

A black silhouette of a city skyline with various skyscrapers of different heights and shapes, set against a white background.

SAFESTART

HUMAN FACTORS

CONFERENCE

Influencing Human Factors to Prevent Serious Injuries and Fatalities

Mike Breneman

Safety Director
U.S. Operations

Peabody



Human Error in an Increasingly Complex World

- BHP forced to intentionally derail an iron ore train in Western Australia in 2018
- No injuries, but it cost the company > \$300M
- What went wrong?
- What can we all learn from this?

Peabody View:

Two categories of factors which are largely responsible for the occurrence of (major) unwanted events

- Individual behaviors and decision-making
- Cultural/organizational influences that may encourage unwanted actions or discourage the prevention of unwanted actions

Negative individual issues we have seen:

- An “unhealthy” level of risk tolerance
- Slip/lapses
- Negative peer pressure
- The four states and critical errors

Negative cultural/organizational issues we have identified:

- Leadership not always promoting consequence-free near miss (close call) reporting
- Leadership negative response to “bad news”
- Inadequate investigation, follow-up and communication of (significant) near misses

Actions taken by Peabody to positively influence individual safety behavior:

- Pre-screening of employee candidates using safety aptitude tests to assess risk tolerance
- Safe Start training and sustained coaching for every employee
- Frontline risk assessments (primarily “Super SLAM”)
- Safety behavior interactions (supervisor and peer to peer)



Employees start every task with a Super SLAM

Look

Am I working with or around high energies? The higher the energy = the greater the risk = **THIS IS WHAT KILLS** Yes ☐ No ☐

Is there the possibility of Explosion, Fire, Structural Collapse, Roof or Highwall Failure, Engulfment or Flooding? Yes ☐ No ☐

Have I looked for line of fire potential such as vehicles, propelled shard or swinging object? Yes ☐ No ☐

Have I checked work area for pinch points? Yes ☐ No ☐

Can I be struck by mobile equipment or can equipment lose control? Yes ☐ No ☐

If I am operating mobile equipment, can I be severely jolted, jarred or pinned? Yes ☐ No ☐

Does this job involve lifting, pushing or pulling which are best described as "heavy, difficult or awkward? Yes ☐ No ☐

Are there areas where I will have poor footing or hand grip while climbing up/down or on/off equipment? Yes ☐ No ☐

What could happen if it goes wrong (with current controls)

Moderate	Significant	Major	Catastrophic
Medical treatment (MTI), restricted work (RWI) or lost time (LTI)	Serious bodily injury or disabling irreversible impairment, permanent partial disability (PPD)	Single fatality incident. Total and permanent disability (TPD) Major irreversible health effects	Multiple fatality incident Major injury/ disease among multiple employees

Hazard: (look for energies) - stored, gravitational, pneumatic, fire, explosion, electrical, hydraulic, etc.

Task	Hazards Identified	Controls/Barriers in place

If person is not performing their regular job, did I add controls? Yes ☐ No ☐

Does the person(s) observed understand the job/procedure? Yes ☐ No ☐

Is there a written procedure? If not should there be? Yes ☐ No ☐

Can task be done repeatedly without getting hurt? Yes ☐ No ☐

Last thought: have I done everything I should? Yes ☐ No ☐

Observe ☺ Open ☺ Discuss ☺ Clarify ☺ Agree ☺

☺ Motivating Desired Behaviors to Continue ☺ Active Listening ☺

Actively Caring ☺ How We Influence Actions ☺ Coaching ☺

Peabody



Interaction Guide

I will be a mentor and coach others

☺ Understand & Influence Less Desired Behaviors to Discontinue ☺

Supervisor or peer observes an employee performing a task and interacts with the employee

Observe & Open

Watch them work for a few minutes

Focus on energy sources - high energies "greatest risk"

What could go wrong? - (Injury / Damage)

Look for specific actions that did or did not occur and for equipment/tool features that are, or are not there

