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**PURCHASE, OPERATION AND MAINTENANCE  
OF UNDERGROUND DIESEL ENGINED MINING  
EQUIPMENT**

**GUIDELINE**



**MOSHAB Approved**

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## FOREWORD

These guidelines have been prepared to assist designers, manufacturers, suppliers and purchasers in the purchase, operation and maintenance of diesel engine mining equipment for underground use in metalliferous mines in Western Australia. The guidelines have also been prepared to assist inspectors from the Department of Industry and Resources in administering the Mines Safety and Inspection Act and Regulations. Safety and fire prevention have been the intent.

The compilation of the guidelines has been undertaken by several working parties of the General Safety Standing Committee (GSSC) of the Mines Occupational Safety and Health Advisory Board (MOSHAB). Considerable help in the preparation, evaluation and trials has been provided by Western Mining Corporation's Kambalda Nickel Mines engineering personnel, and by D.B. Elphinstone Pty Ltd (now known as CATERPILLAR-ELPHINSTONE) personnel. The constructive input from all involved personnel is gratefully acknowledged.

Operating mines' staff and manufacturers' and suppliers' staff have been invited to participate in the compilation and review of the guidelines.

The Mechanical Design Guidelines (MDG) series produced by the Department of Mineral Resources, Coal Mining Inspectorate and Engineering Branch, New South Wales, provided the model for these guidelines. With their permission a lot of their requirements appear in this publication. Their help is also gratefully acknowledged.

To keep abreast of progress within the industry it will be necessary to periodically review these guidelines. The reviews may require the issue of amendments or new editions. Users should therefore ensure that they possess the latest available issue and amendments. Suggestions for improvements to these guidelines are welcomed. Notification of inaccuracies and ambiguities should also be made to allow investigation and appropriate action.

**Safety Health and Environment Division**

**Department of Industry and Resources**

**100 Plain Street**

**EAST PERTH WA 6004**

**TEL: (08) 9222 3333**

**FAX: (08) 9325 2280**

## **1.0 INTRODUCTION**

These guidelines are intended to cover safety aspects of diesel engined mining equipment prior to purchase and in the subsequent operation and maintenance phases. The guidelines do not cover all details, and they are not meant to restrict innovative design.

Many of the items in the guidelines have been identified as being the cause of, or having contributed significantly to, fires in underground mining equipment. Other items have been identified as requiring specific attention to improve the safety aspects.

Original equipment manufacturers (OEM) and their distributors should consult with the purchasers and operators of their equipment to ensure properly engineered equipment is purchased.

Owners and operators of equipment should consult with the OEM and their distributors to ensure the equipment is operated and maintained correctly.

Owners and operators of equipment should consult with the OEM and their distributors prior to making any modifications or installing any additional items.

Unless otherwise specified, the appropriate Australian Standards should apply. Where Australian Standards have not been published the appropriate ISO or SAE standards should be used. A partial list of appropriate standards is included in the contents.

These guidelines do not in any way negate or replace the requirements of the Mines Safety and Inspection Act 1994 and Regulations 1995.

## **2.0 ACCESS**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

Refer to AS 1657, AS 3868

- ◆ All equipment should be fitted with appropriate access to wherever a person is required to work.
- ◆ Steps or stairs, rather than ladders, should be installed where possible.

- ◆ Steps, rungs, and hand holds should be highly visible and easily reached by all personnel using them.
- ◆ The bottom step should be not more than 400mm from normal ground level.
- ◆ If the step is below the lowest extremity of the machine it should be flexibly mounted.
- ◆ Steps, rungs, ladders, platforms and walkways should be provided with non-slip surfaces, and should minimise rock and soil retention.
- ◆ Provision should be made for carrying or lifting tools or equipment to ensure both hands are free when climbing ladders.
- ◆ Where powered extension steps or ladders are fitted a lock out device should be provided which prevents the equipment from moving or operating while the steps or ladders are extended.
- ◆ A person operating steps or ladders should be able to view their operation from the control position to ensure that no person is placed in danger.
- ◆ Where a person may be trapped in the event of a fire an emergency egress should also be provided.
- ◆ Adequate provision should be made for access and working space to carry out maintenance and servicing.
- ◆ Adequate provision should be made for access and working space to carry out cabin window cleaning.
- ◆ Purpose built platforms should be easy to use. When of a transportable variety they should be secured when in use to prevent unintended movement.

### **3.0 BRAKES**

Refer to Mines Safety and Inspection Regulations 1995 - Parts 4, 6, 10

Refer to AS 2958.1, AS 3791, ADR 35/00.

