Guideline for the compilation of a*

Risk Assessment

on the

High Pressure Air Pump
(Blue)

**This guideline has been prepared by New Concept Mining (Pty) Ltd to assist a user in the compilation of its own Risk assessment as required by the Mine Health and Safety Act.*

Revision: 02
Last Revised: 25th July 2009
Ref. Number: NCM RA09

Section 1 Summary

Introduction

In order to compile this risk assessment guide on the High Pressure Air Pump (Blue), nominated members of New Concept Mining (Pty) Ltd met, and agreed on the Risk assessment objective and approach. A team was formed to facilitate and develop the High Pressure Air Pump (Blue) risk assessment guideline.

The High Pressure Air Pump (Blue) is used to inflate hydraulic pre-stress units (PSUs) for mine support props as well as Hydrabolts and X-Pandabolts. It was designed to be safe when used in stoping operations. The pressure is regulated through the Safety Pistol's pressure relief valve and not through the setting of the pump as is the case with other makes of pneumatic pumps. The High Pressure Air Pump (Blue) therefore operates at full available air pressure with no risk to the operators.

A risk assessment guideline is required in terms of the Mine Health and Safety Act 1996 because the item is used to inflate PSUs, Hydrabolts and X-Pandabolts to high pressures resulting in the required loads for correct hanging wall support underground.

From the Risk Assessment Guideline, it is hoped that critical points in the correct operation and maintenance of the High Pressure Air Pump (Blue) will be apparent. By providing attention to these points risks will be minimised and the overall safety of the system maximised.

Operational Risk Analysis

To identify the hazards, prioritise the risks associated, and highlight the controls required to eliminate/minimise the risks related to the High Pressure Air Pump and its operation, as well as any risk of failure, primarily from the point of view of the health and safety of the workforce, but also production delay and asset damage and /or a combination of the three.

Section 3 - Risk analysis method

The risk analysis followed two accepted methods. All risk analyses follow a general scheme that can be described as follows:

- Describe the system under analysis (including equipment, personnel, procedures, work environment, management and supervisory systems etc.).
- Identify loss scenarios (i.e. sequences of events leading up to potential or actual losses i.e. incidents or accidents) in the form of hazards, potential productivity interruptions, asset damage events, environmental issues etc.
- Evaluate the risks of each loss scenario by determining the relative likelihood of each event, and the relative consequence of each event.
- Evaluate the currently planned controls, barriers and safeguards.
- Identify additional, potential controls, barriers and safeguards.

In the current exercise, a select team from New Concept Mining (Pty) Ltd accomplished these steps:

Define the operational system

The exercise was scoped to review risks related to the work process from manufacture to transport into the stope, use and maintenance to minimise risk to the workforce.

Identify the possible system hazards

This step postulated the maximum reasonable consequence of loss scenarios or failures (i.e. of circumstances leading up to or resulting in hazards). The consequences were classified as losses to people (Health & Safety) in this instance. In the second instance, the effect of the failure was highlighted.

Determine the level of risks

Risks associated with each step in the operational process were considered. This is achieved by considering the event frequency or probability, and the event severity or consequence.

The ranking system used is described below:
Risk is defined as the product of **probability** and **consequence**.

Probability categories
Probability categories were defined as follows.

A = Common

B = Has Happened

C = Could Happen

D = Not Likely

E = Practically Impossible

Consequence categories

Consequence categories were defined for health and safety.

	Health & Safety
1	Fatality / Permanent disability
2	Reportable Injury
3	Disabling Injury
4	Dressing Station Case
5	Self Treated

Risk categories

Risk categories were defined by combining the probability and consequence categories above according to a matrix of prioritised risk ranking as follows.

		Probability				
		A	**B**	**C**	**D**	**E**
consequence category	**1**	1	2	4	7	11
	2	3	5	8	12	16
	3	6	9	13	17	20
	4	10	14	18	21	23
	5	15	19	22	24	25

A risk score of 1 denotes the highest (most significant) risk; and a risk score of 25 denotes the lowest (least significant) risk.

Define and describe the system controls and barriers

This step identified existing controls and barriers, and also considered planned, and possible additional controls and barriers which could be used to manage the operational risk. Controls and barriers include engineering devices,

operational methods and practice, management action and principles and environmental and system amendments that the team agrees appropriate to consider.

