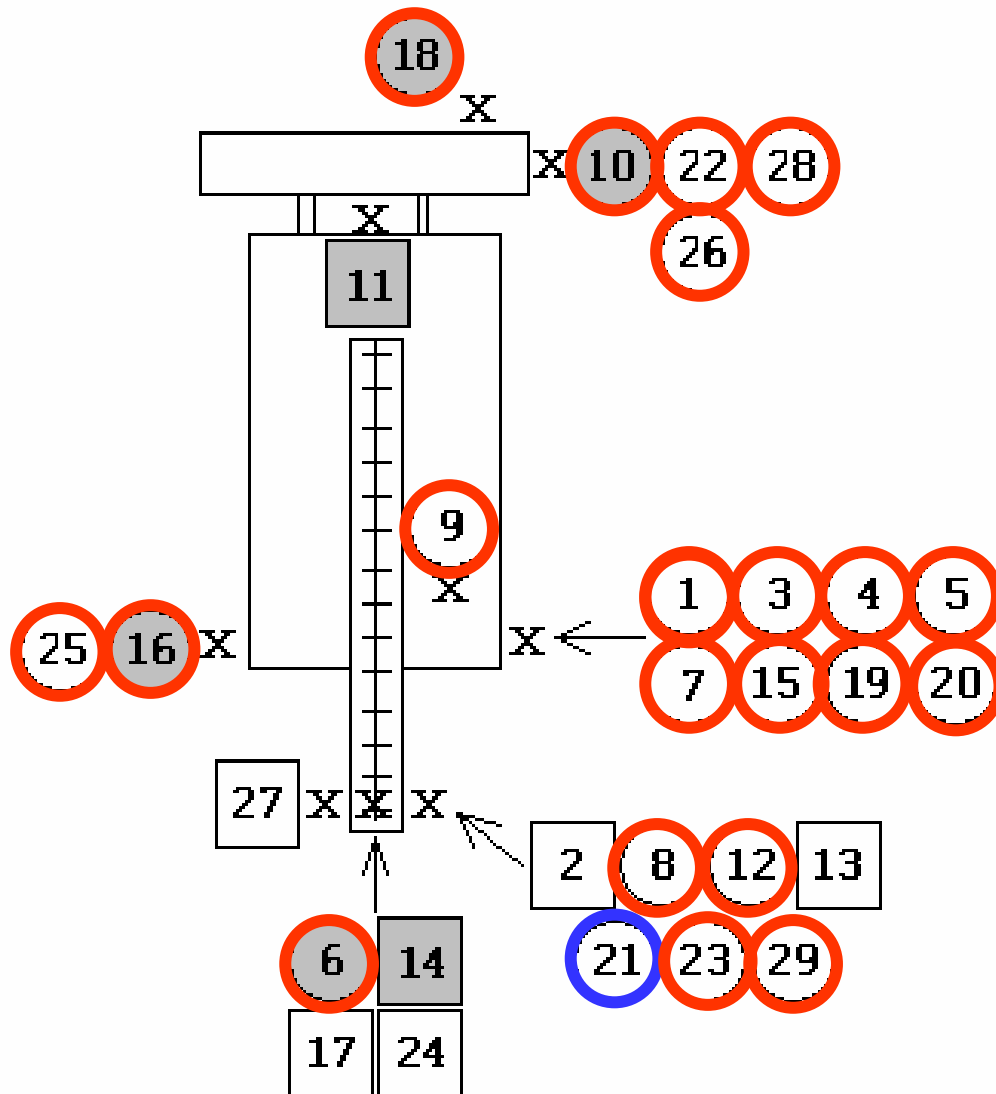




# MSHA - UG Fatalities - Continuous Miner

**Most/all could be avoided if Proximity Systems had been available and installed**

Of the 29 fatalities,  
72% of victims were  
operating the remote at  
the time of the  
accident.



