RISK ASSESSMENT REPORT

SUBJECT: **Risk assessment on the MR 100/110/111 Flame proof alternator**

REPORT DATE: **15/03/07**

ASSESSMENT DATE: **15/03/07**

REVISION: **Yearly**

REPORT PREPARED BY: **Dominic Posavec**

Version 1

Created on 15th March 2007

NB:

It is the responsibility of viewers and clients to ensure they access the most current version of this risk assessment at all times.

There will be no formal notification of review.

Updated versions will be available on request from Mining Repairs:
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1. INTRODUCTION

1.1 *BACKGROUND*

Due to an incident in an underground coal mine where a cable was severed by a drive shaft it was identified that the current alternators used in the industry were not able to monitor the chassis fault, short circuit, under voltage, over voltage and over current.

Mining Repairs (MR) was enforced to develop a system that would pick up these faults and latch out the power supply. MR developed the following styles of alternators.

1. MR 100
2. MR 110
3. MR 111 – latest one with remote reset capabilities

1.2 *REFERENCES*

- Australian / New Zealand Standard 4360, 2004.
- Risk Management Handbook MDG 1010
- Guide to Reviewing a Risk Assessment MDG 1014

1.3 *RISK ASSESSMENT OBJECTIVE*

The objective of this risk assessment is to:

- Identify risks involved in the use of the above flame proof alternators in a hazardous or non hazardous environment. Also we need to identify the risks involved with the design, operation and maintenance of the above flameproof alternators when used on diesel equipment vehicles.
- These identified risks will identify the required barriers, controls that are required to bring these risks to an acceptable level.

1.4 *RISK ASSESSMENT SCOPE*

The scope of this risk assessment is limited to:

- Only the below flameproof alternators

1. MR 100
2. MR 110
3. MR 111

1.4

NAME	ORGANISATION	POSITION	EXPERIENCE	SIGNATURE
Dominic Posavec	Anderson's	General Manager (Facilitator)	28 years	
Aaron Langley	Anderson's	Workshop Manager	14 years	
Peter Channon	Anderson's	Safety Officer / Administration Officer	41 years	

2. METHODOLOGY

2.1 *RISK ASSESSMENT PROCEDURE*

The risk assessment was carried out by following the four defined stages as listed below:-

Stage 1
Determine an objective and a scope.

Stage 2
The information required to adequately address the general issues was tabled and included:-

1. Schematic drawings of the alternator
2. Certificates of conformity and approvals
3. User guides
4. Installation guides
5. Safety alerts and bulletins
6. Directive from DPI Queensland
7. All models MR100, MR 110 and MR 111 alternators

Stage 3

The formal risk assessment was undertaken at Mining Repairs workshop on the 15th of March, 2007.

Stage 4
Following the completion of the risk assessment, the report was written and given to the team members for verification. A list of recommendations, in the form of an action plan, was then passed on to the relevant personnel for implementation.

2.2 *RISK ASSESSMENT PROCESS*

The Risk Assessment process utilised is outlined in the following, to clearly define each step.

2.2.1 ***Set Assessment Objectives***

Set an objective to aim at throughout the process. It is important that all parties agree on the objective of the process and that it is strictly adhered to throughout the discussions.

2.2.2 ***Develop Operational Process***

Analyse the operation and determine a step by step approach.

2.2.3 ***Identify Hazards***

Examine each step in the operation in 2.2.2 so as to identify hazards associated with those steps.

