Guideline for the compilation of a*

Risk assessment

on the

Combi Nozzle

**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.*

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Section 1 Summary

Introduction

In order to compile this risk assessment guideline on the Combi-Nozzle, nominated members of New Concept Mining (Pty) Ltd met, and agreed on the Risk assessment guideline objective and approach. A team was formed to facilitate and develop the Combi-Nozzle risk assessment guideline.

Combi- Nozzles are used in conjunction with the High Pressure Pump and Safety Pistol to inflate hydraulic pre-stress units (PSUs) for mine support props, Hydrabolts and X-Pandabolts.
The PSUs are pumped to 13 MPa and the Hydrabolt and X-Pandabolt are pumped to 25 MPa

A risk assessment guideline is required in terms of the Mine Health and Safety Act 1996.

From the Risk Assessment guideline, it is hoped that critical points in the correct operation and maintenance of the Combi -Nozzle will be apparent. By highlighting these points, it is hoped 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 Combi -Nozzle 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, transport to the stope, use and maintenance of the equipment to minimise loss 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. **In the current exercise, all losses and failure were considered severe, and therefore all hazards were examined.**

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 14th December 2004 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.	Manager…….	Dave Gravett……..……..	
2.	Manager……	Owen McMahon……..	
3.	Quality Manager	Richard Lowe...……	
4.	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.

Combi-Nozzle

		Without controls				With controls			
STEP	**POTENTIAL ACCIDENT**	**Probability**	**Consequence**	**Rank**	**CONTROLS**	**Probability**	**Consequence**	**Rank**	**ISSUES**
1. Manufacture of units.	Combi -Nozzle fails underground.	B	1	2	1. Supplier Quality Management System 2. Materials used are checked when received from supplier for faults and quality.	D	4	21	1. Castings manufactured to manufacturers Spec's.
2. Transport.	Combi- Nozzle is damaged whilst being transported.	D	5	24	1. Combi Nozzles are small and easy to transport. 2. Combi Nozzles are robust with all fittings and o-rings protected.	E	5	25	
3. Storage.	Combi -Nozzle is damaged whilst in storage.	D	5	24	1. Combi Nozzles are robust with all fittings and O Rings protected. 2. All Combi Nozzles are made from cast aluminium and stainless steel.	E	5	25	
4. Maintenance/Repair	Combi-Nozzle fails underground.	A	1	1	1. Replace with a new Combi Nozzle. 2. Ensure fittings are free of grit and fines prior to connecting.	C	3	17	1. All parts are made of non-corrosive materials.
	Combi-Nozzle seal becomes damaged underground	B	1	2	1. Replace seal with new seal	D	1	7	1. Spare seals must be available at repair facilities

5. Training and standard operating procedures.	1. Props blast out due to inadequate pressurising.	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.	B	3	9	1. PPE supplied by the mine. (Goggles, hard hat, boots, gloves) 2. Mine standards. 3. Training by the mine. Refresher courses.
6. Protective equipment must be worn as high pressures are being dealt with. **Notes:** **1- Always release the Safety Pistol handle before removing the nozzle from the PSU, Hydrabolt or X-Pandabolt this relieves the pressure in the pipe and prevents injury.** **2- Always close compressed air and water hoses before removing hoses, nozzle or safety pistol from system.**	Operator injured by pistol or burst hose or leaking Combi-Nozzle whilst inflating PSUs, Hydrabolts and X-Pandabolts. (water enters eyes)	A	1	1	1. Use PPE supplied by the mine. (Goggles, hard hat, gloves, boots)	D	2	12	1. Follow all stope safety procedures whilst using Combi-Nozzle to install PSU's.
7. Pump used to install 3rd party pre-stressing products **Note:** **Combi-Nozzle relief pressure varies depending on thickness of PSU attachment flange.**	Incorrect inflation pressure causes 3rd party PSU to burst	C	1	4	1. Customers to ensure that 3rd party PSU installation pressure compatible with Combi-Nozzle	E	1	11	1. Maximum delivery pressure of Combi-Nozzle stamped on nozzle