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RISK ASSESSMENT STUDY ON THE ROCRETER

FOR

ROCKCRETE EQUIPMENT (PTY) LTD

Prepared by: 

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Report Summary Sheet

Client: Rockcrete Equipment & Guniting Services		Client Order No. 4282
Title of Report: A report on the Risk Assessment Study of the Rockcreter		
Summary: (Brief description of report) This report deals with the risk associated with the operations of the Rockcreter		
Indexing Terms: (Keywords) Rockcrete Equipment & Guniting Services Risk Assessment Study Rockcreter		
Work Carried Out By: (Team initials or names) HM		
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TABLE OF CONTENTS

	Page
1. INTRODUCTION	1.1
2. RISK ASSESSMENT	1.1
3. CONCLUSIONS AND RECOMMENDATIONS	1.1
APPENDIX 1 - Failure Mode and Effect Analyses	
APPENDIX II - Fault Tree Analyses (Injuries to personnel)	
APPENDIX III - Fault Tree Analyses (III health to personnel)	
APPENDIX IV - Fault Tree Analyses (Damage to equipment/production loss)	

EXECUTIVE SUMMARY

This risk assessment addresses the risks associated with the Rockcreter. As there are different models of Rockcreters, the basic principle of operation is the same and for that reason this risk assessment can be considered as a generic risk assessment for all the Rockcreters manufactured by Rockcrete Equipment and Guniting Services.

For this risk assessment only the Rockcreter was considered. The risk assessment thus excludes any equipment or service that is not supplied as part of the Rockcreter.

For this risk assessment the Failure Mode and Effect Analyses (FMEA) and Fault Tree Analyses (FTA) techniques were used.

From the FMEA (Appendix I) follows that there are three categories of risk associated with the Rockcreter, namely:

- Injuries to personnel
- Ill health to personnel
- Damage to equipment and production loss.

From the analyses it follows that if the **operating and maintenance procedures** are adhered to and if the operating personnel are well **trained** and being **aware of the hazards** associated with the operation of the Rockcreter, the risk should be acceptable.

It is recommended that a pre-use inspection procedure be put in place.

1. INTRODUCTION

This risk assessment addresses the risk associated with the Rockcreter. As there are different models of Rockcreters, the basic principle of operation is the same and for that reason this risk assessment can be considered as a generic risk assessment for all the Rockcreters manufactured by Rockcrete Equipment and Guniting Services.

For this risk assessment only the Rockcreter was considered. The risk assessment thus excludes any equipment or service that is not supplied as part of the Rockcreter.

2. RISK ASSESSMENT

For this risk assessment the Failure Mode and Effect Analyses (FMEA) and Fault Tree Analyses (FTA) techniques were used.

From the FMEA (Appendix I) follows that there are three categories of risk associated with the Rockcreter, namely:

- Injuries to personnel
- Ill health to personnel
- Damage to equipment and production loss.

For these categories of risk three different Fault Tree Analyses were carried out as given in Appendix II, III and IV, respectively. The different combinations of basic events that could result in one of these three categories of risk are give in tables 1, 2 and 3 respectively.

The minimum combinations of basic events are events that have to happen simultaneously in order for the injury, ill health or damage to equipment/production loss to result.

It is important to note that the contents of tables 1, 2 and 3 must be read together with the Fault Tree Analyses given in appendices II, III and IV.

3. CONCLUSION AND RECOMMENDATIONS

From the analyses, as shown in Tables 1, 2 and 3, it follows that if the **operating and maintenance procedures** are adhered to and if the operating personnel are well **trained** and being **aware of the hazards** associated with the operation of the Rockcreter, the risk should be acceptable.

It is recommended that a pre-use inspection be put in place.