2.2.4 ***Estimate Probability***

Determine the probability of a hazard, as identified in 2.2.3, occurring. Team consensus, (or statistical evidence where available), decides the rating of the probability.
The basis of the rating is shown in the table below -

A	Common or Frequent Occurrence
B	Is Known To Occur or 'It Has Happened'
C	Could Occur At Some Time or 'I've Heard Of It Happening'
D	Not Likely To Occur
E	Practically Impossible

2.2.5 ***Estimate Consequence***

Determine the consequences of the identified hazards, should they occur. Team consensus, (or statistical evidence where available), decides the rating of the consequence.
The basis of the consequence rating is shown in the table below –

	Descriptor	Damage/Loss	Health/Safety
1	**Major**	**>$500,000**	Fatality or Permanent Disability
2	**Serious**	**$250,000 - $500,000**	Serious Lost Time Injury or Illness
3	**Moderate**	**$50,000 - $250,000**	Moderate Lost Time Injury or Illness
4	**Minor**	**$5,000 - $50,000**	Minor Lost Time Injury or Illness

5	**Minimal**	**<$5,000**	No Lost Time - (Possible First-Aid)

2.2.6 ***Establish Risk from Risk Matrix***

Give a risk ranking to each identified hazard or loss scenario. The risk ranking can be determined by checking the Probability and Consequence rating for each hazard against the Risk Matrix below.

	A	**B**	**C**	**D**	**E**
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

Risk Ranking

1 - 6 Unacceptable Risk, New Controls Required

7 - 15 Moderate Risk, New Controls to be Considered.

16 – 25 Acceptable Risk, Existing Control Adequate

2.2.7 ***Nominate Existing Barriers / Controls***

Nominate, where possible, any existing barriers / controls presently in the design of the System, which may prevent identified hazards from occurring.

2.2.8 ***Recommend Potential New Barriers / Controls***

Through group discussion, drawing from the team members' experience, apply the hierarchy of control to eliminate or reduce the level of risk to an acceptable level.

	Hierarchy of Control
1	**Elimination**; *Can the problem be eliminated?*
2	**Substitution**; *Is there a similar product that could be used?*
3	**Isolation**; *Does the hazard need to be isolated from a certain group of people or section of the facility?*
4	**Engineering**; *Can an engineering modification reduce the risk such as a guard?*
5	**Administration**; *Will Signage, a new or revised procedure, TBT, Training etc help reduce the risk?*
6	**Personal Protective Equipment**: *Is there any PPE which could further protect the person or people involved?*

2.2.9 ***Prepare Report***

Prepare the report; this report should have included the following as a minimum.

2.2.9.1 A list of the risk assessment team including the person's name, company and position.

2.2.9.2 A list of the new or revised items assessed.

2.2.9.3 Clear drawings, diagrams and photos where available to validate the effected equipment.

2.2.9.4 Any available injury and safety statistics should be documented in the appendix.

2.2.9.5 All processes, hazards, probabilities, consequences, risks and barriers nominated in the exercise are to be listed.

2.2.9.6 A final recommendation list of selected barriers and the hazards they minimise or eliminate must be listed.

2.2.9.7 Statements as to the reasons why potential new barriers have not been implemented must be supplied.

2.2.10 ***Implement New Barriers***

The implementation of the potential new barriers and controls that have been identified by the team that eliminate or minimize the risk associated with the hazard.

A written explanation as to the reasoning behind the rejection of the suggested new barriers is required for each of the identified hazards.

2.2.11 ***Review Process***

A Review process of the RA & new controls mechanisms should be clearly outlined stating when, how & who will undertake it.

Outcomes of this process will be documented & made available to all reasonably foreseeable persons associated with the hazard, identified risks & controls measures.

3. RESULTS

3.1 *Hazard Identification*

The following steps in the operation are those that the Risk Assessment team members identified as having the potential to present a hazard to personnel:-

1. Lifting causing back injuries
2. Incorrect installation ie belt tension and alignment
3. Incorrect speed RPM
4. Heat source close to alternator installation area
5. Heat source from the alternator
6. Moving parts around the alternator installation
7. Incorrect installation of the alternator
8. Bearing failure causing a fire
9. Risk of a spark caused by the alternator
10. Incorrect assembly in workshop
11. Alternator being struck by an object
12. Alternator being struck intentionally by personnel
13. Ingress of water into the alternator

3.2 *Identified Hazard Summary*

3.2.1 Risk Score

The hazards identified by the Risk Assessment process are listed below in order of risk score (from highest to lowest):-