- ◆ Brakes should comply with the relevant Regulations and relevant Australian Standards and Australian Design Rules.
- ◆ Service braking systems should be dual circuit systems. This should be interpreted as a separate circuit for front wheels and a separate circuit for rear wheels. Both circuits should be operated by the same brake pedal.
- ◆ A suitable warning and indicating device should be provided to show residual brake pressure in either circuit.

- ◆ An external method to monitor brake wear and brake reservoir fluid levels should be provided.
- ◆ Suitable connecting points to measure brake systems' pressures should be provided.
- ◆ Pneumatic or hydraulic energy storage systems, if required for brake systems, should be provided solely for brake applications.
- ◆ Brake linings or pads should not contain asbestos.
- ◆ Brake operation indication lights should be installed. Refer to Section 13.

#### **4.0 CONTROL FUNCTIONS**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10.

Refer to AS 2956.4, .5,

- ◆ The controls should be located within the "zones of comfort and reach" as detailed in AS 2956.5.
- ◆ The operating controls should be clearly marked to show their function and mode of operation in accordance with AS 2956.4.
- ◆ Emergency stops for electrically powered plant should be provided in accordance with Section 6 - Electrical.
- ◆ A horn or similar device should be provided for use as a manually initiated audible warning device.
- ◆ If a horn or similar device is air operated then an alternative warning device should be provided (eg. for electric start engines where air is not available until the engine is operating).
- ◆ Pre-start audible warning devices should be provided where the engine compartment is not visible to the operator.
- ◆ An automatic audible reversing alarm should be provided on all trucks, graders, and other mobile plant except LHD units.
- ◆ Controls which comply at least with Section 6 - Electrical - should be provided.
- ◆ The details of all controls should comply with minimum ergonomic requirements. Refer Section 8.
- ◆ Emergency Stops For Electrically Powered Plant
  - The stop button should be clearly identified and clearly marked.
  - The stop should be initiated by pushing a large red button.

- Emergency stops should be located at the operator’s position and at the bottom of all equipment access points.
  - The stops should not be located in front of outblowing fans or airflows.
  - Emergency stops should not need power to shut down the engine.
  - When operated the device should latch either electrically or mechanically, such that the actuation can only be reversed by a deliberate action. The equipment should not restart automatically.
- ◆ **Meters**
- A speed indicating meter should be installed.
  - A service hour meter should be installed.

## **5.0 DIESEL ENGINE REGISTRATION**

Refer to Mines Safety and Inspection Regulations 1995 - Parts 4, 6, 10.

An ‘Application for Underground Diesel Unit Registration’ should be submitted to the District Inspector for the mine.

A sample form can be found in Appendix A2.

## **6.0 ELECTRICAL**

Refer to Mines Safety and Inspection Regulations 1995 - Parts 4,5,6,10.

Refer to AS 1319, AS 2956, AS 3000, AS 4242

### **◆ Extra Low Voltage**

Refer specifically to AS 4242 - Earth-moving machinery and ancillary equipment for use in mines - Electrical wiring systems at extra-low voltage.

The requirements of this standard should be followed precisely. The standard was developed to minimise the risk of injury to persons and damage to equipment arising from the design, installation, maintenance and servicing of extra-low voltage (automotive type) wiring systems of earth-moving machinery and ancillary equipment used in surface and underground mines.

### **◆ Above Extra Low Voltage**

Refer specifically to AS 3000

Refer specifically to AS 4242 Sections 1,2,3



## 7.0 ENGINE COMPARTMENT

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10.

Refer AS 1530, AS 1657, AS 2122, AS 3791, AS 3868

- ◆ The location of services including fuel, hydraulic oil, lubricating oil, other oils, and electric power within the engine compartment should be avoided where ever possible.
- ◆ Any services required to be in the engine compartment should be effectively shielded from hot spots and suitably protected from wear and the potential for physical damage during maintenance work.
- ◆ All hydraulic oil, lubricating oil, and other oil circuits within the engine compartment should comply with the following :
  - All hoses should be constructed to AS 3791 and be routed away from hot engine surfaces.
  - All pipes and or hoses should be covered so that oil from any leaks cannot contact any exposed metal surface where the temperature exceeds 200°C under any condition of equipment use. This is to include compressors and all other heat sources. If this is not possible the exposed metal surface may require shrouding or heat shielding to reduce the temperature to less than 200°C.
  - All pipes and or hoses should be covered so that fuel from any leaks cannot contact any exposed metal surface where the temperature exceeds 80°C under any condition of equipment use. This is to include compressors and all other heat sources.

### OR

- All fuel systems should be installed so that fuel cannot leak onto any engine component under any conditions of equipment use.
  - All engine exhaust systems should be installed so that no flames or glowing particles can be emitted within the engine compartment under any conditions of equipment use.
  - All pipes and or hoses should also be routed in a manner which will give them maximum mechanical protection.
- 
- ◆ A fire wall or a barrier should be installed to separate the engine compartment from the hydraulics components.