Can I recognize signs of the (SAFESTart "4-States"):

☐ Rushing

☐ Frustrated

☐ Fatigued

☐ Complacent/Comfortable

Can I determine why they are in these State(s)? Yes ☐ No ☐

Have I influenced it? Yes ☐ No ☐

Being in one of these state increases the chance of errors:

☐ Eyes not on task

☐ Mind not on task

☐ Line of fire

☐ Traction/Balance/Grip

Are they familiar with the "Critical Error Reduction Technique(s)" to help prevent making errors:

☐ Self trigger on state/energy

☐ Watch others for patterns of behavior

☐ Analyze close calls

☐ Work on habits

Discuss, Clarify, Coach & Agree

Comment on specific desired actions (if any)

Discuss specific desired actions observed and their importance. Explain why the behaviors are important to you. This encourages those behaviors to continue

Discuss undesired actions observed and include SLAM

Was a SLAM completed? If not complete Yes ☐ No ☐ the card together

Ask to review the SLAM card together

Actions/hazards/controls, documented could create a coaching opportunity?

Discuss concerns - consequence to self or others - using examples

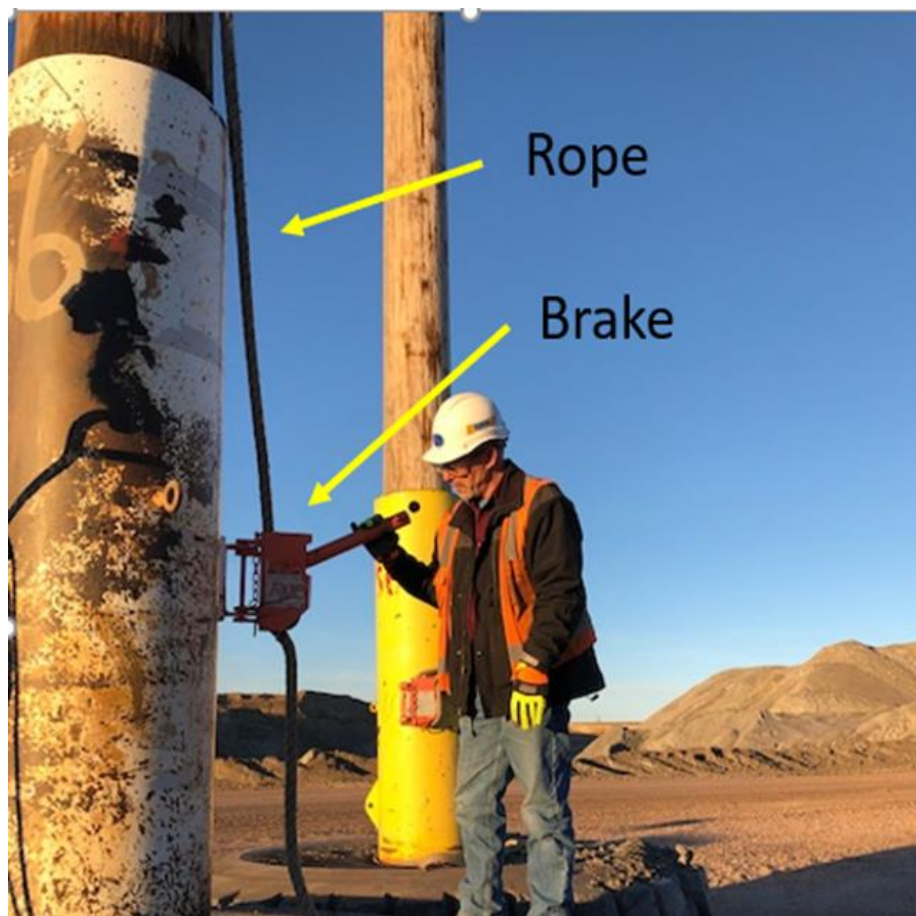
Do you understand the reason for undesired actions? To prevent we need to understand why they are chosen

Get verbal commitment to perform task in safe manner in future. E.G: to perform quality SLAM - identifying hazards and having effective controls in place

Discuss other safety issues - things we might have missed.