Risk Rank	Item Number	Identified Hazard
7	**4.2**	Water ingress damaging flame paths or bearing failure causing possible non-flame proof condition
11	**1.1**	Fluid film not used correctly or on the flame path causing explosion of methane gas
11	**1.2**	Gland holes not fitted correctly with approved blank plug leaving alternator in an unsafe condition
11	**3.1**	Alternator struck by steel on external casing causing the alternator not to be flameproof
12	**2.7**	Alternator installed incorrectly causing bearing failure due to over tension of V belts with possible fire risk due to flame path failure
12	**3.2**	Communication window hit and making the alternator non flame proof
12	**3.3**	Alternator struck by intentional force on external casing causing the alternator not to be flameproof
14	**2.5**	Slips, trips and falls
16	**1.7**	Bearing installation incorrectly causing bearing failure and possible fire
16	**2.9**	Over speed of alternator causing bearing failure and excessive heating and rotor de-fragmentation
17	**2.2**	Back injuries
17	**2.11**	Injuries caused by moving components during installation of the alternator
18	**1.4**	Tools used to confirm integrity of the flame path being out of adjustment causing incorrect measurements of the flame path.
18	**1.8**	Incorrect spacer for fitment of circuit board causing heating on the board components and flexing causing bad solder joints and track problems on the boards.
18	**1.9**	Crush injuries due to weight of the alternator during assembly process
19	**1.6**	Alternator non-conformance of product during assembly causing loss of revenue
19	**2.3**	Burns by external sources
19	**4.1**	Water ingress damaging internal components.
21	**2.1**	Crush injuries
22	**1.3**	Nut on end of pulley not installed correctly causing the flame path not to be met as approved.
22	**2.4**	Burns by Alternator
22	**2.1**	Under-speed of alternator causes no excitation.
23	**1.5**	Alternator not bench tested correctly causing failure at mine
24	**2.0**	Magnets not installed correctly in the assembly of the rotor
24	**2.6**	Alternator dropped on the drive end causing issues with flame path and rotation with possible consequences of bearing failure and fire

3.2.2 Consequence

The hazards identified by the Risk Assessment process are listed below in order of Consequence (from highest to lowest):-

Cons	Item Number	Identified Hazard
1	**1.1**	Fluid film not used correctly or on the flame path causing explosion of methane gas
1	**1.2**	Gland holes not fitted correctly with approved blank plug leaving alternator in an unsafe condition
1	**2.8**	Incorrect rear cover replacement after cables have been terminated causing the flame paths to be non flame proof
1	**3.1**	Alternator struck by steel on external casing causing the alternator not to be flameproof
1	**4.2**	Water ingress damaging flame paths or bearing failure causing possible non-flame proof condition
2	**2.7**	Alternator installed incorrectly causing bearing failure due to over tension of V belts with possible fire risk due to flame path failure
2	**2.9**	Over speed of alternator causing bearing failure and excessive heating and rotor de-fragmentation
2	**3.2**	Communication window hit and making the alternator non flame proof
2	**3.3**	Alternator struck by intentional force on external casing causing the alternator not to be flameproof
3	**2.2**	Back injuries
3	**2.11**	Injuries caused by moving components during installation of the alternator
4	**1.4**	Tools used to confirm integrity of the flame path being out of adjustment causing incorrect measurements of the flame path.
4	**1.5**	Alternator not bench tested correctly causing failure at mine
4	**1.8**	Incorrect spacer for fitment of circuit board causing heating on the board components and flexing causing bad solder joints and track problems on the boards.
4	**1.9**	Crush injuries due to weight of the alternator during assembly process
4	**2.1**	Crush injuries
4	**2.5**	Slips, trips and falls
5	**1.3**	Nut on end of pulley not installed correctly causing the flame path not to be met as approved.
5	**1.6**	Alternator non-conformance of product during assembly causing loss of revenue
5	**2.0**	Magnets not installed correctly in the assembly of the rotor
5	**2.3**	Burns by external sources
5	**2.5**	Burns by alternator
5	**2.6**	Alternator dropped on the drive end causing issues with flame path and rotation with possible consequences of bearing failure and fire
5	**2.10**	Under-speed of alternator causes no excitation.
5	**4.1**	Water ingress damaging internal components.