- ◆ The fire wall or barrier should be so designed that engine ventilation and cooling remains satisfactory.
- ◆ All engine covers (bonnets) should be made from non-flammable material.
- ◆ Hydraulic components should be located where main ventilating air will not cause leaking oil to be spread throughout the engine compartment.
  
- ◆ **Cooling System**
  - Radiator caps for cooling systems should be fitted with a means of safely relieving pressure to prevent scalding personnel.
  - Safe access should be provided to the radiator caps and to other cooling system components.
  - Radiator caps should be guarded against damage by foreign objects.
  
- ◆ **Fuel System**
  - All units should be fitted with fuel devices requiring power on to operate.
  - All fuel lines should be double braid, heat resistant, corrosion resistant metal braided or metal. All fuel lines should be clamped.
  - Fuel filter elements should be enclosed within metal containers.
  - All fuel tanks should be substantially constructed and protected against damage by collision. All fuel tanks should be fitted with non-leaking caps which are effective irrespective of the attitude of the equipment. The caps should be secured to the tank.
  - Where overflow hoses are fitted the hose should extend so it is lower than all engine components.
  - Automatic fast-fuel filling systems should be fitted. Where these systems are not fitted the filler and vent should be located so that leaks or spillage during refuelling will not contact hot surfaces.
  - All fuel tanks should be able to be refilled from ground level.

## 8.0 ERGONOMICS

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

Refer to AS 2953, AS 2956

- ◆ All relevant ergonomic aspects of the equipment should be addressed by the manufacturer in the design and manufacture of the equipment.
- ◆ Driver visibility should be maximised, eg. auxiliary equipment should be located where it will not interfere with visibility.
- ◆ The manufacturer should provide a drawing identifying the driver's field of vision in all directions.
- ◆ Reference should be made to ISO 5006/2 and /3 in the review of visibility.

## 9.0 FIRE FIGHTING

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

Refer to AS 1180, AS 1210, AS 1271, AS 1358, AS 1841, AS 2030, AS 2613, AS 2971, AS 3676, AS 3920

Refer to Department of Minerals and Energy Guidelines 'FOAM FIRE SUPPRESSION SYSTEMS ON MINE VEHICLES' ZMA579BY/Guideline.

Refer to Department of Minerals and Energy Safety Bulletin No. 8 dated 7 July 1993 entitled 'RECHARGING OF FIXED FIRE SUPPRESSION SYSTEMS ON MOBILE EQUIPMENT' in Appendix A4.

### ◆ Fire Suppression Systems

- All units of diesel engine mining equipment should be fitted with an AFFF or equivalently effective fire suppression system in the engine compartment and in other likely combustion compartments.
- The system should not allow the engine to start, or to keep running, if system pressure falls below the manufacturers recommended minimum pressure.
- When any in-built fire suppression system is actuated by any means, the engine should automatically shut down. A delay of about 6 seconds could be installed.  
Note : Operators may neglect to stop the engine when abandoning a vehicle with the result that damage to equipment and the working environment can be exacerbated.
- All units should be fitted with at least two manually operated fire suppression system actuators; one in the cabin and the other(s) at an external position(s) where it (they) can be readily reached from the ground level.

- Automatic systems could also be fitted. In this case the operator should be given ample warning that the system is about to operate and the engine is about to shut down. A delay of about 6 seconds could be installed.

The selection of a manually operated system, or an automatic system should ensure the risks or hazards to personnel are minimised.

- Loaders which are to be operated by remote control should be fitted with fire suppression systems which may be actuated by any one of three mechanisms, all of which should be installed :
  - Automatic actuation
  - Remote control actuation
  - Manual control actuation

#### ◆ **Operation and Maintenance**

- Visible indication should be provided for the plant operator to show the operational readiness of the system. This indication should be visible to the operator from the normal operating position. (This does not apply to remote control panels).
- Instruction manuals setting out the details of installation, operation, maintenance and charging/recharging should be provided. These manuals should draw attention to any special precautions needed to be followed, and to any special tools required.
- All cylinders subjected to internal pressure should be suitably protected by a pressure relief valve. The cylinder and valve should comply with the relevant Australian Standard.

#### ◆ **Electrical Supply**

- There should be a separate electrical supply to each fire suppression system. The switch(es) should be clearly marked 'IN THE EVENT OF FIRE DO NOT SWITCH OFF'.
- All controls should fail to safety unless a back-up power supply is provided.
- Loss of electrical power should not prevent the operation of the system.

- Wiring systems should be capable of maintaining an adequate supply to the equipment when exposed to fire.

◆ **Suppression Systems**

Where a fire suppression system is installed the system should be interlocked so that :

- The equipment cannot be operated with the fire suppression system disabled or faulty.
- The interlock may be able to be over-ridden by an over-ride switch that requires constant hand operation. This applies to allow the plant to be moved to a safer location.