Thank the employee - Look them in the eye, shake their hand and thank them genuinely

The Cable Tree Incident



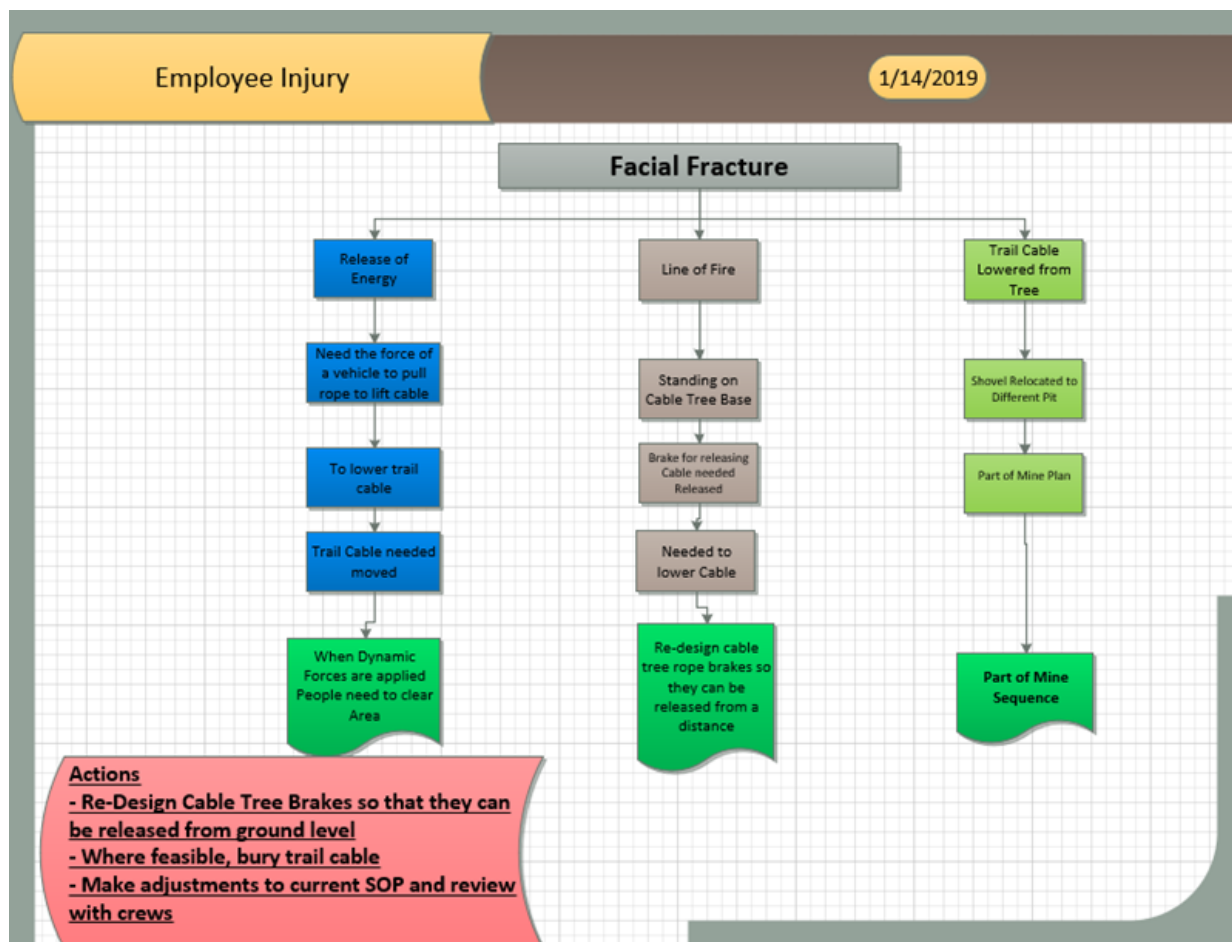
Actions taken by Peabody to positively impact cultural/organizational influences:

- Leadership training for all supervisors through VPs, with significant safety leadership component
- Through senior leader coaching and incentives/dashboards, each operation encourages close call reporting, investigations, corrective action and communication

Actions taken by Peabody to positively impact cultural/organizational influences:

- Learning from (significant) near misses (SafeStart “analyze close calls and small errors”)
 - Effective investigative techniques
 - Sologic Root Cause Analysis
 - Intersafe
 - Corrective actions (non-punitive)
 - Communicating/sharing learnings

Sologic root cause analysis

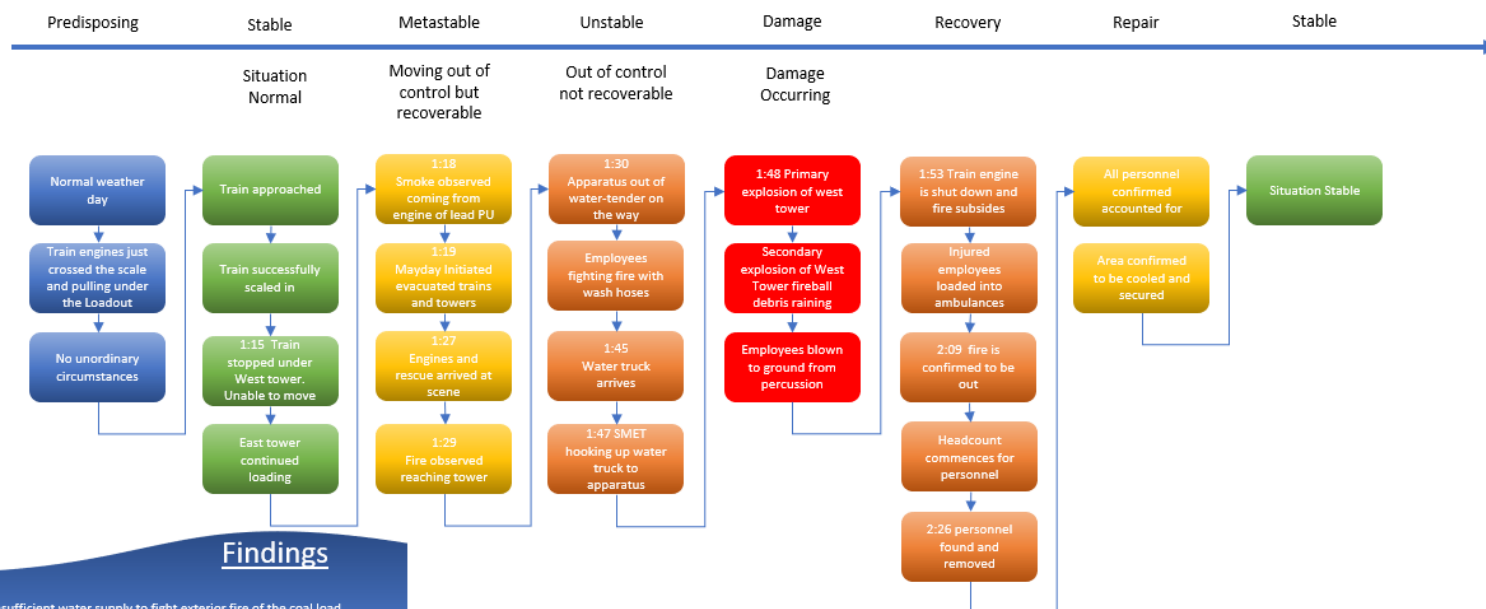


InterSafe investigations

Tabletop Exercise – Loadout Fire

Conducted – July 31, 2019

Loadout Explosion



Findings

1. Insufficient water supply to fight exterior fire of the coal load out area. Nearest hydrant is 100 meters away at silos
2. Staging of load spare water truck
3. Insufficient knowledge of train engine emergency shutdowns
4. Insufficient defined access of heavy equipment into the rail loop by loadout towers

