NSW GOVERNMENT | Industry & Investment

SAFETY BULLETIN

Human interaction with backhoes and excavators

BACKGROUND

Statistical incident data collected by Industry & Investment NSW in the four years to August 2009 identifies significant numbers of the incidents reported related to backhoe and excavator operations.

Analysis of the incidents has indentified that serious bodily injury was an outcome due to human interaction in and around the work zone of backhoes and excavators.

There were approximately 73 reported incidents involving backhoe and excavator-type equipment (not including fires on the machine).

Nineteen of the incidents resulted in injury to either the operator or a person in the vicinity of the backhoe or excavator.

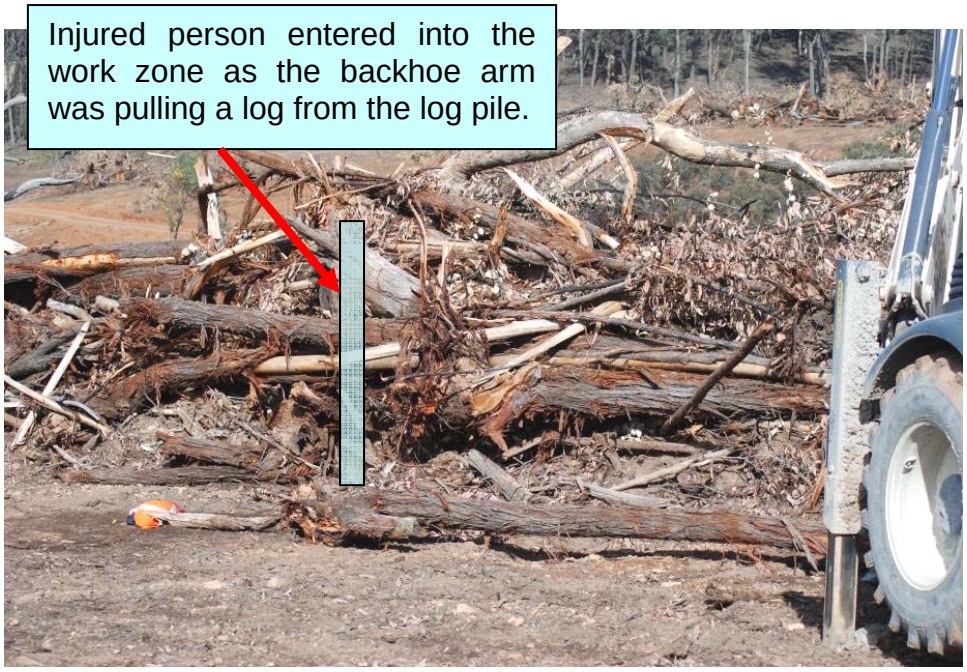
The injuries were significant including one fatality, a person with multiple skull fractures resulting in brain injury and persons receiving fractures to the spine, pelvis and arms and crush injuries.

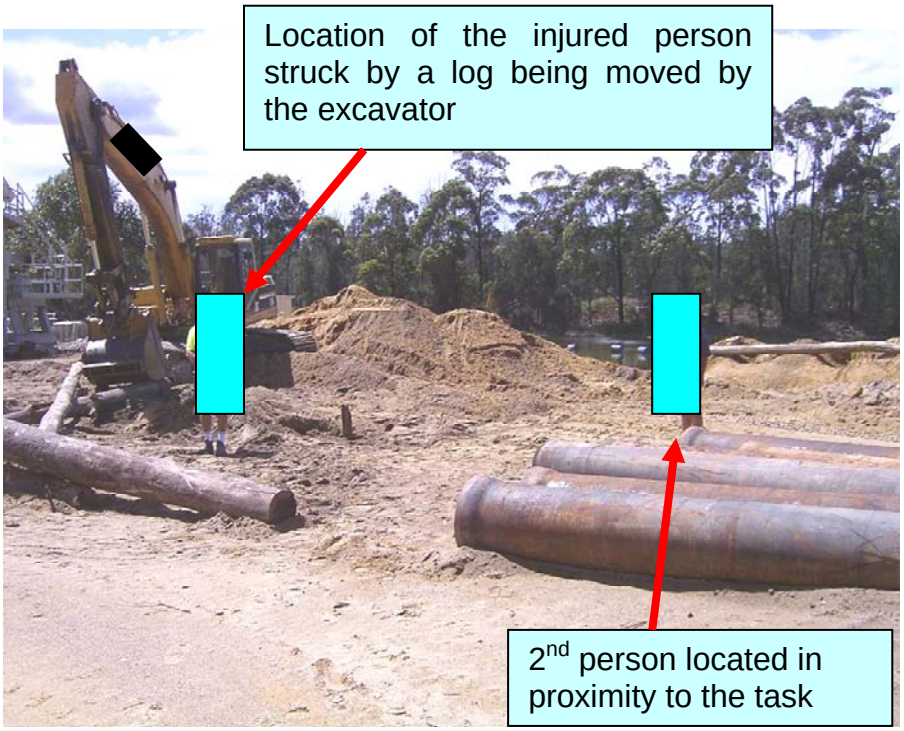
The type of work tasks resulting in injury were;

- Handling logs and trees – 3 incidents
- Handling polyethylene pipe – 2 incidents
- Using the arm of the machine as a lifting device – 2 incidents
- Maintenance activities – 5 incidents
- Operational and machine collisions – 4 incidents
- Operator access/egress from machine – 3 incidents.