Refer also to Section 19.0 Remote Control

◆ **Portable Extinguishers**

- Adequate portable fire extinguishers should be fitted and maintained on each vehicle.
- Fire extinguishers should be thoroughly cleaned, inspected serviced, and maintained on a regular basis not less than the OEM's recommendations.

◆ **Training**

- Operators of all diesel engine mining equipment should be instructed and trained to bring a moving unit to rest before actuating the fire fighting system so that control of the vehicle is not lost.
- All relevant personnel should be trained to record details of repairs and maintenance carried out to fire suppression systems.

◆ **Pressure Relief**

It should be possible to relieve the pressure from hydraulic oil and fuel tanks. Instructions on the method required to do this should be clearly labelled (to permit pressure which may be fuelling a fire to be shut off).

◆ **Reporting of fires**

- It is a requirement of the MINES SAFETY AND INSPECTION ACT 1994 to immediately report any outbreak of fire to the district inspector.  
A sample form can be found in Appendix A3.
- Any outbreak of fire should also be reported to the original equipment manufacturer or the supplier.

◆ **Investigation of fires**

All fires should be thoroughly investigated by a competent person. The equipment should not be returned to work until the causes of the fire have been determined and repaired. In the instances where fuel and or oil has leaked on to hot engine components the source of the leak and the source of the ignition should have been individually located and repaired.

◆ **Hazard analysis and risk assessment**

It is a requirement of the MINES SAFETY AND INSPECTION REGULATIONS 1995 for all associated with plant from the designer to the end user to identify hazards, to assess the risks, and to reduce the risks. This includes fires.

## **10.0 FLUID POWER SYSTEMS and PNEUMATIC SYSTEMS**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

Refer to AS 2671, AS 2788, AS 3791, AS 4297

- ◆ Flexible hoses should be compatible with the hydraulic fluid used and the maximum system pressure and temperature.
- ◆ Where a hydraulic system incorporates an accumulator, the accumulator should be connected to the system using components of minimal length and adequate rating. Fittings should be located or otherwise guarded to provide mechanical protection. A manual bleed valve should be fitted to allow pressure relief for maintenance. Fluid should return to tank.
- ◆ Accumulators should be securely installed. A method to relieve accumulated pressure to tank should be provided to enable maintenance to be undertaken.
- ◆ Nylon or PVC piping for pneumatic control systems of safety related items should be used only in cases where loss of pressure within these systems cause the system to fail to safety. All such piping should be adequately protected from physical damage and shielded from contact with hot and or sharp surfaces.

- ◆ Only properly specified hoses should be used between an air compressor and an air receiver. Care should be taken to ensure the clamps used are suitable for the job and have the pressure rating stamped on them.
- ◆ All hoses and fittings are to meet or exceed the specifications of the manufacturer or supplier of the equipment for the duty in which they are applied, and are to be fitted according to the manufacturer's recommendations. No improvised repairs should be allowed.
- ◆ Pressure vessels should comply with the requirements of the Mines Safety and Inspection Act and Regulations. Refer also to Section 18.
- ◆ All hydraulic hoses should be supported and or sleeved or otherwise protected so as to eliminate wear through contact with other vehicle components.
- ◆ Hydraulic tanks should be able to be re-filled from ground level.
- ◆ Air compressors should comply with AS 4297 Stationary Air Compressor - Safety Rules and Code of Practice or other Australian Standard as applicable.

## **11.0 GUARDS and SHIELDS**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,  
Refer to AS 2958, AS 1530

- ◆ Shields should be fitted to prevent damage to components. For example:
  - In areas where hoses may be damaged by impact.
  - In the vicinity of the exhaust and turbocharger to prevent fuel or oil spraying on hot surfaces, provided that they don't trap fuel or oil around the exhaust or turbocharger. Refer to Section 7.3.
- ◆ Guards should be fitted to prevent injury to personnel. For example:
  - In the vicinity of all hot components.
  - In the vicinity of every moving component that is readily accessible. (Wheels are an obvious exception).
  - Any other areas required to be guarded by regulations.
  - Around every tail shaft to prevent a damaged or broken shaft from whipping around in a compartment or digging into the ground.

- Any other areas as identified from accident statistics or risk assessments.
- ◆ The engine compartment should be effectively fire shielded from the driver's compartment and from the means of egress from the driver's compartment.
- ◆ Any covers, shields or guards, if not constructed from steel, shall be constructed from fire resistant material if the failure of the material may place an operator at risk.
- ◆ Wherever possible movable guards should remain hinged to the vehicle when open.