Communicating near misses

Peabody

Peabody EHS ☐ Alert / ☒ Significant Incident Alert

SECTION 1 – Initial alert		SAP Incident No:			
Incident Date:	05/07/2019	Incident Time:	12:05am		
Site / Mine:	El Segundo	Area / Location:	Pit #4 Ramp #26		
Person (s) impacted:	Occupation/ Classification: Equipment Operator IV	Yrs mining experience:	10yrs. 40 wks.		
	Employee (s) ☒	Contractor (s) ☐	Visitor/Vendor (s) ☐		
Incident Details (including a description of the damage sustained, any equipment involved and relevant events before and after the occurrence, and any explanation of the cause of any injury. Include any linkage to principle hazards):	The Bucyrus 495BII Shovel (S-104) completed the set and backed out of the face for a scheduled lunch break. The Caterpillar 690D Rubber Tire Dozer (RT-504) moved in to clean the face where S-104 planned to walk back into after lunch; RT-504 commenced cleaning the pit floor on the south (spoil side). RT-504 operator was using material to push into a low spot near the south side of the pit. As he was backing up, the spoils began to move and came in against the rubber tire. Spoil material broke the left cab door glass and prevented the door from opening. The operator exited the machine through the right-side cab window without assistance.				
Actual and Potential Consequence (select one from each list):	The operator was wearing his seatbelt, and reported a minor injury.				
NOTE: PSI = Peabody Significant Incident RCA = Root Cause Analysis	<table border="0"> <tr> <td> Actual consequence: ☐ Low (Near hit / no damage) ☒ Minor (first aid treatment) ☐ Moderate (☐ MTI / ☐ RWI / ☐ LTI) ☐ Significant (FPD) ☐ Major (Fatality) ☐ Catastrophic (Fatalities) </td> <td> Potential consequence: ☐ Low (Near hit / no damage) ☐ Minor (first aid treatment) ☐ Moderate (MTI / RWI / LTI) ☐ Significant (FPD) ☒ Major (Fatality) ☐ Catastrophic (Fatalities) </td> </tr> </table>			Actual consequence: ☐ Low (Near hit / no damage) ☒ Minor (first aid treatment) ☐ Moderate (☐ MTI / ☐ RWI / ☐ LTI) ☐ Significant (FPD) ☐ Major (Fatality) ☐ Catastrophic (Fatalities)	Potential consequence: ☐ Low (Near hit / no damage) ☐ Minor (first aid treatment) ☐ Moderate (MTI / RWI / LTI) ☐ Significant (FPD) ☒ Major (Fatality) ☐ Catastrophic (Fatalities)
Actual consequence: ☐ Low (Near hit / no damage) ☒ Minor (first aid treatment) ☐ Moderate (☐ MTI / ☐ RWI / ☐ LTI) ☐ Significant (FPD) ☐ Major (Fatality) ☐ Catastrophic (Fatalities)	Potential consequence: ☐ Low (Near hit / no damage) ☐ Minor (first aid treatment) ☐ Moderate (MTI / RWI / LTI) ☐ Significant (FPD) ☒ Major (Fatality) ☐ Catastrophic (Fatalities)				
Consequence Category (check all that apply):	<table border="0"> <tr> <td> ☒ Injury / illness ☐ Environmental impact ☐ Equipment / property damage ☒ Business disruption </td> <td> ☐ Security ☐ Community impact ☐ Citation/ Reputation ☐ Fraud / Theft </td> </tr> </table>			☒ Injury / illness ☐ Environmental impact ☐ Equipment / property damage ☒ Business disruption	☐ Security ☐ Community impact ☐ Citation/ Reputation ☐ Fraud / Theft
☒ Injury / illness ☐ Environmental impact ☐ Equipment / property damage ☒ Business disruption	☐ Security ☐ Community impact ☐ Citation/ Reputation ☐ Fraud / Theft				
Immediate Actions:	Mayday was called over the radio and all mine operations were halted. Operator exited the cab with no assistance and only minor injuries. Emergency Response Team members assessed RT operator. Operator was treated on site for a small abrasion on his cheek from his safety glasses.				
Investigating person / team:	Name(s): Brian Lackey, Ross Hall, Matt Puderbaugh, Mitch Knapton and Cotton Jarrell	Date started: 05/07/2019			
Photos / Sketch:					