Table 1: The Minimum combination of basic events that will result in injury to personnel

Minimum combination of events		Basic Events		
B3, C3	Maintenance is being carried out on the Rockcreter	Rockcreter is not disconnected from air or power supply		
F4, C4	Rockcreter is not stopped timeously when blockage occurs (back pressure in Rockcreter)	Foreign object in Rockcreter		
F4,D4	Rockcreter is not stopped timeously when blockage occurs (back pressure in Rockcreter)	Rockcreter running too fast		
F4, E4	Rockcreter is not stopped timeously when blockage occurs (back pressure in Rockcreter)	Material hose not properly cleaned since previous use		
I4,J4	Dislodging of a blockage in the material hose takes place	The material hose is not secured properly		
H,J	Pre-use inspection fails to detect a potential problem and have it rectified timeously	Mechanical failure of the material hose connection take place		
H,B5	Pre-use inspection fails to detect a potential problem and have it rectified timeously	Air hose comes loose due to a loose bracket or damaged hose		
H,L	Pre-use inspection fails to detect a potential problem and have it rectified timeously	Mechanical failure of the material hose takes place		
H,B2, C2	Pre-use inspection fails to detect a potential problem and have it rectified timeously	The sieve is removed from the Rockcreter	Rockcreter is loaded	

Table 1: (Continue)

Basic Events			
Minimum combination of events			
C,D,H,F	Air supply hose is connected to the Rockreter	Mechanical failure of the connecting coupling on the air supply hose takes place	Pre-use inspection fails to detect a potential problem and have it rectified timeously
C,D,H,G	Air supply hose is connected to the Rockreter	Mechanical failure of the connecting coupling on the air supply hose takes place	Safety chains/straps on the air supply hose fails
			Pre-use inspection fails to detect a potential problem and have it rectified timeously
			Safety chains/straps are not connected to the air supply hose (operating procedure to followed)

Table 2: The Minimum combination of basic events that will result in ill health to personnel

Basic Events	
Minimum combination of events	
C6,H	Incorrect clamping is used
H,E6	Pre-use inspection fails to detect a potential problem and have it rectified timeously
H,G6	Pre-use inspection fails to detect a potential problem and have it rectified timeously
	Pre-use inspection fails to detect a potential problem and have it rectified timeously
	Critical parts are worn
	Nozzle is failed

Table 3. The minimum combination of basic events that will result in damage to equipment and or production loss

Basic Events	
Minimum combination of events	
C7,H	Two or more of the lifting hooks on the Rockcreter fail
H ₁ ,H7	Pre-use inspection fails to detect a potential problem and have it rectified timeously
H ₁ ,I7	Pre-use inspection fails to detect a potential problem and have it rectified timeously
E7,F7	A foreign object is put into the Rockcreter
	Pre-use inspection fails to detect a potential problem and have it rectified timeously
	Incorrect electrical connection exists
	Air motor is connected incorrectly
	The Rockcreter is not stopped timeously