## Legend

X Victim location

## Operating the remote

☐ Not operating the remote

**○ A moving RCCM collided with another at an intersection, causing the stationary RCCM to pivot and crush the other Op**

● ■ Maintenance activity





# Types of Systems

- Not technology based – mirrors, delineation, separation, intersection design, barricades, lighting, FRCP, ‘Golden Rules’, Training, High Viz, NoGo Zones etc.
- These will always have a place
- Technology based – several alternatives
  - RFID
  - RADAR
  - GPS
  - WIFI
  - Cameras
  - Combination of the above



# Some workshop feedback - Scoping

- Systems are available - workshop
- Open Cut vs Underground – Coal vs Metalliferous
- Low Speed vs High Speed
- V2V, V2P V2I (vehicle to vehicle, vehicle to person, vehicle to infrastructure)
- Detection Capability & Range – near and far field
  - around the corner capability
- Detection Sensitivity – near/far field, vehicles, people, stationary objects, infrastructure
- Directional Algorithms – is a collision likely?
- Audible vs Visual alarm – escalating alarm

## Some workshop feedback cont'

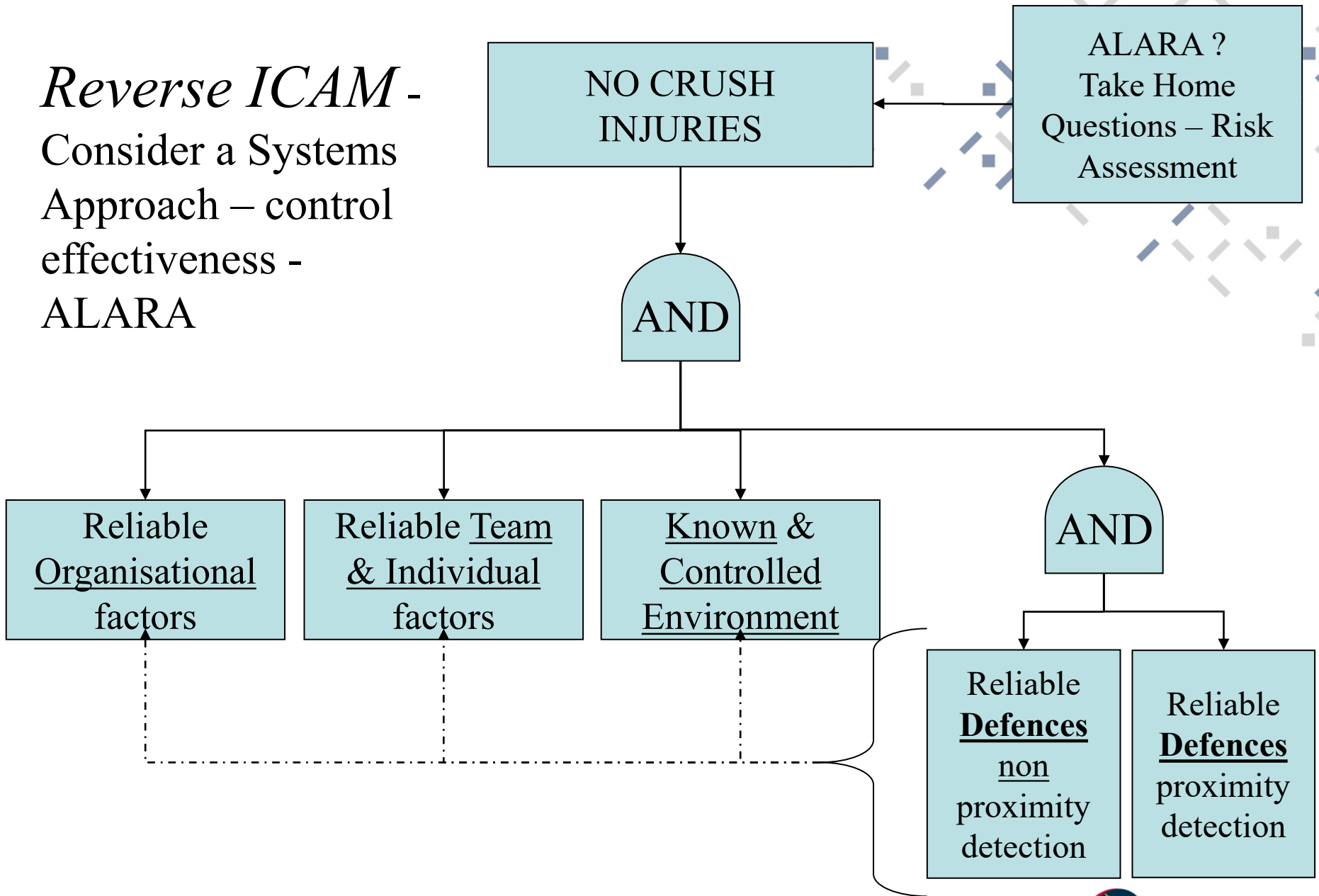
- Standalone vs dependant on other systems - Integration
- Active vs Passive systems
- Redundancy – fail safe
- Intuitive & Simple
- Normalisation – desensitization of operators - false alarming
- Operator interference
- Cabin Clutter – Veiling - Ergonomics
- Interference with other systems & environment – Physics
- Rules
- KPIs - effectiveness
- Machine shutdown?