Peabody Energy Safety and Health Alert Form
Document Number: PE-SH-VFRA-AL-RT

Uncontrolled when printed

1 of 5

Peabody

Peabody EHS ☐ Alert / ☒ Significant Incident Alert

	
Issue Date:	5/07/2019
Location Contact:	William Jarrell Phone: 505-285-3048 Email: wjarrell@peabodyenergy.com

SECTION 2 – Causes and corrective actions			
SAFESTART States:	Rushing ☐ Frustration ☐ Fatigue ☐ Complacency ☒		
Critical Errors:	Eyes not on task ☐ Mind not on task ☐ Line-of-Fire ☒ Balance/Traction/Grip ☐		
Hazardous Energy:	Mechanical ☐ Thermal ☐ Chemical ☐ Electrical ☐ Other ☒		
Essential or Contributing factors:	Area that failed had been back filled		
Underlying (root) causes:	Shovel had stripped back to 1/2 to 1 slope and there was Moisture in the toe of the spoils		
Fault Tree Diagram / Apollo / ICAM RCA (optional inclusion on alert form)			
Corrective Actions:	What (detail action, object or system). Safety Stand Down with crew and oncoming dayshift crew	Control Type Administrative	Who (accountable person) Mitch Knapton
			When (completion date) 05/07/2019

Peabody Energy Safety and Health Alert Form
Document Number: PE-SH-VFRA-AL-RT

Uncontrolled when printed

4 of 5

The Cable Tree Incident (revisited)



Fatality Prevention



Peabody (U.S.) Experience (number of fatalities)

- 1957-1959 – 14 (industry avg – 483 per year)
- 1960s – 54 (266)
- 1970s – 80 (155)
- 1980s – 32 (94)
- 1990s – 7 (45)
- 2000s – 6 (32)
- 2010s – 9 (19)

