

## **1. BACKGROUND INFORMATION**

### 1.1 Location and Time

At approximately 11.45 hours on Friday 30<sup>th</sup> November 2001, an incident involving a drill rig UDR 650#1 occurred. The rig was performing Reverse Circulation (RC) drilling and following standard procedure.

### 1.2 Personnel and Equipment

Personnel on the rig included the driller and two offsidiers.

Equipment included AD drill rig UDR 650#1, a modified crawler mounted UDR 650, and all associated rod handling gear for RC drilling.

### 1.3 Description of Equipment involved in Incident

The rod handling system used on this drill rig incorporated the use of the main winch cable (standard set-up on UDR650 rigs) attached to a 'clamshell' or sliding saddle from which a wire rope is run to a hook. Both the clamshell and the hook have handles for manually controlling the apparatus. This system (or variations of it) is standard practice in the industry.

## **2. DESCRIPTION OF INCIDENT**

### 2.1 Sequence of Events

The incident occurred when the wire rope attaching the clamshell to the hook broke causing the drill rod to slide through the clamshell and fall to the ground. The offsider had hold of the handle on the hook which dragged him down as the rod fell causing him to strike his head against the drill rod. As he collapsed, he also knocked his right knee on a metal guard on the ground.

The drill rod came to rest against the mast having fallen onto the metal mesh spin-guard which was placed on the ground while running rods – Figures 1 & 2.

### 2.2 Extent of Injury

The offsider was transported to the mine office by the driller and other offsider where he received first aid. He had suffered mild concussion after the blow to his head caused momentary loss of consciousness. He also had a small contusion on his right knee from the impact on the metal guard.

He was then taken by site ambulance to Orange Base Hospital for medical treatment. He was discharged after a medical examination and a short period of observation. He returned to work on alternate duties the following day.

## **3. ANALYSIS OF THE INCIDENT**

### 3.1 Investigation

The accident scene was secured and immediately inspected by the Senior Project Geologist, and Technical Services Manager. The Engineering Manager also visited the scene to assist with the investigation.

Three (3) other RC rigs were also in operation at the project site. These included UDR 650#8, rigs UDR 1000#10 and UDR 650#3. The rod handling gear on these rigs was inspected by the investigation team.

The later two rigs were found to be adequately engineered for purpose and allowed to continue work. Rig UDR 650#8 however was set up in a similar manner to UDR 650#1. This rig was also shut down until the wire rope could be replaced with high tensile chain and corresponding shackles and swivels fitted.

### 3.2 Contributing Factors

- The wire rope was 8mm, 6 strand (each of 6 finer strands), right hand wound, ‘spinning’ cable rated to 10,325lb or 4.61 ton for a steady lift - Figure 3.
- This cable is intended for use as the wire line rope on (diamond) drill rigs and not as a lifting cable for RC rigs although the practice of using the readily available wire line rope on multipurpose rigs is common.
- The wire rope was fitted prior to the rig commencing the program at the site on the 10<sup>th</sup> October 2001; the rig had since completed a total of 2514 metres (@ 6m rod length = 419 x 2 rod trips in and out of hole).
- The wire rope was fitted with swivels at both ends as opposed to a single swivel at the clamshell attachment (usual set-up) – Figure 4.
- The drill rod was a 4” diameter x 6 metre long Medski rod of approximately 159kgs.
- The main winch on the UDR 650 rigs is capable of exerting in excess of 10 ton pulling capacity.
- The main winch hydraulic system did not incorporate a ‘torque limiter’.
- The clamshell was a standard issue UDR component for which there is no stated rating.

### 3.3 Mode of Failure

- As the main winch is capable of exceeding the rating of the wire rope, and as no torque limiter was fitted to that rig, it is likely that at some stage the hook or clamshell has been caught on something momentarily causing a tensional force in excess of the wire rope rating. This is plausible but not definite in the opinion of the crew.
- The use of ‘spinning’ wire rope instead of ‘non-spinning’ rope will cause the cable to unravel or bird-nest when subjected to high tension (sudden jamming etc).
- An initial ‘jamming’ may have caused a minor internal failure of one or more of the fine strands which could have propagated with repeated use; the external appearance of the cable would not show obvious signs of the ‘bird-nesting’ internally.
- A slight jerk of the main winch while running the rods would be enough to cause sudden catastrophic failure, this is quite likely (and unavoidable) when conducting rod handling exercises.

### 3.4 Remedial Action

- Immediately replace the wire rope with 6 tonne rated, high tensile chain and shackles to suit on all rigs requiring attention. COMPLETED 30<sup>th</sup> November.
- Replace the two swivels with one equally rated swivel. COMPLETED 30<sup>th</sup> November.
- Install torque limiter on drill rig UDR650#1 (UDR 650#8 and UDR650#2 both have torque limiters fitted). TO BE COMPLETED by 7<sup>th</sup> December.

The drilling rigs operated by \_\_\_\_\_ were inspected on the day and found to be using lifting gear and winches compliant with the manufacturer’s recommendation.



**Figure 1.**  
Metal mesh guard on which off-sider struck knee. Lifting hook with handle still in rod end, failed wire rope and swivel attached.



**Figure 2.**  
Drill rod leaning against rig mast, end 'speared' into metal mesh guard. Clamshell and main winch at top (7/8) position on rod.



**Figure 3.**  
8mm diameter, 6 strand wire cable showing tensional failure.



**Figure 4.**  
Lifting 'rope' showing failure and twin swivel set-up.

## 4. RECOMMENDATIONS

### 4.1 RC Drilling Rod Handling Procedure

- Review procedure and investigate alternate method of rod handling.

### 4.2 Lifting Apparatus/Rod Handling Gear.

- Discontinue the practice of using wire line cable; use either 'non-spinning' cable or high tensile chain.
- Ascertain safe working load rating of UDR manufactured 'clamshell'.