# **Risk Management is all about Control**

## ***Think Systems***

# *Reverse ICAM* - Consider a Systems Approach – control effectiveness - ALARA



**81% System Success**

**19% System Failure**



*Reverse ICAM - Consider a systems approach – control effectiveness*

**Multiplier Effect**

95%

95%

AND

95%

95%

**Reliable Organisational  
factors**

**Reliable Team & Individual  
factors**

**Known & Controlled  
Environment**

**Reliable Defences**

Individual Success %	System Success %	System Failure%
99%	96%	4%
90%	65%	35%
85%	52%	48%

# Safety alert

**Mines Inspectorate**

[www.dme.qld.gov.au](http://www.dme.qld.gov.au)

**Safety alert 194**

**Published 18 April 2008**

## Well Done! Collision Saved by Centre Rill on Haul Road

**Mine Type:** All surface mines

**Incident:** A Cat 785 driver was taking the last load of the shift to the dump and attempted to drink from a water bottle. The driver's left hand was used to steer and the right to balance the water bottle for drinking. In doing this, the truck drifted toward the left side of the road. As the driver corrected the steering, the water bottle overbalanced. The driver was distracted sufficiently to lose control of the truck, which was brought to rest by the centre safety rill of the haul road. At the time, another vehicle was approaching in the opposite direction and there was a high probability that a head-on collision would have occurred.



‘Isolation’ – hard barriers

**Mines and Energy**

Department of Employment, Economic Development and Innovation

**Equipment:** CAT 785 Rear Dump Truck

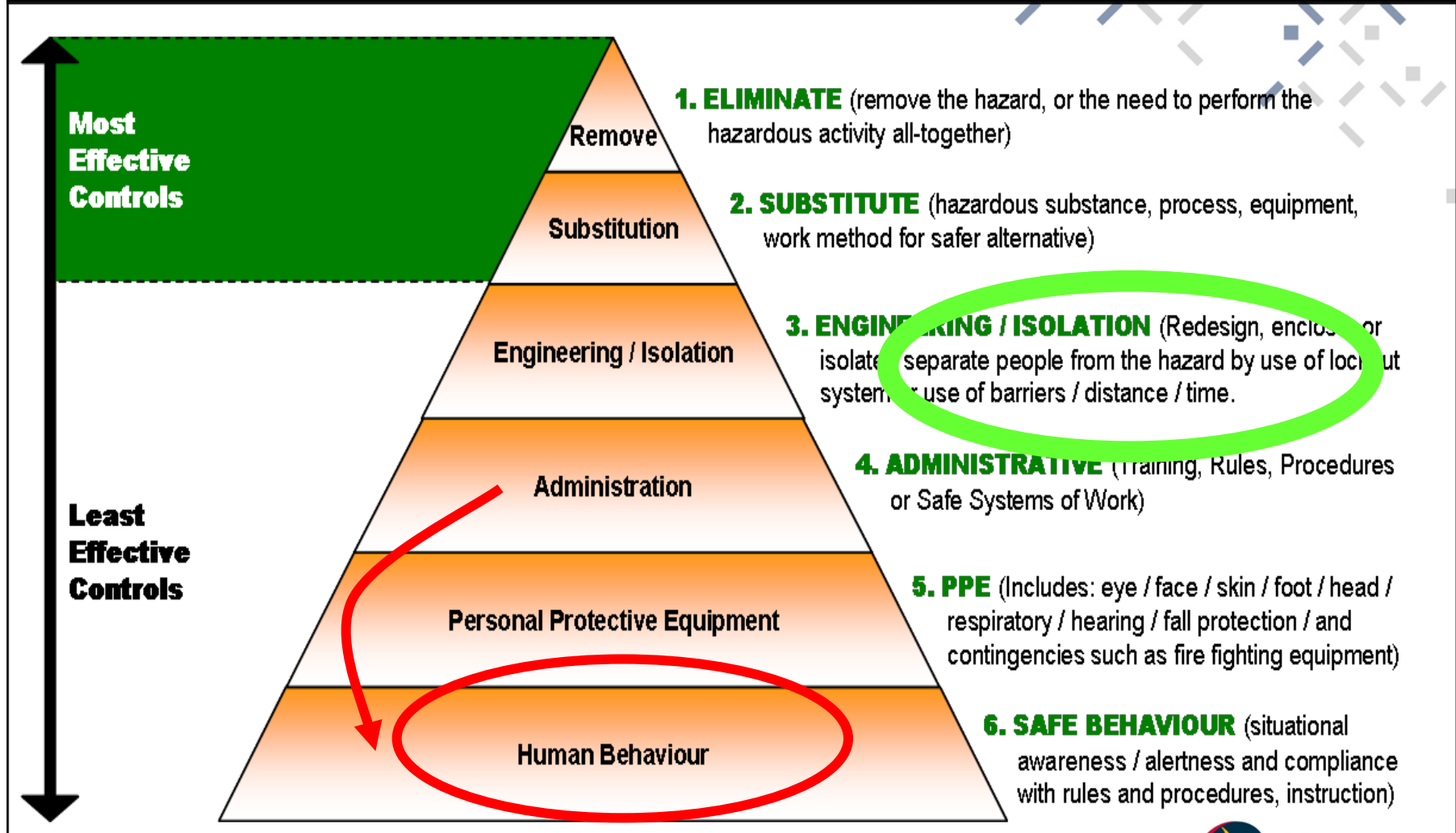
**Hazard:** Unplanned movement / loss of control