APPENDIX I

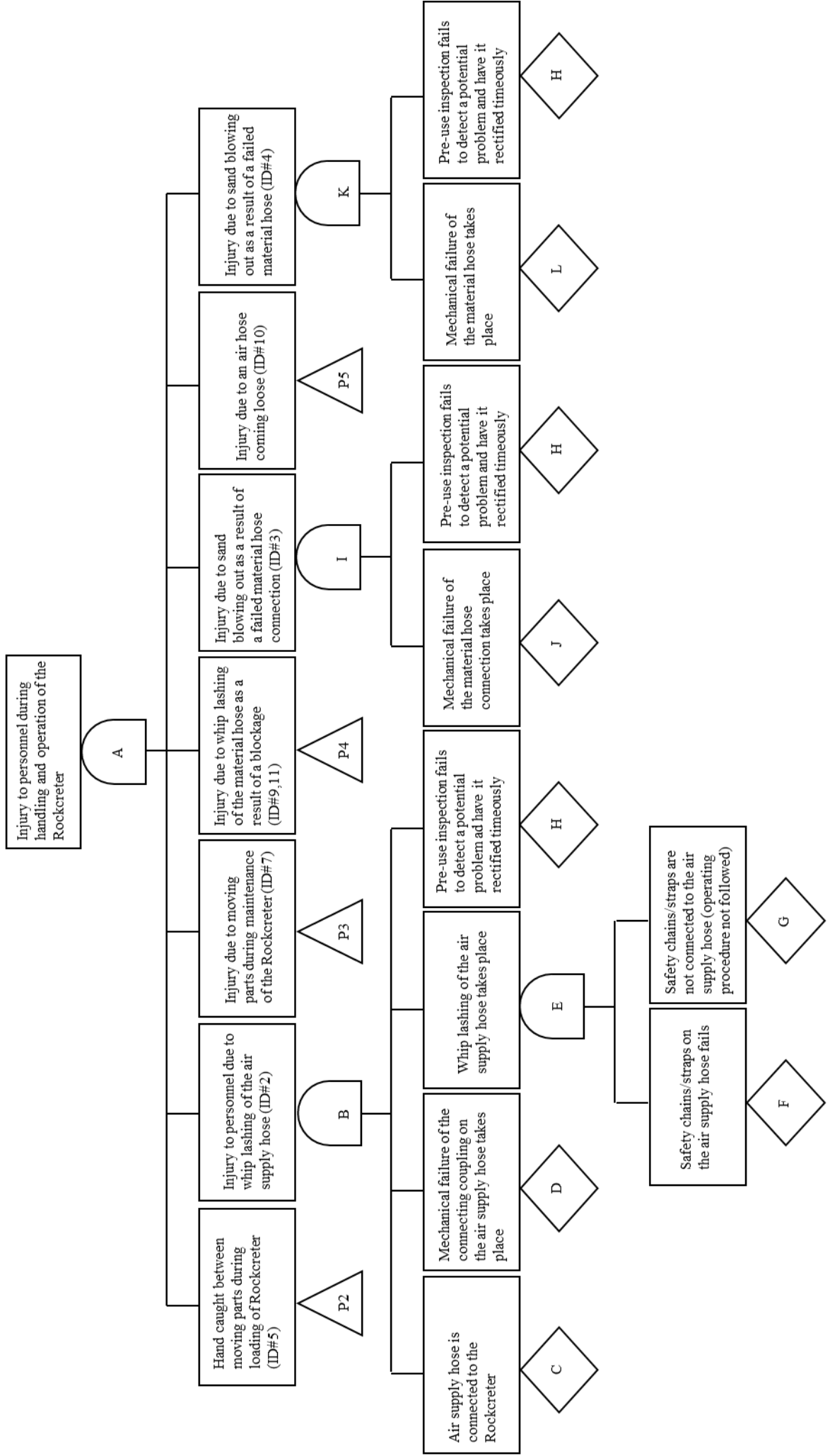
Failure Mode and Effect Analyses

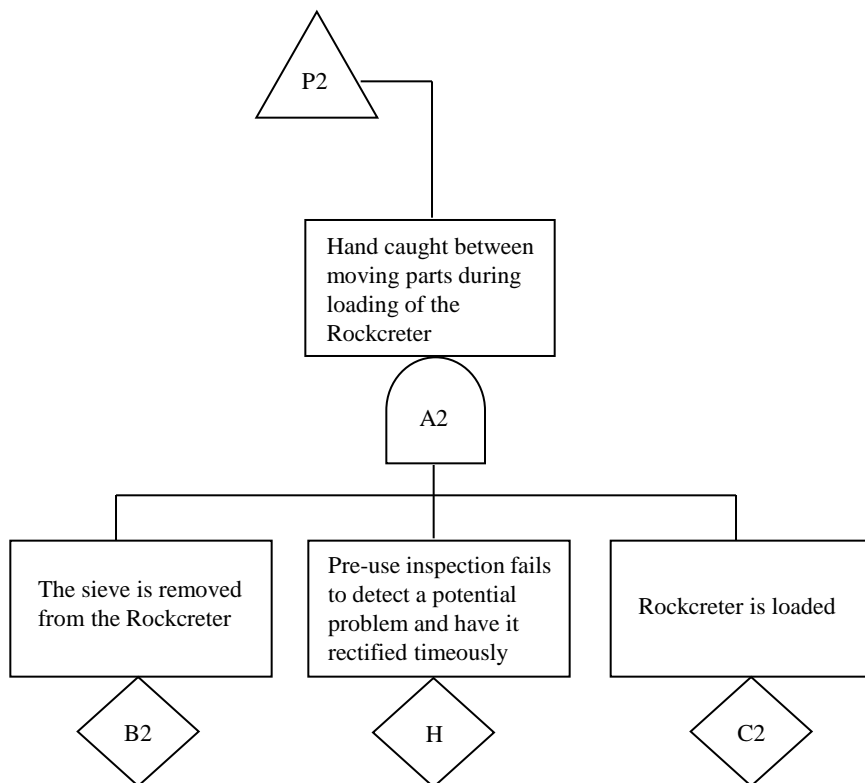
Risk Assessment on Rockcreter						
PROJECT:						
ORGANIZATION:						
LOCATION:						
DATE:						
PROJECT NO.:						
TEAM MEMBERS:						
ID #	Failure Mode	Failure Mechanism	Failure Detection Mode	Protection or mitigating measures	Effects if protection works	Effects if protection fails
1	Failure of more than one of the lifting/hoisting hooks during slinging of the Rockcreter	Mechanical failure of two or more of the lifting hooks	Visual inspection of lifting hooks	Visual inspection of lifting hooks prior to slinging	Nothing	Rockcreter going down the shaft and or damage to equipment
2	Failure of the air supply connection to the Rockcreter	Incorrect failure of the connecting coupling	Visual inspection	Training and awareness	Nothing	Rockcreter going down the shaft and or damage to equipment
3	Failure of the material hose connection	Mechanical failure of the connecting coupling	Visual inspection	Training, awareness and Inspection Operating Procedure	Nothing	Whip lashing of the hose resulting in injuries/fatality
4	Failure of the material hose during operation	Mechanical failure due to wear and tear	Visual inspection	Safety chains/straps	Nothing	Whip lashing of the hose resulting in injuries/fatality
5	Hand or loose clothing caught in moving parts during loading of Rockcreter	Mechanical failure of the connecting coupling	Visual inspection	Training, awareness and daily inspection of hoses	Nothing	Injuries/splashes in eyes due to sand blowing out from the failed material hose
6	Mechanical damage to the Rockcreter	Mechanical failure due to wear and tear	Visual inspection	Training, awareness and daily inspection of hoses	Nothing	Injuries/splashes in eyes due to sand blowing out at the failed connection
7	Exposure of personnel to moving parts during maintenance	Loading of sand and cement when the sieve is removed	Visual inspection	Training and awareness/not allowed to operate the Rockcreter without the sieve in place. Safety procedure	Nothing	Severe injuries to hand/arm
8	Mechanical damage to the Rockcreter	Foreign objects entering through the sieve	Stalling of Rockcreter	Sieve, training and awareness	Nothing	Production loss and repair cost
9	Exposure of personnel to moving parts during maintenance	Maintenance being carried out whilst machine is not disconnected	Visual	Training and awareness/not allowed to carry out any maintenance on the Rockcreter whilst in operation or when power and or air is connected to it	Nothing	Severe injuries to hand and other body parts