## 12.0 LABELLING

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

**Refer to AS 2956,**

The labels required should include the following where applicable :

- ◆ A compliance plate displayed in a prominent position or in the operator's cab showing the following:
  - The serial number.
  - The tare and gross weight of the equipment.
  - The axle loads.
  - The maximum number of personnel for whom seating is provided.
  - Maximum operating grade and load limit for that grade.
- ◆ Individual labels displayed in suitable positions. For example:
  - Towing instructions
    - a) for towing the equipment if inoperable
    - b) for towing a load
    - c) maximum load to be towed
  - Refer also to Section 21.
  - A warning at all accumulators that pressure must be safely released before work commences. (Section 11.3)
  - A warning on any spring applied brake chamber that it contains a spring under compression.
  - A warning on all suspension cylinders which are under constant pressure.



- An operator check list within the control compartment denoting the minimum operator checks prior to operating the equipment.
- A warning that "hearing protection must be worn" if noise level exceeds 85dB(A) at any location on the equipment.
- Refer also to Section 16.
- Minimum safe operating pressure to be marked on the pressure gauges of hydraulic and/or pneumatic braking systems.
- Danger signs and other signs as considered necessary by the Manufacturer to be placed in appropriate positions on the equipment.
- A warning that the park brake and other applicable devices that should be applied before leaving the equipment.
- Identification of all controls including direction of movement where applicable.
- Location of brake wear indicators.
- Emergency stops. (Where applicable)
- Any automatic and or self starting equipment or equipment started remotely should be identified as such.
- Location of battery and or electrical isolation points.
- Fire fighting system.
- Emergency steering.
- Equipment should have permanently marked attachment points for lifting for transport, assembly and dismantling, and for the fixing of safety chains if required.
- Equipment constructed in separate sub-assemblies for transport should have the weight of the sub assembly and the attachment points for lifting permanently marked on it.
- The lifting attachment points should have a minimum safety factor of 4 on the ultimate breaking load in relation to the weight of the sub-assembly.
- Articulated vehicles should be fitted with a steering frame lock.
- The required driver action in event of a fire occurring, eg.

<b>IN CASE OF FIRE</b>
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**DO NOT GET DOWN FROM MOVING EQUIPMENT**

- 1. STOP THE EQUIPMENT, LOWER ALL IMPLEMENTS, APPLY THE PARK BRAKE.**
- 2. SHUT DOWN THE ENGINE.**
- 3. ACTIVATE THE FIRE SUPPRESSION SYSTEM IF REQUIRED.**
- 4. USE FIRE EXTINGUISHERS IF REQUIRED.**

◆ **Materials**

Labels should be made of non-corroding material and be attached with non-corroding screws, rivets, etc.

**13.0 LIGHTING**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,  
Refer to AS 4242.

The following should be provided in addition to normal head and tail lights. This includes towed equipment also.

All lights should be easily cleanable.

- ◆ All mobile equipment should be provided with the following :
  - Dual indication lights readily visible from the rear of the equipment to show service brake operation.
  - Where retard braking is provided by other than service brakes, dual indication lights visible from the rear of the equipment.
- ◆ Reversing lights should be provided on all equipment. The lights should be initiated automatically when reverse is selected. Equipment normally operated in both directions should be equipped with headlights for both directions.
- ◆ Adequate reflectors and or reflective tape should be provided on all equipment to make it readily visible from any direction and hence reduce the likelihood of a collision. (eg. with a broken down item of equipment)  
This includes, but is not limited to:

- The front head board or highest extremity of all mobile equipment to provide visibility in undulating terrain.
- The sides of all equipment to assist in identifying the length of the equipment.
- ◆ Indicator lights should be fitted front and rear to trucks, service vehicles and light vehicles only to warn other traffic of an intention to turn.

#### **14.0 LIMITS OF MACHINE OPERATION**

Refer to Mines Safety & Inspection Regulations 1995 - Part 4, 6, 10.

- ◆ A list of all limits of equipment operation applying to the equipment should be submitted. Such limits should be in accord with relevant standards and should include, but not necessarily be limited to:
  - a) Maximum grade (%)
    - Loaded
    - Unloaded
    - Other variable where applicable
  - b) Maximum cross grade (%)
    - Loaded
    - Unloaded
    - Other variable where applicable
  - c) Maximum load (tonnes)
    - Level conditions
    - A range of grades
    - Other variable where applicable
  - d) Maximum speed (km/hr) - Under all above conditions
  - e) Retardation effort and graphs
- ◆ The registered manager should ensure that all operators are trained by a competent person or persons in the correct safe operation of plant before being appointed to operate that plant. A record of trained operators should be kept at the minesite.
- ◆ Equipment should be operated at a speed consistent with the type of equipment being operated, roadway conditions, grades, clearances, visibility, other traffic and to rules laid down by the registered manager.