**Cause:** Driver not maintaining full attention to driving the truck



# Take Home Question: Where are you pitching your controls?

## Hierarchy of Controls



## Truck Pre-Start Checklist

**Priority #1 : Defined as a task that must be done now do not operate.**

### NOTIFY DISPATCH.

Steering.	Emergency Steering.	Horn.	Rock ejector bent & in tyre.
Services Brakes.	Park Brakes.	Head Lights	Mirrors missing.
Warning System.	Fire Suppression.	Tail Lights.	Wheel Nuts missing <3.
Fire Extinguisher.	ROPs / FOPs.	Fluid levels Eng / Hyd.	Hoist Rams / Pins bent missing
Seat.	Brake System Leaks.	Radiator Sight Glass (LvL)	Wipers / Washers missing.
Seat belt.	Major Tyre Damage.	Pins / Retainers auxiliary gear.	Access step missing.
Fuel Tank major damage.	Major coolant leaks.	Major Oil Leaks.	

**Priority # 2 : Defined as a task that does not have to be done now, however it should be done before next service and or repaired with-in 24 to 48 hours notify Dispatch.**

Two way radio. (get Hand held)	Grease Lines.	Oil leaks.	Collision avoidance.
Fuel leaks.	Mirrors loose.	Pin retainers.	Rock ejector bent.
Main Access loss.	Water leaks.	Tyres- Cuts & damage	
	Gauges.	Air con	