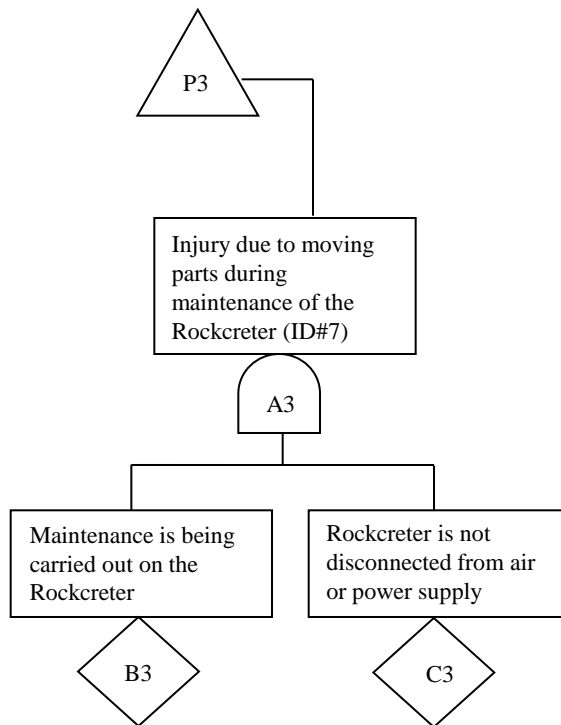
ID #	Failure Mode	Failure Mechanism	Failure Detection Mode	Protection or mitigating measures	Effects if protection works	Effects if protection fails
7.1	Screen on hopper to be pad locked	Maintenance being carried out whilst machine is not disconnected	Visual	Training and awareness/not allowed to carry out any maintenance on the Rockcrete whilst in operation or when power and or air is connected to it	Nothing	Severe injuries to hand and other body parts
7.2	Main air in to have lock out on valve	Maintenance being carried out whilst machine is not disconnected	Visual	Training and awareness/not allowed to carry out any maintenance on the Rockcrete whilst in operation or when power and or air is connected to it	Nothing	Severe injuries to hand and other body parts
8	Excessive dust during operation of the Rockcrete	Incorrect setting of Rockcrete	Visual	Training, awareness and correct clamping procedure	Nothing	Ill health resulting from excessive exposure to dust
		Worn parts	Visual inspection	Training, awareness and scheduled maintenance	Nothing	Ill health resulting from excessive exposure to dust
		Loss of water pressure at the nozzle	Visual inspection	Maintenance of the nozzle and inspection	Nothing	Ill health resulting from excessive exposure to dust
9	Blockage of the material hose	Foreign objects	Back pressure will cause exhausting in the hopper	Stop Rockcrete immediately	Nothing	Injury to personnel due to whip lashing of the material hose
		Rockcrete running too fast	Back pressure will cause exhausting in the hopper	Training and awareness. Stop Rockcrete immediately	Nothing	Injury to personnel due to whip lashing of the material hose
		Rockcrete/material hose not properly cleaned since previous use	Visual inspection	Training and awareness	Nothing	Injury to personnel due to whip lashing of the material hose
10	Air hoses on the Rockcrete coming loose	Loose clamps or damaged hose	Pre-use inspection	Maintenance	Nothing	Injury to body parts
11	Whip lashing of the material hose during dislodging of a blockage	Blockage of the material hose and over pressurisation	Visual	Training and awareness. Operating procedures	Nothing	Injury to personnel due to whip lashing of the material hose
12	Damage to electrical motor	Single phasing of the motor due to cable failure or incorrect connection	Pre-use inspection	Training and awareness	Nothing	Damage to electrical motor and consequential production loss
13	Rockcrete turning in the wrong direction	Incorrect electrical connection	Pre-use inspection	Training and awareness	Nothing	Rockcrete will not operate
		Incorrect connection of the air motor	Pre-use inspection	Training and awareness	Nothing	Rockcrete will not operate