The following three photographs were taken following incidents where a person associated with the work task had moved into proximity of the work zone of an operating backhoe / excavator. The machine operator was facing in the same general direction as the person located in the work zone.

Injured person had entered into the work zone and was positioned between two steel structures. The person was crushed between the railing forced by the backhoe arm and the fixed steel structure. The backhoe operator was not aware of the location of the injured person due to the raised backhoe arm.





The following photograph was taken following an incident involving lifting and dragging a 12 metre length of polyethylene pipe weighing approximately 600kg by an excavator. The pipe slipped through the supporting chains and entered the operator's cabin, striking the operator and resulting in injury.

Do you have backhoes or excavators operating on your site?

When conducting risk assessments involving the control of human interaction with work tasks involving backhoes and excavators it is foreseeable that incidents can potentially result in serious injury and death. (Many of the issues also apply to loaders).

Listed below are 10 of the reported 19 incidents involving injury:

Date	Detail	Injury Outcome
1 Aug 2009	Excavator pulling polyethylene pipe resulted in a fatal injury of a person located nearby to the pipe. Refer to Safety Alert SA09-10 and Safety Bulletin SB09-03	Fatality
31 Mar 2009	Excavator lifting and dragging polyethylene pipe. The pipe slipped on the lifting chains and came through the windscreen, injuring the operator.	Crush injury
30 Jan 2009	Excavator moving a tree stump. The stump entered the cabin and injured the operator.	Fractures to leg
18 Nov 2008	Excavator moving logs. The log struck a person assisting the work task	Fractured pelvis
24 Aug 2008	Backhoe arm applied energy to a log in a timber pile. Log ejected and struck person on the head assisting with the task. Refer to Safety Bulletin SB08-08	32 skull fractures, brain injury
19 Aug 2008	Excavator lifting tree with a grab onto a low loader. The tree slipped and contacted the cabin and broke the cabin windscreen.	No injury
11 Aug 2008	Backhoe arm lifting a metal plate while machine located on a slope of a sump. Person assisting task was crushed by the backhoe slipping forwards. Refer to Safety Alert SA08-11	Crush injury
16 May 2007	Mud fell from the base plate of excavator onto the head of a maintenance person	Fractured vertebra
10 Oct 2006	Person fell from excavator boom replacing hydraulic hose during maintenance activity	Fractures
29 Nov 2005	Person's arm was broken by the excavator arm as it was being lowered to lift a bundle of timber	Broken arm

Examples of questions related to risk assessment and consideration of hierarchy of control for human interaction

Have the risk assessment controls which identify human interaction considered the effectiveness of the hierarchy of control as identified in AS 4801:2001 OHS Management Systems?

Will the selected risk controls achieve 'as low as reasonably practicable' outcomes?

1) **Eliminate the risk**
   a. Remove the offsider from the work zone of an excavator or backhoe.
   b. Place hard barrier controls to prevent an offsider from entering the work zone without the machine operator being fully aware of the intent to enter.

2) **Substitute the risk**
   a. Substitute the method of controlling the load instead of reliance on hands-on human interaction with the load, e.g. use tag lines.
   b. Substitute the risk in consultation with engineering advice to ensure lifting and pulling equipment is used within its rated capacity.
   c. Substitute in consultation with the appropriate OEM fit–for-purpose equipment suitable for the task, e.g. use of log grab and pipe handling devices.

3) **Engineering controls**
   a. When handling pipes and logs provide guarding for cabin windows.
   b. Proximity detection to warn the machine operator of persons and equipment around machines has been trialled at several NSW and Queensland mining operations. It is reasonably practicable to use proximity detection technology to warn an operator of the unintended presence of a person in the work zone of a backhoe or excavator.

4) **Administration procedural controls**
   a. Has an approved safe work method statement been created?
   b. Does the safe work method statement consider available information published in Australian Standards, Codes of Practice and Guidelines?
   c. Do the supervisor, operator and offsider review the procedure and risk controls specific to the site before commencing the work task?
   d. Is the method of communication between an operator and the offsider effective?
   e. Have the operator and offsider been trained and assessed as competent for the work task?
   f. Is work place compliance the subject of frequent supervisor observation, audit and review?

5) **Personal protective equipment**
   a. Wear appropriate PPE.

NOTE: Please ensure all relevant people in your organisation receive a copy of this Safety Bulletin, and are informed of its content and recommendations. This Safety Bulletin should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's notice board.

REFERENCES

Safety Alert *SA09-10 Directional boring fatality*
Safety Bulletin *SB09-03 Broken pull chain results in fatality*
Safety Alert *SA08-11 Worker crushed by sliding backhoe*
Safety Bulletin *SB08-08 Mineworkers injured in machinery crush zones*
Safety Alert *SA04-09 Broken chain connector results in serious injury*

Small Mines Safety Management Kit (version 3)

Investigation Unit report - Slings and chains:
www.dpi.nsw.gov.au/minerals/safety/major-investigations/investigation-reports

Work Cover Code of Practice 2002 – Safety in Forest Harvesting Operations
WorkCover Guide 2003 - 6th edition - Dogging
WorkCover Guide 2005 - 2nd edition - Rigging

AS 4801:2001 -	Occupational Health and Safety Management Systems – Specification with guidance for use
AS 4360:2004 -	Risk Management
AS 2294.1 Supp 1 – 2003	Earthmoving machinery – protective structures

Signed

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