ESIG | ***SAFETY NOTICE***

Drilling Breakout and Slips Table Hazards

INTRODUCTION

The frequency of fatalities and traumatic injuries in the drilling industry has been greatly reduced in recent years. This can largely be attributed to the widespread use of engineering controls such as high pressure air hose restraints, cages around rotating rods and automated rod handling equipment.

Although usually less severe, incidents relating to breakout are gaining higher profile and recognised to be quite common.

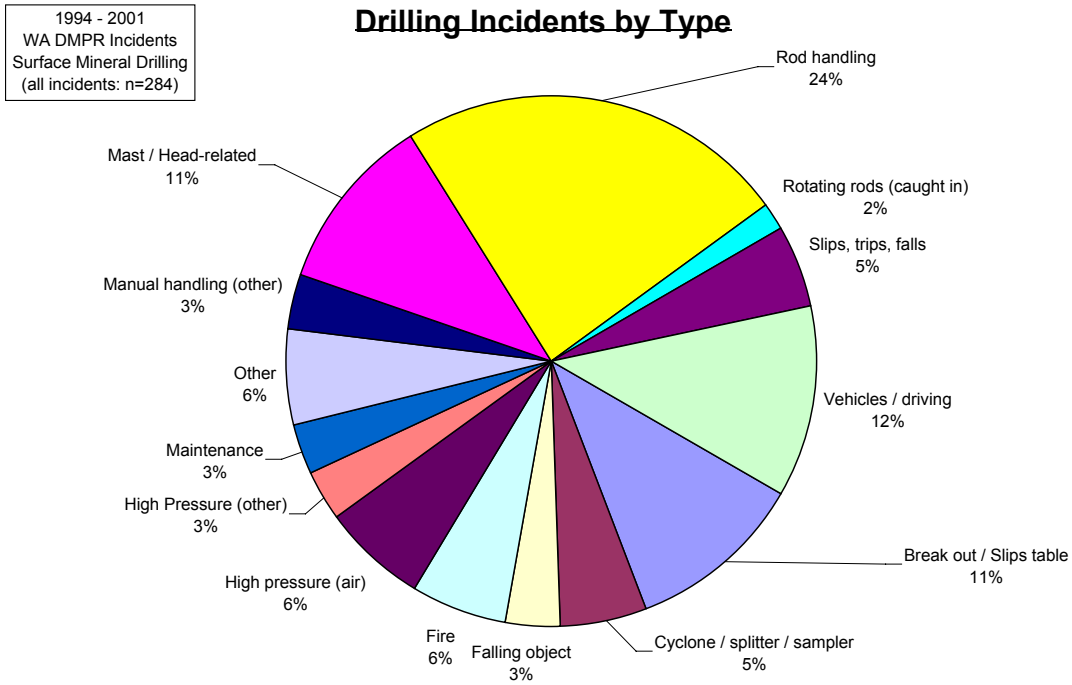
This document summarises drilling incident statistics, some recent breakout incidents, discusses some key learnings from these incidents and presents some examples of mechanical solutions.

STATISTICS

Drilling incident data was acquired from the WA Department of Minerals and Petroleum Resources web site and other publications. The number of surface mineral drilling incidents totals almost 200 (1994 to 2001), although the data for 1994 – 1996 is limited.

The main points to come from analysis of this data are:

- 61% of drilling injury-related incidents involve offsiders
- 77% of reported drilling incidents result in injury
- 41% of injuries are to the hands
- the mechanism for 41% of injuries is 'caught by or between' ('struck by' = 35%)
- Rod handling accounts for 23% of incidents. Breakout / slips table = 11%.



INCIDENTS

The following examples have been included to highlight some of the dangers associated with breakout activities during drilling. A listing of breakout incidents is appended to this safety notice.

Editing Note: Do we need to get permission from the drilling companiesy involved in these incidents.

Aircore Rig, February 2000

A Drill Offsider had his little finger squashed during a rod change on an aircore rig.