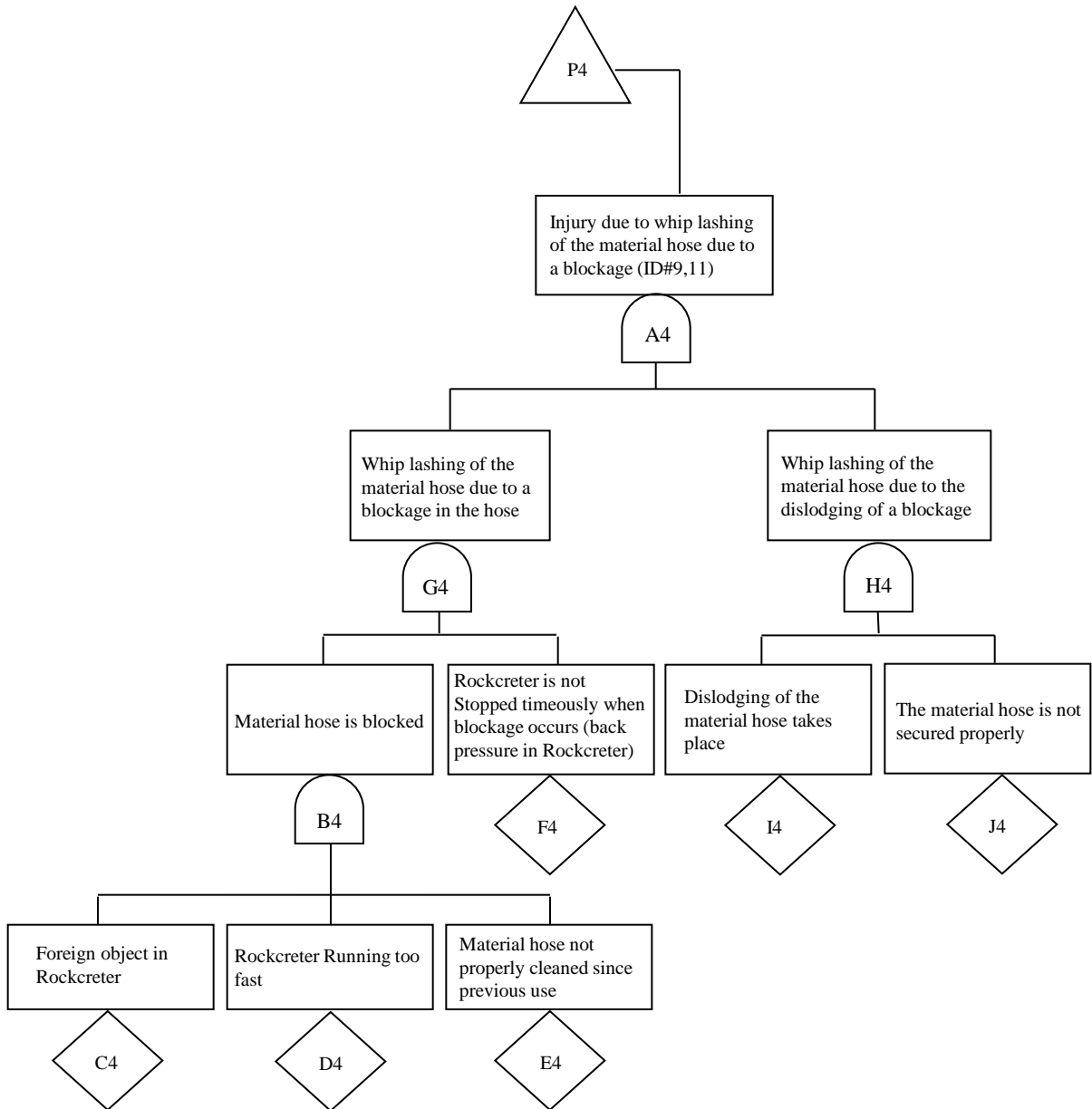
APPENDIX II

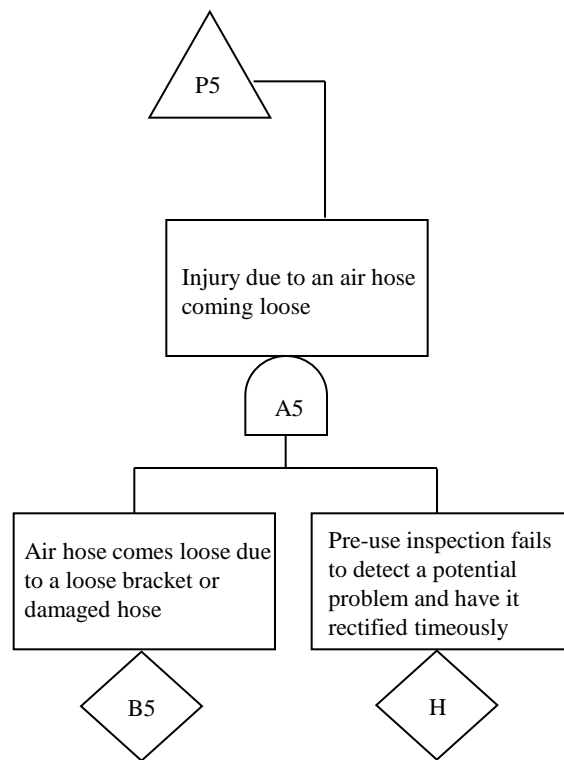
Fault Tree Analyses (Injuries to operators)





