

# MINE SAFETY INVESTIGATION UNIT

Human interaction with backhoes and excavators

# Industry and Investment NSW data

- 73 reported incidents involving backhoe and excavator type equipment (4 year period August 2005 to 2009)
- <u>19 (average of 1 in 4)</u> of the reported incidents resulted in injury to either the operator or person in the vicinity of the equipment.
- Significant injuries one fatality, multiple skull fractures, fractures to the spine, pelvis, arms and crush injuries.



# Type of work task resulting in injury

Maintenance activity 5 injuries

Operation/machine collisions 4 injuries

Handling logs and trees3 injuries

Operator access/egress 3 injuries

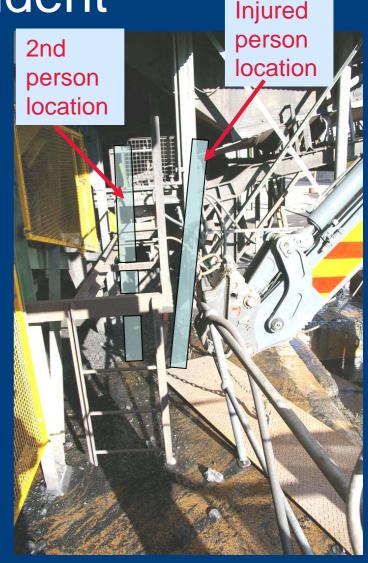
Handling polypropylene pipe2 injuries

Using arm as a lifting device2 injuries



### Person to Vehicle Incident

- What happened
  - Person located in between two steel structures and in front of a backhoe arm lifting a steel plate.
  - Backhoe operator not aware the person had entered into backhoe arm work zone
  - Unplanned slip and forward movement of the backhoe due to slope of ground
- Result Person crushed across the hips by the steel handrail as the backhoe arm pushed against the handrail.
- When 11 August 2008
- Where Coal preparation plant, Southern Districts, NSW.
- Published Safety Alert SA 08 -11





#### Person to Vehicle Incident

- What happened
  - Person walked into the work zone of a backhoe excavator arm whilst levering out a log from a pile of timber logs.
- Result Person struck in head by the root ball of the timber log as it ejected from the timber pile.
  - 32 skull fractures and brain injury
- When 24 August 2008
- Where Surface waste dump, Western Districts, NSW.
- Published Safety Bulletins
  - SB 08-08
  - SB 09-04

Injured person location





### Person to Vehicle Incident

- What happened
  - Person located in the work zone of an excavator moving logs.
- Result

Person struck by the moving timber log. Fractured pelvis and internal injuries

- When 18 November 2008
- Where Extractives, Southern Districts, NSW.
- Published Safety Bulletin
  - SB 09-04

Injured person location

2nd person in proximity





Operator struck in excavator cabin

- What happened
  - Excavator used to lift and drag 12m length of poly pipe weighing 600kg.
     The pipe slipped through the supporting chains and entered the operators cabin.
- Result Poly pipe broke cabin window and struck the operator.
  - Crush injuries
- When 31 March 2009
- Where Extractives, Sydney Region, NSW.
- Published Safety Bulletin
  - SB 09-04





# Significant incidents

- Fatal incident on 1 August 2009
  - Excavator pulling poly pipe resulted in the fatal injury of a person located nearby to the pipe being pulled. I&I NSW SA 09-10 and SB 09-03
- Fractures to leg on 30 January 2009
  - Excavator moving a tree stump, the stump entered the cabin and injured the operator
- Tree enters excavator cabin on 19 August 2008
  - Excavator lifting a tree with a grab onto a low loader. The tree slipped and broke the cabin windscreen.



# Significant incidents

- Fractured vertebra on 16 May 2007
  - Mud fell from the base plate of excavator onto the head of a maintenance person
- Fractures on 10 October 2006
  - Maintenance person whilst replacing a hydraulic hose fell from excavator boom arm
- Broken arm on 29 November 2005.
  - Persons arm was broken by the excavator arm as it was being lowered to lift a bundle of timber



## Issues of concern

- Failure of risk assessments to identify and control risky behaviour of persons in and around machinery
- Failure of plant operators and supervisors to identify and control risky behaviour of persons in and around machinery
- Failure to establish and maintain no-go zones, control zones and barricading around machinery
- Failure to maintain line of sight, and communications with persons working around mobile plant and machinery



- Do your identified risk assessment controls related to human interaction consider hierarchy of control?
  - AS 4801- 2001 OHS Management Systems
- Will the selected risk controls achieve
  - "As Low as Reasonably Practicable" outcomes ? (ALARP / ALARA)



- Eliminate the risk remove the offsider from the work zone place hard barrier controls
- Substitute the risk substitute 'hands on' activity by the offsider
- Engineering controls consider proximity detection systems to warn the operator of a person entering the work zone
- Administration controls safe work method statement, training and supervision



### Recommendations

- Review OHS management system and major hazard management plan to ensure that;
  - The working relationship between persons and machinery and primary hazards are examined. eg person to vehicle interaction (P to V)
  - Barriers, signs and markings are used to identify hazardous work areas, nogo zones and control zones. Persons should stay outside the mobile plant operating radius and turning circle.
  - Risk assessments and SWP for operation and maintenance of mobile plant are adequate to ensure that release of energy are identified.
  - Adequate training and information provided to operators and operator competency is reviewed.



# Industry and Investment NSW and other published resources

#### Safety Alerts and Bulletins

_	Directional boring fatality	SA 09-10
_	Broken pull chain results in fatality	SB 09-03
_	Worker crushed by sliding backhoe	SA 08-11
_	Mineworkers injured in machinery crush zones	SB 08-08
_	Human interaction with backhoes and excavators	SB 09-04

#### **Technical References**

- MDG 5004 Pitzer Report Study of risky positioning behaviour of operators of remote control mining equipment
- I&I NSW Small mines safety management kit (version 3)
- I&I NSW Investigation report slings and chains
- Workcover Code of practice 2002 Safety in forest harvesting operations
- Workcover Guide 2003 - 6<sup>th</sup> edition - Dogging
- Workcover Guide 2005 - 2<sup>nd</sup> edition - Rigging
- OHSMS specification with guidance for use AS 4801:2001
- AS 4360:2004 - Risk Management
- AS 2294.1 Supp 1- 2003 Earthmoving machinery – protective structures