The offsider placed the rod spanner in the tool joint of the lower rod and within the metal guides on the slips table. The driller began to rotate the rods and initiate "breakout". As he did this, the offisider attempted to re-position the rod spanner with his right hand. In doing this, the offsider raised the heel (rear) of the rod spanner and, as the rod and spanner were rotated, the spanner passed over the RH platform stop on the slips table. Rotation continued and the offsider's RH little finger was crushed between the rod spanner and the hydraulic stilson. The offsider suffered a cut requiring three stitches. A guard (shroud) was fabricated on the rod spanner to prevent similar injuries in the future

RC Drilling, March 2001

A drilling offsider suffered injuries to a finger when it was struck by the breakout spanner.

Whilst pulling rods, the driller was still rotating the rods to align the flats and the offsider was ready to position the breakout spanner. The offsider attempted to position the spanner before the driller had stopped rotation. The spanner partially caught and rotated with the rods, trapped a finger on the offsider's right hand between the rod spanner and the hydraulic stilson. Rod spanner was redesigned to eliminate the extension handle. Better communication between driller and crew required. Long term action is to fit an automated breakout device.

Diamond Drilling, August 2001

A driller was struck in the mouth by an extension bar used on a stilson wrench. Minor abrasions and bruising / swelling were sustained. He was pushing on the extension bar when his hands slipped and the bar sprung back, striking him in the mouth. Correct procedure was not being followed. (The photograph shows a re-enactment of this incident.)

KEY LEARNINGS

Assess Risks
A comprehensive risk assessment should identify and prioritise the risks associated with breakout tasks. It should then be possible to recommend control measures to effectively manage the risks.

Use of Mechanical / Automated Breakout Tools
Engineering controls are recognised as very effective hazard control devices under the accepted Hierarchy of Control. Such controls either remove an operator away from the hazard or provide a barrier to guard an operator against the hazard.

Inspect Tools
All tools, whether manual or automated, involved in the breakout process need to be inspected regularly. This is especially important for critical tools or components. Tremendous forces are applied during breakout and tools can easily become subject to wear-and-tear and metal fatigue.

Develop and Follow Procedures
Step-by-step procedures should be developed as a result of an analysis of breakout tasks. This should be done by consultation with key workers and agreed to as the safest way to carry out the task.

Inductions and Training
Drilling personnel involved in breakouts must be properly trained in these tasks. This should include a summary of the breakout process and the energies involved, the correct procedures to be followed, and the inspection and maintenance regimes.

Non-verbal Communication
Operating drilling rigs can be extremely noisy working environments and it is not always possible to rely on verbal communication to be heard and understood. Drill crews should develop and understand basic methods of non-verbal communication (eg. hand signals) to assist when required during breakout.

MECHANICAL SOLUTIONS

Conventional Breakouts

Although these are not automated methods of breakout, they are still much safer than existing stilsons because they grip the entire circumferance of the rod and reduce slippage.