**Priority # 3 : Defined as a task that is to be done next service notify Dispatch.**

**Priority # 4 : Defined as a task that can be done at or after next service notify Dispatch.**

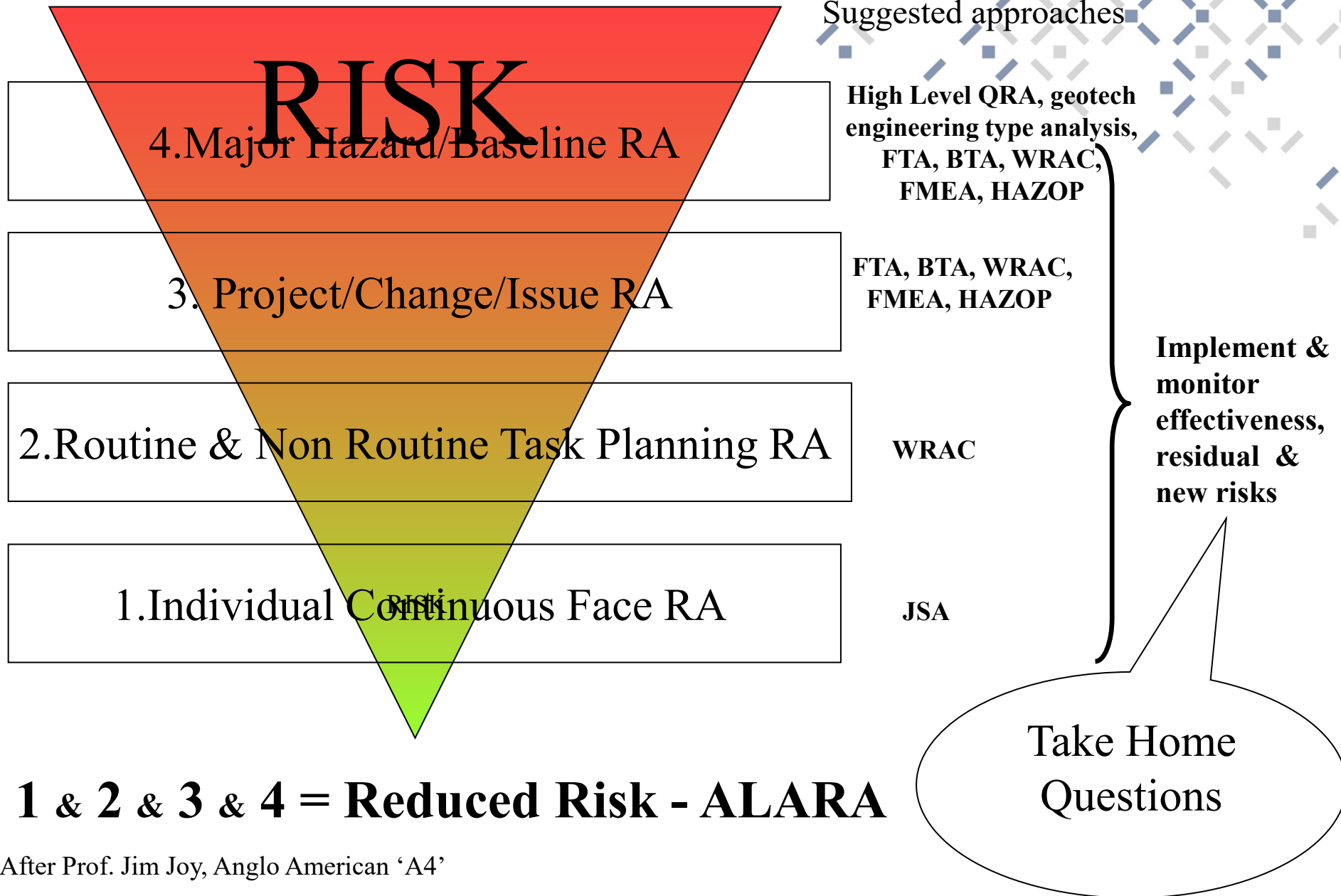
**{AN INFORMATION TAG MUST BE PLACED ON THE EQUIPMENT}**

Minor oil leaks.*	Damage reported.	Small Air leaks.
Wipers / Washers loos.	Other ladders / rails loose.	

**What an Oil leaks classification reporting rating would look like**

	<b>Level 1</b> Major Oil Leaks On Equipment		<b>Level 2</b> Running Oil small leak.		<b>Level 3,4</b> Dripping Oil leak
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# Layered Site Risk Management - What Risk Assessment to choose



# Take Home Questions - Control Effectiveness

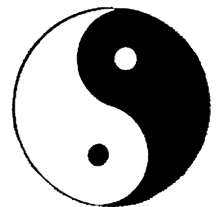
- Where are you pitching your controls – Elimination... or PPE?
- How good are the controls you currently have in place?
  - Are the controls actually available ?
  - Are the controls reliable, resilient and effective?
  - Does the control actually address the hazard? ‘How good is it ???’
  - Will the controls be used?
  - Will the control ‘survive’ the initial accident or incident?
  - Does the control rely on the intervention of a person, eg the operator, or are they automatic?
- Do your controls meet legislative requirements?
- Have you looked at the design of your equipment?





# In Summary

- **V2V, V2P V2I accidents are preventable**
- **If we don't do it – there will be more fatalities**
- **Proximity detection is not the complete answer but it is an essential part of the solution**
- **Must also look at human factors**
- **Up to industry as end-user to scope proximity system functionality and work with designer/manufacturers**
- **Proximity Detection Technology is available or rapidly becoming available**
- **Underground coal mines still not well covered due to IS approval issues**
- **Need a side by side combination of approaches**
- **COLLISIONgate - 2010**



# Proximity Workshop

Your last chance

- September 1 & 2, 2009 Townsville
- September 7 & 8, 2009 Toowoomba





# Decisions – in a nutshell



Decisions can be life taking  
Decisions can be life giving  
Its your call...