#### **15.0 MAINTENANCE**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 5, 6, 10, 13.

Refer to All Australian Standards called up in this guideline for maintenance recommendations.

- ◆ The Registered Manager should appoint a competent person who will personally ensure that all inspections and maintenance are carried out in accordance with established procedures and manufacturers' specifications. The competent person should maintain an accurate record of such inspections and the maintenance undertaken on each item of equipment.
- ◆ All equipment should be thoroughly cleaned at least after every 250 hours of operation and carefully inspected for oil and fuel leaks; for defective hoses, pipes, fittings, and protective shrouds; and for defective electrical components and cables. Necessary repairs should be made before the equipment returns to service.
- ◆ The fire suppression system should be carefully inspected every 250 hours and maintained in accordance with the manufacturer's specifications.
- ◆ All circuits and systems initially installed should be maintained in correct operating condition.
- ◆ All exhaust system components should be thoroughly inspected and repaired as required by the OEM.
- ◆ No exhaust leaks should be tolerated. The OEM should specify test procedures and the necessary instruments and gauges to test for exhaust leaks.
- ◆ Provision should be made to mechanically support any hydraulically operated components when they are required to be in the raised position for maintenance.
- ◆ Electrical items should not emit sparks under any conditions of equipment operation.

## **16.0 NOISE**

Refer to Mines Safety and Inspection Regulations 1995 - Part 7  
AS 1269, AS 2012.2, AS 2789.7

### **General Requirements**

Every effort should be made to reduce noise emission generated by any underground mining equipment to as low as practicable levels. Engineering noise control measures such as acoustically treated operator's cabin, engine cooling fan, exhaust and auxiliaries muffling should be used to achieve this objective.

- ◆ **Operator's Position Noise**

#### Underground Measurements

The operator's noise exposure (L<sub>aeq</sub>.8h) should be assessed for a cycle of operating conditions in accordance with AS 1269. All measurements should be taken with the doors and windows closed and the air conditioning system operating at maximum speed.

#### ◆ **Exterior Noise**

##### Underground Measurements

The equivalent continuous A-weighted sound pressure levels (L<sub>Aeq,T</sub>) of the equipment should be measured at a safe distance from the surface of the equipment while it works during a representative work cycle.

#### ◆ **Operator's Cabin**

Cabins should be fully enclosed and fitted with a combination of acoustic insulation and absorption materials to meet the requirements listed in 17.1

#### ◆ **Information to be Reported**

The equipment supplier should provide a written record of all information related to tests on the completion of commissioning procedures

## **17.0 OPERATOR'S CAB**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

Refer to AS 1530, AS 2294, AS 2664, AS 2823, AS 2955.

- ◆ Falling Object Protective Structures should be provided as required in the Regulations.
- ◆ Two means of exit should be provided from operator's cabs. This may be achieved by a second door or a push out window or panel. Any push out window or panel should be suitably marked.
- ◆ At least one exit should be useable in the event of a roll-over.
- ◆ Cabs should be totally enclosed and soundproofed to comply with noise requirements. Refer to Section 16.
- ◆ The location of cabs and the fitting of windows should provide the operator with maximum visibility.
- ◆ All windows should be fitted with laminated safety glass or other shatterproof material.
- ◆ Forward and rear windscreen washing and wiping facilities should be provided.
- ◆ Other windows should be capable of being opened, preferably by sliding.
- ◆ Adequate demisting should be provided within the operator's cab.
- ◆ The operator's seat should comply with AS 2955.6. The seat should be made to allow the operator to comfortably wear the required cap lamp battery and self-rescuer.
- ◆ The operator's seat belt and seat belt anchorages should comply with AS 2664.
- ◆ Seats should be adequately robust and should be anchored securely.
- ◆ Air conditioning should be provided in accordance with AS 2823. The mounting of the air conditioner or the accessories should not interfere with driver visibility.
- ◆ The air conditioner air intake should be located to avoid engine exhaust emissions, any fuel or heat source, and any fumes that could be expected from any fire.
- ◆ The cab interior, upholstery and insulation should be made of fire resistant material.

## **18.0 PRESSURE VESSELS**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

Refer to AS 1210, AS 2971, AS 3920.

- ◆ All pressure vessels should comply with the relevant Australian Standard.

- ◆ A drain line with a manually operated valve should be provided to drain the lowest point of all air receivers. This valve and line should be suitably protected against damage.

## **19.0 REMOTE CONTROL**

Refer to Mines Safety and Inspection Regulations - Parts 4, 6,10,  
AS/NZS 4240  
and to other AS referenced within AS 4240.