Assess the adequacy of the controls

The adequacy of the nominated controls in terms of design devices, management and operational practices and system amendments was reviewed by the team to ensure that additional scope for risk reduction has not been overlooked within the time available. If the controls are considered inadequate, recommendations to improve the situation are made.

Document the study process and results

The report is presented so that the company can review the planned and proposed controls and barriers and can *devise an implementation plan* to incorporate additional approved controls established through the risk analysis.

Analysis logistics

The risk analysis was conducted over one day being the 07 January 2000 at New Concept Mining (Pty) Ltd offices with a selected risk review team participating in the exercise. Participants are listed below:

	Section/Position	***Name***	***Signed***
1.	Managing Director……	Paul McKelvey B.Sc. MSc (Mech. Eng.)……	
2.	Manager…….	Nick Marvin B.Sc.(Min.Eng.)……..……..	
3.	Manager……	Owen McMahon……..	
4.	Technical Support + Safety	Simon Mangena……	
5.	Design Engineer…….	Dave Tyrer B.Sc (Mech. Eng.)……..……	

Section 4 - results

The risk analysis exercise generated a set of results presented in this section.

Format for results

The analysis team developed a format for the result based on the flow chart of the work activities.

Results

Results are presented overleaf in the following sequence.

- Risk analysis tables.

High Pressure Air Pump

		Without controls				With controls			
STEP	**POTENTIAL ACCIDENT**	**Probability**	**Consequence**	**Rank**	**CONTROLS**	**Probability**	**Consequence**	**Rank**	**ISSUES**
1. Manufacture of the Air Pump.	Unit fails underground	A	1	1	1. Materials used in manufacturing process made to detailed drawings. 2. All components checked on delivery 3. All working components made from corrosive resistant materials. 4. Design is such that unit is insensitive to dirty air and water. 5. Filters built into the unit.	D	1	7	All units are tested prior to delivery.
2. Transport.	Unit is damaged whilst being transported.	C	2	8	1. Units are light weight and easy to transport. 2. The units are torpedo in shape for easy manuverability in stopes 3. Unit is enclosed in durable plastic housing.	D	2	12	The design is such that the unit can be pulled through the stope and not foul on broken ore support members.
3. Storage.	Unit is damaged whilst in storage.	C	2	8	1. Units are robust and all working parts protected by durable plastic housing. 2. Components are made of corrosion resistant materials.	D	2	12	The units are highly visible underground. (Blue)

4. Maintenance.	Pump fails underground.	A	1	1	1. No lubrication required. 2. Units will require servicing during life in stopes. 3. Service to be done in work shop not in stopes.	C	1	4	1. All working parts are made of non corrosive materials. 2. Units are tested prior to delivery. 3. Maintenance manual provided
5. Training and standard operating procedures.	Props blast out due to inadequate pressurising. Sub-standard Hydrabolt or X-Pandabolt installation	A	1	1	1. All sections are trained on the product to ensure minimal blast out rates. 2. Instructors do follow up visits to sections to retrain. 3. Training done at training centres and in production sections. 4. Maintenance training done at mine designated work shops.	C	1	4	1. Installation chart is supplied. 2. PPE supplied by the mine. (goggles, hard hat, boots, gloves) 3. Mine standards. 4. Training by the mine. Refresher courses.
6. Protective equipment.	Operator injured by Pump whilst pre-stressing PSUs, Hydrabolts or X-Pandabolts.	A	1	1	1. Use PPE supplied by the mine. (goggles, hard hat, gloves, boots)	D	1	7	1. Installation chart supplied 2. Follow all stope safety procedures whilst installing Jackpots, Hydrabolts or X-Pandabolts. 3. Unit operates at full air pressure available. Pressure relief is on the Safety Pistol (25MPa) and Combi-Nozzle (13MPa). 4. 10meter hose supplied to ensure pressurisation is done remotely.
7. Pump used to install non-New Concept Mining pre-stressing products	Incorrect inflation pressure causes non-New Concept Mining PSU to burst	C	1	4	Customers to ensure that the hydraulic connections on pre-stressing units comply with New Concept Mining specifications.	E	1	11	1. Specification of hydraulic connectors supplied.