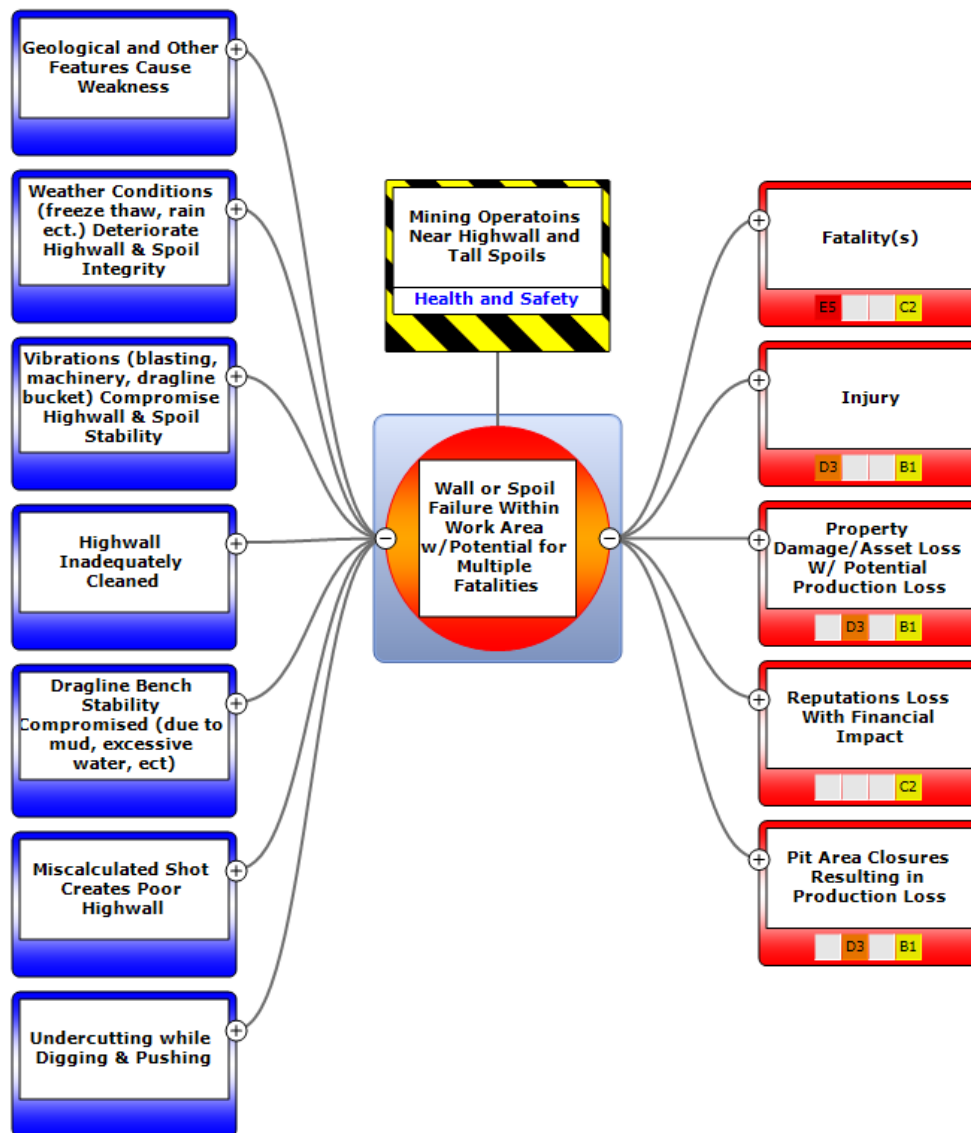
Fatality Prevention

- ✓ **Current emphasis on catastrophic risk management/event prevention**
 - Identified 43 plausible scenarios
 - Performed Bow Tie analysis on 22 of the scenarios to date
 - Creating a critical control management program/culture