- ◆ Prior to requesting the required diesel registration a declaration should be made that the remote control has been designed, manufactured, installed and commissioned to AS 4240. All of the recommendations and requirements for safe commissioning, operation, maintenance and testing set out in AS 4240 and as set out by the manufacturers should be formally documented and be available for audit when required. Upgrades, changes, or modifications to these documents should be recorded as and when they occur.
- ◆ Records should be kept of the names and occupations of all personnel who have been trained in the various aspects pertaining to the equipment.
- ◆ Fire suppression equipment should be fitted which may be actuated by any one of three mechanisms, all of which should be installed:
  - automatic actuation
  - remote control actuation
  - manual control actuation
- ◆ In the event that fire suppression equipment is discharged during remote control operation the interlock described in 9.4.1 may be able to be over-ridden by a remote control over-ride switch that requires constant hand operation. This applies to allow the plant to be moved to a safer location.
- ◆ A recovery system should be installed that can be operated remotely. See also section 21.

## **20.0 SAFETY DEVICES**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10.

A comprehensive list of all safety devices and their functions should be submitted to the owner. The list should be split into those devices provided by the OEM with the equipment and those which have not been provided, but which are available as an option.

◆ **Extended Bumpers**

Extended bumper bars should be considered for some vehicles where they are considered practical. (Can reduce impact injuries and reduce damage to vehicles.)

◆ **Stability Devices**

Devices intended to increase the stability of the equipment in working mode (eg outriggers, oscillating axle locking etc) should incorporate devices to lock them in their working positions. Outriggers or similar devices should also be lockable in their transport positions.

◆ **Rear Dump and Ejector Trucks - Warning Devices**

An audible and visible warning device should be provided in the operator's cabin, to indicate when the rear dump tray is elevated or extended.

◆ **Rear Dump and Ejector Trucks - Interlocks**

When the rear dump tray is elevated or extended, propulsion in the REVERSE direction should be inhibited. Propulsion in the forward direction should be restricted to 1st range only.

◆ **Supports**

Provisions should be made for mechanical devices to protect personnel working under hydraulically supported components.

## 21.0 TOWING

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10,

◆ Towing of plant which is inoperable.

A means of towing should be recommended by the manufacturer and provisions to be made should include the following :

- The towing attachment should be designed to a minimum safety factor of 2.5 times the maximum rated towing capacity of the towed plant.
- Provision should be made for crossed slings to be fitted for towing.



- The maximum towable weight (gross load) for a towed plant to be as per the towing vehicle manufacturer's recommendation.
  - A means of releasing brakes without having to go beneath the vehicle.
  - A means of steering or guiding the towed vehicle.
  - A means of adequately braking the towed vehicle. Brake indication lights should operate.
  - Documentation of limitations and requirements of the towing system.
  - Direct communications between operators of towing equipment and towed equipment should be installed (on an as required basis).
- ◆ Towing of plant under dangerous ground  
(For example - an LHD being operated by remote control)  
A means of releasing the brakes and of towing the plant that does not require any person to approach the broken down plant should be recommended and installed by the manufacturer.

## **22.0 LIGHT VEHICLES and SPECIAL PURPOSE VEHICLES**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10.

Refer to AS 1841, AS 2664, AS 4242

Refer to ADR 35/00

Refer to Department of Minerals and Energy Guidelines 'FOAM FIRE SUPPRESSION SYSTEMS ON MINE VEHICLES'.

- ◆ Fire Suppressant controls on 4 x 4 transport vehicles
- Light vehicles used for the transportation of personnel and equipment, and for servicing, should be fitted with double braided heat resistant, corrosion resistant, metal braided or metal fuel lines.
  - Fuel filter elements should be enclosed within metal containers.
  - Provision should be made for the extinguishing of fire in the engine compartment without raising the bonnet.
  - Adequate portable fire extinguishers should be fitted and maintained on each vehicle.

- Fire extinguishers in such vehicles should be thoroughly cleaned, inspected, serviced and maintained on a regular basis, appropriate to the severity of the vehicle's use, but not less than the OEM recommendations.

◆ **Overhead Structures on Light 4WD Vehicles**

- If an overhead structure is fitted it should be made of light tubular (pipe) or RHS, to the extent that it does not add excess weight or make the vehicle top heavy and the vehicle continues to comply with Australian Design Rules.
- Frameworks of this type should be designed to:
  - assist persons to climb on and off utility vehicles safely.
  - confine persons within the vehicle tray to prevent injury from impact with walls or services in the headings travelled.
  - allow a light cover to be placed over the open tray back to prevent persons standing up while travelling.

◆ **Control of Circuits**

- Isolation of fire protection circuits. Where a switch is provided to isolate fire protection circuits for the purpose of servicing the system, the switch should be prominently marked: IN THE EVENT OF FIRE, DO NOT SWITCH OFF.
- Battery isolation switch. A battery isolation switch should be installed as close as practicable to the batteries and shall be easily accessible. This does not preclude the installation of additional isolating switches at other positions. Fire protection systems and communication systems need not be controlled by the battery isolating switch.

