

# **QMIHS** Conference

## Hydraulic Semi-Automatic Chain Control System

**Presented by:** 

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# Incident

- **Date:** 13<sup>th</sup> January 2009
- **Place:** U62 Feeder Room, U1A Picking Belt
- Occurrence: Wet ore was discharged into the U62 surface bin
- **Result:** Uncontrolled movement of ore through U1A chute, sweeping the Operator off his feet causing him to strike his head against a ladder framework



## **Result – Uncontrolled movement of ore**





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## **Uncontrolled movement of ore**

#### **Definition:**

 This is a hazard that involves the existence of a significant quantity of water, when mixed with a material is likely to be released and flow uncontrollably due to external energies, eg. gravity or pressure.

#### **Consequence:**

- Serious injury to the Operator
- Damage to property/equipment
- Business interruption



# **Incident – U1A Picking Belt**





# Current U1A/U1B Ore Control XStrata





# Swing chute

## Sling to secure chains



# **Original Operation**

## **Risks**

- Uncontrolled flow of ore Operators exposed to potential serious injury
- Steps taken to prevent/minimise uncontrolled flow of ore introduced additional risks - Manual handling, pinch points, belt isolation & working at heights

#### **Error forcing conditions**

- Time taken to set up and de-rig sling and chain block was a minimum of 30 minutes
- Numerous notifications of wet ore without an event, would amount to the operator dismissing the call to prevent an interruption to hoisting.



## **Major/Principle Hazard Management**

### HAZARD (ENERGY)

THREATENING EVENT

Water / Material (Gravitational) Uncontrolled Movement of ore



## **Hazard and Risk Management Process**





# **Control Framework**





# **Solutions**

#### Prevention

- Water control devices are being installed at various strategic points in the ore stream to limit excessive water ingress into the system.
- Communication Procedure for operators in the event of wet ore.

#### Monitoring

• A "Vega" radar bin level monitoring and control device has been installed in the U62 ore bin to ensure that the bin levels are being monitored at all times.

#### 1<sup>st</sup> Response

Chain Control Systems

#### Amelioration

• As per the current site Emergency Response Plan



Two design options of a Hydraulic Semi-Automatic Chain Control System were developed and installed:

### Design 1

 Electro-hydraulic Rigid "U" Frame operating from the rear of the chute – U1A (Design option 1)

#### **Design 2** (Preferred option)

 Electro-hydraulic Compression frame operating from the front of the chute – U1B (Design option 2 – Preferred)



## **Chain Control System**

#### Electro-hydraulic Compression frame operating from the front of the chute – U1B

- A fabricated compression frame that pivoted above the front of the U1B chute was attached to a hydraulic ram that applied/released pressure to the chains.
- The chains were attached to the compression frame thus eliminating the use of the bridle and chain block system that had been in use to control the ore flow.
- By raising or lowering the frame the flow of ore is controlled.
- To stop the flow of ore through the chute or in the event of an uncontrolled movement of ore, the ram is fully extended compressing the chains against the ore flow.
- Total cost \$16 000.



# xstrata copper

# Advantages

- Safety is enhanced as the operator can immediately compress the chains to prevent an uncontrolled flow of ore
- One Operator no additional crews required for set-up
- Control of the ore can take place from a remote location
- Reduction in manual handling operations for the Operator
- Operator fatigue levels reduced due to less manual handling operations
- The swing chute is no longer required to limit the flow of ore.
- System is very easy to operate, minimum training required
- In the event of hydraulic failure, operator can revert to chain block operation
- Highly cost effective



# Conclusion

Transferability of innovation to other feeder systems – R62 Feeder room, all U/G Chain controlled chutes