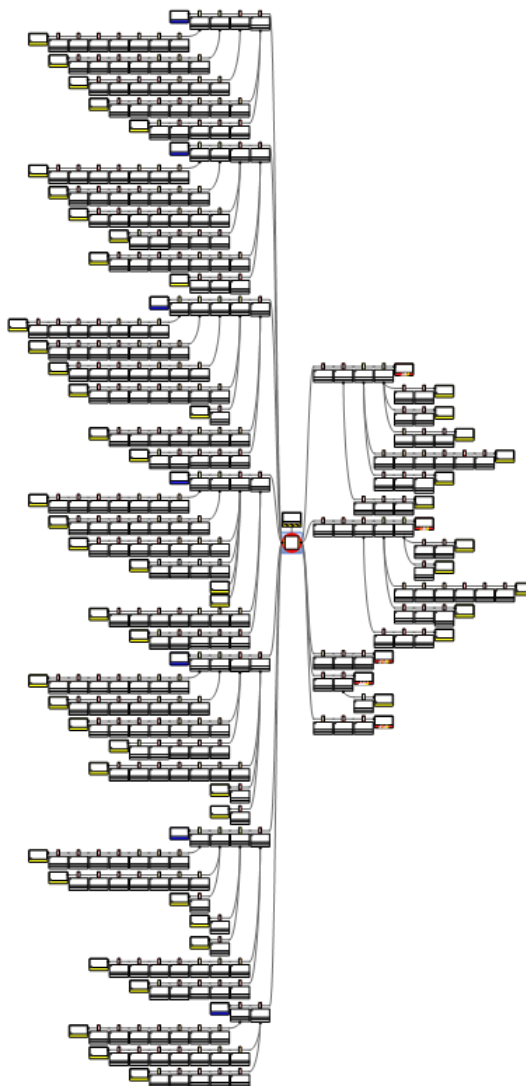
Catastrophic scenarios

AMERICAS CATASTROPHIC RISK BOW-TIE ANALYSIS STATUS						
High Hazard/Risk	BowTie Planned	Bowtie Complete	Bowtie Under Construction	Bowtie Needs to be Scheduled	Remarks	Posted on Por
All Mines						
Offsite Transport or Accommodation Incident (eg Fire)	✓					✓
Entry into Confined Space		✓				✓
Severe Weather (typically tornado/lightning)		✓				✓
Water Hazard/Drowning		✓				✓
Arc Flash				X		
Electrocution (High voltage)		✓				
Loss of control of a vehicle (collision with another vehicle or object)		✓				✓
Structural Collapse (Notably a wash plant)		✓				✓
Collision at Railroad Crossing (Struck by train)				X		
Natural Gas Explosion (Leak + ignition/explosion)				X		
Fall from Equipment/Other Height (eg two people in a JLG)		✓				✓
Equipment/Transformer Fire		✓				✓
Coal Dust Explosion/Fire (<i>maybe this should be moved to surface</i>)				X		Coa
Security Event Impacting Multiple People (trespasser/active shooter)		✓				✓
Surface Mines						
Public Road Crossing Collision (Haul truck to non mine vehicle)		✓				✓
Impact from Explosives (Fly rock)		✓				✓
Unwanted / Unplanned Initiation of Explosive materials or loaded holes		✓				✓
Highwall Failure/ Instability of ground		✓				✓
Tire Fire or Uncontrolled Release of Energy from Tire		✓				✓
Walking / rolling shovel				X		
Boom Failure/Collapse (Dragline and Shovel)				X		

Bow Tie analysis



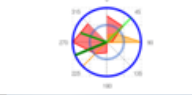
Bow Tie analysis



Critical control verification



Peabody

Americas heavy and light vehicle collision prevention at intersections (surface)		
Revision Draft 1	06/24/2017	Sites:
Initial Training ☐	Competency ☐	Critical Control Verification ☐
Hazard that can kill you: Collision between Haul Truck and a Light Vehicle		
 Caution: The interaction of light vehicles, particularly at intersections continues to be a contributor to severe injuries and fatalities.		
Equipment, PPE and visibility items required for the vehicles or people:		
	Flags and flashing lights or flag whips that are lighted to enhance visibility of light vehicles.	☐
	Proximity detection where installed.	☐
	Back up cameras on haul trucks or heavy equipment.	☐
	Cheese heads.	☐
Pit / road features that should be present or considered:		
	Stop signs for both Haul trucks and light vehicles at intersections other than Roundabouts. Roundabout signage includes directional and right-of-way signage.	☐
	Roundabouts at intersections or Intersections / crossings designed and constructed at 90 degrees.	☐
	Gates on haul road – some utilize sensors to activate. The gate ensures a complete stop (+ a few seconds) - as the haul truck waits while the gate arm raises, this allows enough time for traffic to exit potential blind spots. (This control was implemented at a public road crossing where haul trucks frequently crossed).	☐
	Radar system at intersection that detects presence of vehicle on haul road and signals by flashing red light and audible alarm that haul road traffic is in or approaching the crossing zone.	☐
	Berms lowered (but wider) near intersections increasing visibility between haul trucks and light vehicles as they approach intersections or concrete double Jersey barriers for 20ft prior to intersections.	☐

Document Number: PC-SAH-FRM-CRCS

Uncontrolled when printed

1 of 2





Conclusions

✓ **LEADERSHIP – this is where we must begin if we want to Influence the Human elements that can lead to Serious Injuries and Fatalities**

1. Caring
2. Communicating and collaborating
3. Setting the example
4. Investing – training, gadgets, time

THANKS FOR
Your Participation!