3.3 *Assessment Spreadsheet* **Loss Type = S** for safety **/ P** for production **/ En** for environment **/ Eq** for equipment
Hierarchy of Control = 1 for Elimination / **2** for Substitution / **3** for Isolating / **4** for Engineering / **5** for Administration / **6** for Personal Protective Equipment.

Note; All Hierarchy of Control Measures MUST be considered from top to bottom. If the control method cannot be used it should be stated in the column provided.

					Existing			Loss		New		
No.	**Task/Activity**	**No.**	**Hazard/Threat**	**Existing Control Measures**	**P**	**C**	**R**	**Type**	**New Control Measures Hierarchy of Control**	**P**	**C**	**R**
1	**Assembly of the alternator**	1.1	Fluid film not used correctly or on the flame path causing explosion of methane gas	• **Trained competent personnel** • **Procedures have been developed** • **Certification drawings available**	**D**	**1**	**7**	**S,P, Eq**	• **Second assembler to check for evidence of fluid film around mating surfaces.**	**E**	**1**	**11**
		1.2	Gland holes not fitted correctly with approved blank plug leaving alternator in an unsafe condition	• **Trained competent personnel** • **Procedures developed** • **Previously only single gland entry available**	**E**	**1**	**11**	**S, P, Eq**	• **Removal of plastic plugs and a fitment of approved blanks on all gland entries** • **Tool Box talk to be conducted to explain issues** • **Procedures to be changed to reflect the fitment of approved plugs instead of the plastic plugs**	**E**	**1**	**11**
		1.3	Nut on end of pulley not installed correctly causing the flame path not to be met as approved.	• **Trained competent personnel** • **Procedures have been developed** • **Certification drawings available** • **Bench test performed to**	**C**	**5**	**22**	**Eq**	**Current controls considered adequate**	**C**	**5**	**22**

					Existing			Loss		New		
No.	**Task/Activity**	**No.**	**Hazard/Threat**	**Existing Control Measures**	**P**	**C**	**R**	**Type**	**New Control Measures Hierarchy of Control**	**P**	**C**	**R**
				check operation of alternator								
		1.4	Tools used to confirm integrity of the flame path being out of adjustment causing incorrect measurements of the flame path.	• **NATA approved workshop** • **Inspections against master gauges carried out** • **Tools kept in a clean environment** • **Trained competent personnel** • **Procedures have been developed** • **Certification drawings available**	**C**	**4**	**18**	**Eq**	**Current controls considered adequate**	**C**	**4**	**18**
		1.5	Alternator not bench tested correctly causing failure at mine	• **Trained competent personnel** • **Procedures have been developed** • **Test sheet available to record results** • **Tested before being painted in process** • **Person that builds the job tests the alternator**	**E**	**4**	**23**	**Eq**	**Current controls considered adequate**	**E**	**4**	**23**
		1.6	Alternator non-conformance of product during assembly causing loss of revenue	• **Goods inwards procedures controls to check product on delivery** • **QA procedures** • **Engineering supplies certificate of conformity**	**B**	**5**	**19**	**Eq**	**Current controls considered adequate**	**B**	**5**	**19**