- Petol
- Rapspan
- Diaspan

Examples of Automated Breakouts

- Safe-T-Spin

- UDR RC Breakout Tong

Breakout Description
A driller's off-sider suffered a crushed thumb when it was trapped against the drill mast. He was applying a stilson wrench when the driller applied some power trapping the off-sider's hand.
A contractor's driller's offsider had his ring finger partiallly amputated whilst removing a drill rod from the hole. He placed a stilson on the tooling joint to torque up the joint when the rod rotated trapping his finger between the wrench and the mast.
A contractor's driller's offsider suffered an amputation of the finger when it became trapped between the rod and the chuck whilst attempting to remove the spanner after adding a drill rod.
A driller's offsider fractured his ring finger while pulling rods on a RC rig. His finger became jammed between the stilson wrench and the drill mast.
A driller's offsider, on his first day on the job, received crush injuries to four fingers. The driller was manoeuvring the drill table when the offsider's hand became caught between the two halves of the table.
A drillers offsider had a piece of metal fly off a drillrod and lodge in his chest when he hit the drill sub with a hammer to free it from the drill string.
A driller received lacerations and a broken cheekbone when he was struck by the jaw of a stilson wrench which broke during the removal of drill rods.
A driller received a bruised foot when it was crushed by the drill string while he was attempting to adjust the slip rings.
A driller was injured when a stilson wrench he was using snapped, hitting him on the chin and inflicting a 50 mm gash.
A driller and his offsider were attempting to unscrew a reaming bit down the hole. The offsider's fingers were lacerated when they were jammed between a stilson and the drill table.
An assistant driller injured his ribs when he slipped and fell while attempting to break the diamond bit off the barrel of a rod.
A contract driller sustained chest and back injuries when he was attempting to free a drill assembly and he became pinned between a scaffold and a pipe spool.
A table offsider received bruised ribs when the Stilson he was using to break the top thread of drill rods caught on the moving rod, causing the Stilson to rotate and strike him in the rib area.
A driller's offsider sustained bruising to his sternum and shoulder when he was struck by a break out ram while attempting to break out the hammer from a drill rig. The offsider was in the process of using the ram on a stilson wrench when the rod broke and struck him.
A driller's offsider received soft tissue damage to his hand and rib area when a stilson struck him. He had placed the wrench on the hammer drill shaft in preparation for breaking the rods, while the driller raised and lowered the string. The driller accidently pushed the reverse rotation lever instead of the fine feed lever, causing the stilson to swing and strike the offsider.
A driller's offsider suffered lacerations and two minor fractures of his finger when he caught his hand between the drill rod and the lower rod clamp. A misunderstanding of the communications between the driller and the offsider was the cause.
A driller's offsider suffered pain and possible fracture in his palm when using Stilson wrenches to break a jammed drill connection. The Stilson slipped and struck his hand.
A driller received facial injuries when attempting to break the join between the hammer and the rotation rod, using a pair of stilsons. The victim started the back rotation, but the bolts holding the rotation head to the mast sheared, and the head swung quickly and caught him in the face.
A driller sustained lacerations to his penis when it became caught between the drill mast and the slips table as he was hammering the slips back into place.
A driller suffered a strained lower back when he lost his balance while using a sledge hammer to break apart a drill string.
A driller's offsider sustained a crush injury to his finger during a breakout of drill rods. While he was attempting to position the spanner, the jaws caught and rotated the spanner, with the handle and his fingers being slammed against the rig structure.
A driller's offsider sustained a fracture to a finger when his hand was caught between the rod spanner and the hydraulic stilsons while pulling rods out of the hole.
A fitter suffered bruised ankles when he was struck by the stilson wrench he was using to break a hammer off drill rods. The wrench grabbed on the drill rod and rotated with it striking him on one ankle, the driller then reversed the rotation and the wrench struck him on the other ankle.
A driller sustained bruising and lacerations when his hand slipped on the piece of pipe he was using as leverage on a stilson during, the break out of a drill rod. The bar recoiled and struck him in the mouth.
A driller's offsider suffered a small broken bone in his hand when unlocking a drill rod. The stillson wrench slipped and he caught his hand between the stillson and the other spanner.
A driller's offsider received bruising and lacerations to his fingers while breaking rods with a stillson wrench. The rod dropped a short distance, jamming his fingers between the stillson handle and the footplate.
A driller received broken bones in his hand when it became trapped between the drill rod column and a stillson wrench.
A driller's offsider suffered damaged ribs when he fell against the handle of the rod spanner. While putting a new rod on the drill the victim's leg slipped through the rod aperture in the platform, causing him to fall forward.
A driller's offsider received a lacerated ear and bruising to the head when removing rods from the hole. A stillson wrench was being used to unscrew the rods, and when the two rods separated the stillson swung round and struck the victim on the head.
A drilling assistant required surgery to remove a sliver of steel from his abdomen following a mishap while changing drill bits. Drilling had stopped and the last drill rod had to be removed by applying two stillsons and hitting the stabiliser with a steel hammer to break the join. The stabiliser had a build up of hard-faced weld, a piece of which sheared off at impact and struck the worker.
A driller's offsider received bruising to the chest when he was struck by a drill rod and knocked from the platform on which he was standing. The rod was being removed from the drill hole when it pivoted on the Stillson wrench holding it and swung around hitting the man.

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