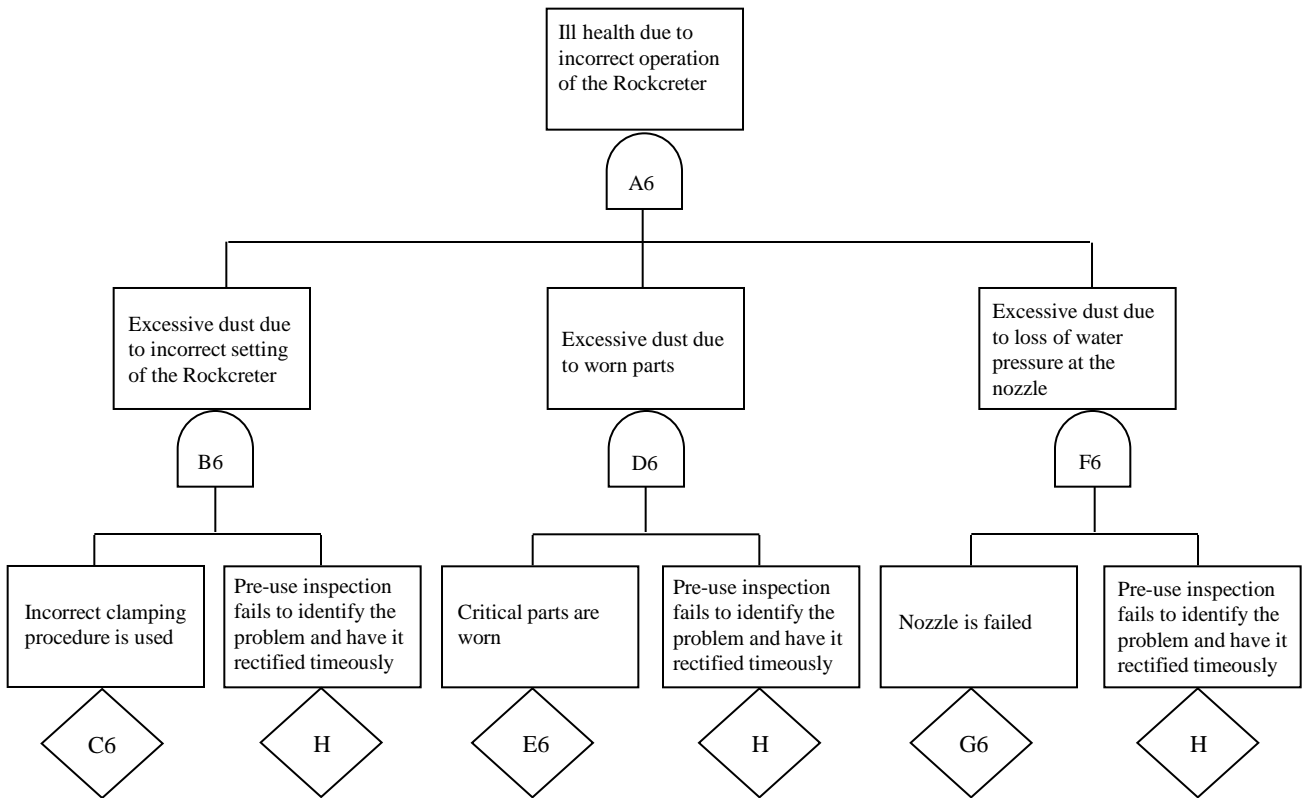






APPENDIX III

Fault Tree Analyses (Ill Health to operators)



APPENDIX IV

Fault Tree Analyses (Damage to equipment/Production loss)