					Existing			Loss		New		
No.	**Task/Activity**	**No.**	**Hazard/Threat**	**Existing Control Measures**	**P**	**C**	**R**	**Type**	**New Control Measures Hierarchy of Control**	**P**	**C**	**R**
		1.7	Bearing installation incorrectly causing bearing failure and possible fire	• **Bearings to be pressed on and tools supplied** • **Trained competent personnel** • **Procedures have been developed** • **Use of loctite on all bearings to stop from rotation** • **Bench test performed to check operation of alternator** • **Reputable bearing supplier**	**C**	**2**	**8**	**S, P, Eq**	• **Measure front and rear housings for bearing fitment** • **Tool Box talk to be conducted to explain issues** • **Procedures to be changed to reflect the fitment of bearings**	**E**	**2**	**16**
		1.8	Incorrect spacer for fitment of circuit board causing heating on the board components and flexing causing bad solder joints and track problems on the boards.	• **Trained competent personnel** • **Procedures have been developed** • **Bench test performed to check operation of alternator** • **Visually inspected during assembly**	**C**	**4**	**18**	**Eq**	**Current controls considered adequate**	**C**	**4**	**18**
		1.9	Crush injuries due to weight of the alternator during assembly process	• **Trained competent personnel** • **Procedures have been developed** • **Manual handling internal course completed** • **PPE** • **Rubber fitted on top of benches**	**C**	**4**	**18**	**S, Eq**	**Current controls considered adequate**	**C**	**4**	**18**

					Existing			Loss		New		
No.	**Task/Activity**	**No.**	**Hazard/Threat**	**Existing Control Measures**	**P**	**C**	**R**	**Type**	**New Control Measures Hierarchy of Control**	**P**	**C**	**R**
				• **Take 5**								
		2.0	Magnets not installed correctly in the assembly of the rotor	• **Trained competent personnel** • **Procedures have been developed** • **Specific tools have been developed for job** • **Special Adhesives have been tested** • **Bench test performed to check operation of alternator**	**D**	**5**	**24**	**P, Eq**	**Current controls considered adequate**	**D**	**5**	**24**
2	**Installation and fitment of the alternator**	2.1	Crush injuries	• **Trained competent personnel** • **PPE** • **Handling awareness** • **Alternator sent in a box to reduce possibilities of being dropped**	**C**	**4**	**18**		• **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control on DVD**	**D**	**4**	**21**
		2.2	Back injuries	• **Trained competent personnel** • **Handling awareness** • **Alternator sent in a box to reduce possibilities of being dropped**	**C**	**3**	**13**	**S**	• **Sticker to be developed indicating weight of alternator and manual handling issues** • **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control on DVD**	**D**	**3**	**17**

					Existing			Loss		New		
No.	Task/Activity	No.	Hazard/Threat	Existing Control Measures	P	C	R	Type	New Control Measures Hierarchy of Control	P	C	R
		2.3	Burns by external sources	• **Trained competent personnel** • **PPE** • **Machines usually washed down** • **Allow cooling time for the engine package**	**B**	**5**	**19**	**S**	• **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control on DVD**	**B**	**5**	**19**
		2.4	Burns by alternator	• **Trained competent personnel** • **PPE** • **Machines usually washed down** • **Allow cooling time for the alternator**	**C**	**5**	**22**	**S**	• **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control on DVD**	**C**	**5**	**22**
		2.5	Slips, trips and falls	• **PPE** • **Housekeeping to be adequate**	**B**	**4**	**14**	**S**	• **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control on DVD**	**B**	**4**	**14**
		2.6	Alternator dropped on the drive end causing issues with flame path and rotation with possible consequences of bearing failure and fire	• **Housekeeping to be adequate** • **PPE** • **Handling awareness** • **Regular inspections** • **Alternator sent in a box to**	**D**	**5**	**24**	**S, Eq**	• **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control**	**D**	**5**	**24**

					Existing			Loss		New		
No.	Task/Activity	No.	Hazard/Threat	Existing Control Measures	P	C	R	Type	New Control Measures Hierarchy of Control	P	C	R
				reduce possibilities of being dropped					**on DVD**			
		2.7	Alternator installed incorrectly causing bearing failure due to over tension of V belts with possible fire risk due to flame path failure	• **Reputable bearing supplier** • **High speed, high load bearings used** • **Bearings long life** • **Correct tolerances adhered to** • **Use of loctite to lock bearing in position** • **Brass bush is designed to take load of bearing in case of bearing failure for a short period.** • **Regular inspections**	**C**	**2**	**8**	**S, Eq**	• **Supply copy of risk assessment as part of alternator paperwork** • **Determine maximum side load tension for bearing supplied in alternators** • **Procedures to be developed for the installation tensions** • **Consider incorporation of training and risk control on DVD**	**D**	**2**	**12**
		2.8	Incorrect rear cover replacement after cables have been terminated causing the flame paths to be non flame proof	• **Trained competent personnel** • **Certification drawings available** • **Mine site procedures and testing** • **Regular inspections**	**C**	**1**	**4**	**S,P,**	• **Use of feeler gauges to be used to check integrity by installers** • **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed** • **Consider incorporation of training and risk control on DVD**	**D**	**1**	**7**
		2.9	Over speed of alternator causing bearing failure and excessive heating and rotor de-fragmentation	• **High speed bearings used** • **Maximum 7000 RPM stated on approval drawings** • **Regular inspections**	**E**	**2**	**16**	**S, Eq**	• **Supply copy of risk assessment as part of alternator paperwork** • **Installation procedure to be developed**	**E**	**2**	**16**

					Existing			Loss		New		
No.	**Task/Activity**	**No.**	**Hazard/Threat**	**Existing Control Measures**	**P**	**C**	**R**	**Type**	**New Control Measures Hierarchy of Control**	**P**	**C**	**R**
									• **Consider incorporation of training and risk control on DVD**			
		2.10	Under-speed of alternator causes no excitation.	• **Procedures developed where the minimum speed is quoted at 2200 RPM**	**C**	**5**	**22**	**Eq, P**	• **Check current excitation averages in line with paperwork**	**C**	**5**	**22**
		2.11	Injuries caused by moving components during installation of the alternator	• **Trained competent personnel** • **Isolation procedures in place** • **Use of electronic RPM counter does not require to be positioned close to moving parts** • **PPE**	**D**	**3**	**17**	**S,P**	• **Current controls considered adequate**	**D**	**3**	**17**
3	**Alternator being struck by an object**	3.1	Alternator struck by steel on external casing causing the alternator not to be flameproof	• **Robust steel construction** • **Usually alternator installed in areas of good protection** • **Alternator painted to reduce risk of corrosion** • **Passes impact tests in accordance with Test Safe conformity.** • **Close tolerances on faces**	**C**	**1**	**4**	**S, P, Eq**	• **Users of alternators to be made aware to ensure installation of the alternators is behind covers that protect the alternator** • **Supply copy of risk assessment as part of alternator paperwork**	**E**	**1**	**11**
		3.2	Communication window hit and making the alternator non flame proof	• **Robust steel construction and glass construction** • **Usually alternator**	**D**	**2**	**12**	**S, P, Eq**	• **Users of alternators to be made aware to ensure installation of the alternators is behind**	**D**	**2**	**12**

					Existing			Loss		New		
No.	**Task/Activity**	**No.**	**Hazard/Threat**	**Existing Control Measures**	**P**	**C**	**R**	**Type**	**New Control Measures Hierarchy of Control**	**P**	**C**	**R**
				installed in areas of good protection • **Passes impact tests**					**covers that protect the alternator** **Supply copy of risk assessment as part of alternator paperwork**			
		3.3	Alternator struck by intentional force on external casing causing the alternator not to be flameproof	• **Mine management plans in place** • **OH&S rules in regards to equipment abuse** • **Robust steel and glass construction**	**C**	**2**	**8**		• **Supply copy of risk assessment as part of alternator paperwork** • **Tool box talk or procedure to be considered to identify that the alternators are not designed to be struck.** • **This subject to form part of DVD.**	**D**	**2**	**12**
4	**Water ingress**	4.1	Water ingress damaging internal components.	• **IP rating of 65** • **Fluid film reduces water getting in** • **Regular inspections**	**B**	**5**	**19**	**Eq**	• **Supply copy of risk assessment as part of alternator paperwork** • **Tool box talk or procedure to be considered to identify risks involved in hosing down the alternator with high pressure water. This could form part of DVD.**	**B**	**5**	**19**
		4.2	Water ingress damaging flame paths or bearing failure causing possible non-flame proof condition	• **IP rating of 65** • **Fluid film reduces water getting in** • **High speed bearings used** • **Quality bearings used** • **Regular inspections**	**B**	**1**	**2**	**S, Eq, P**	• **Supply copy of risk assessment as part of alternator paperwork** • **Tool box talk or procedure to be considered to identify risks involved in hosing down the alternator with**	**D**	**1**	**7**

					Existing			Loss		New		
No.	Task/Activity	No.	Hazard/Threat	Existing Control Measures	P	C	R	Type	New Control Measures Hierarchy of Control	P	C	R
									high pressure water. This could form part of DVD. • Inform people not to leave alternator in rain or drive through high water levels			

4. NEW CONTROL MEASURES' ACTION PLAN

As identified by applying the Hierarchy of Control, the following 'New Control Measures' are considered necessary to safely and effectively achieve the objectives of the risk review.

ITEM NO.	CONTROL COMPLETION DATE	NEW CONTROL MEASURE	RESPONSIBILITY
1.1	11/04/2007	• **Second assembler to check for evidence of fluid film around mating surfaces**	♦ Mining Repairs
1.2	11/04/2007	• **Removal of plastic plugs and a fitment of approved blanks on all gland entries**	♦ Mining Repairs
1.2,1.7	28/08/2007	•**Tool Box talk to be conducted to explain issues.**	♦ Mining Repairs
1.2	28/08/2007	• **Procedures to be changed to reflect the fitment of approved plugs instead of the plastic plugs**	♦ Mining Repairs
1.7	11/04/2007	• **Measure front and rear housings for bearing fitment**	♦ Mining Repairs
1.7	11/04/2007	• **Procedures to be changed to reflect the fitment of bearings**	♦ Mining Repairs
2.1, 2.2,2.3,2.4,2.5,2.6,2.7,2.8,2.9,3.1,3.2,3.3, 4.1,4.2	11/04/2007	• **Supply copy of risk assessment as part of alternator paperwork**	♦ Mining Repairs
2.1,2.2,2.3,2.4,2.5,2.	30/08/2007	• **Installation procedure to be developed**	♦ Mining Repairs/End-users

ITEM NO.	CONTROL COMPLETION DATE	NEW CONTROL MEASURE	RESPONSIBILITY
6,2.7,2.8,2.9			
2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8,2.9	30/08/2007	• **Consider incorporation of training and risk control on DVD**	♦ Mining Repairs
2.2	1/05/2007	• **Sticker to be developed indicating weight of alternator and manual handling issues**	♦ Mining Repairs
2.7	27/08/2007	• **Determine maximum side load tension for bearing supplied in alternators**	♦ Mining Repairs
2.8	30/08/2007	• **Use of feeler gauges to be used to check integrity by installers**	♦ Mining Repairs/End-users
2.10	30/08/2007	• **Check current excitation averages in line with paperwork**	♦ Mining Repairs/End-users
3.1,3.2	30/08/2007	• **Users of alternators to be made aware to ensure installation of the alternators is behind covers that protect the alternator**	♦ Mining Repairs/End-users
3.3	30/08/2007	• **Tool box talk or procedure to be considered to identify that the alternators are not designed to be struck.**	♦ Mining Repairs/End-users
3.3,4.2	30/08/2007	• **This subject to be covered in DVD**	♦ Mining Repairs
4.1,4.2	30/08/2007	• **Tool box talk or procedure to be considered to identify risks involved in hosing down the alternator with high pressure water. This could form part of DVD**	♦ Mining Repairs/End-users
4.2	30/08/2007	• **Inform people not to leave alternator in rain or drive through high water levels**	♦ Mining Repairs/End-users

5. REVIEW PROCESS 'ACTION PLAN'

As identified by the new control measures action plan a review process of the RA & action plan is considered necessary to ensure new controls are implemented effectively reducing risk to an acceptable level & whether any new hazards or risks which where not foreseen before have emerged.

REVIEW DATE	REASON FOR REVIEW	OBJECTIVE
	♦	♦
	♦	♦
	♦	♦