◆ **General considerations**

- All mechanical and electrical componentry in such vehicles should be thoroughly cleaned, inspected, serviced and maintained on a regular basis, appropriate to the severity of the vehicle's use, but not less than the OEM recommendations.
- Provision of a safe means of climbing on and off such vehicles is important, to reduce the risk of personal injury.
- Provision of proper seating and seat belts is also important where personnel are to be transported in 4WD light vehicles.

- A grab handle should be provided near each seat which can easily be reached by the passenger from the seated position.
- Passengers should have facilities for speech or signal communication with the driver.
- Braking systems should be maintained to Australian Design Rules standard.
- The retrofitting of enclosed wet disc brakes is encouraged.

◆ **Vehicles for Special Purposes**

In addition to all other specifications the following should be observed.

- **Elevating work platforms**  
Refer to AS1418, AS2549, AS2550.  
These items are not Classified Plant if used exclusively underground. However they should be operated and maintained as if they were Classified Plant.
- **Explosives Charging**  
Refer specifically to Department of Minerals and Energy Safety Bulletin No. 7 dated 23 July 1993 entitled 'EARTHING OF ANFO LOADERS USED UNDERGROUND'. See copy in Appendix A4.
- **Explosives Transport**  
Refer specifically to Department of Minerals and Energy 'GUIDELINES FOR THE TRANSPORT OF EXPLOSIVES AND DETONATORS UNDERGROUND' dated 6 September 1992 (Refer MMI669AP).
- **Mobile Cranes**  
Refer to AS1418, AS2549, AS2550.  
These items are not Classified Plant if used exclusively underground. However they should be operated and maintained as if they were Classified Plant.

### **23.0 WHEELS and RIMS**

Refer to Mines Safety and Inspection Regulations 1995 - Part 4, 6, 10.

Refer to AS 4457.

- ◆ The original equipment manufacturer of the equipment to which the rims and wheels are fitted should recommend and advise :
  - The maximum wheel loads, speeds and operating temperature etc.

- Procedures for servicing wheel rims, including in particular, multi-piece wheel rims.
- Clear Limits of tolerances, permissible wear and other permissible defects of wheel and rim components.
- The standards to which wheel and rim components are manufactured.
- Recommended tyre pressures.

## **APPENDIX A1**

### **AUSTRALIAN STANDARDS**

**All equipment should comply in the first instance to relevant Australian Standards.**

**If there is no relevant Australian Standard the equipment should comply to the relevant ISO Standard or the relevant SAE J Standard.**

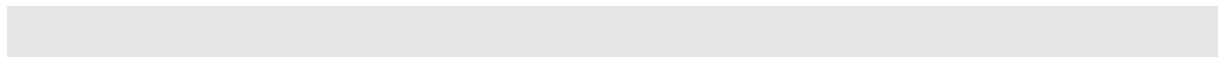
- AS 1180 Methods of test for hose made from elastomeric materials
- AS 1210 Unfired pressure vessels
- AS 1269 Acoustics, hearing conservation
- AS 1271 Safety valves, etc for boilers and un-fired pressure vessels
- AS 1319 Safety signs for the occupational environment
- AS 1358 Bursting discs and devices, guide to application, selection, installation
- AS 1418 Cranes
- AS 1530 Methods for fire tests on building materials, components and structures
- AS 1636 Agricultural wheeled tractors - roll over protection structures - criteria and tests
- AS 1657 Fixed platforms, walkways, stairways and ladders
- AS 1841 Portable fire extinguishers
- AS 2012 Measurement of airborne noise, emitted by earth moving machinery
- AS 2030 The approval, filling, inspection, etc, for cylinders of compressed gas
- AS 2122 Combustion characteristics of plastics
- AS 2149 Starter batteries - lead acid
- AS 2294 Protective structures for operators of earth moving machines
- AS 2359 Powered industrial trucks
- AS 2549 Cranes - Glossary of terms
- AS 2550 Cranes - Safe use
- AS 2596 Seat belt assemblies for motor vehicles
- AS 2613 Safety devices for gas cylinders
- AS 2664 Seat belts and anchorages
- AS 2671 Fluid power - hydraulic systems and components
- AS 2788 Fluid power - pneumatic systems and components
- AS 2823 Agricultural tractors - tests for air conditioning systems
- AS 2868 Classification of machinery for earth moving etc
- AS 2951 Earth moving machinery - nomenclature

AS 2952 Earth moving machinery - basic shapes and dimensions  
AS 2953 Earth moving machinery - human dimensions  
AS 2954 Earth moving machinery - rated loads and volumetric ratings  
AS 2955 Earth moving machinery - tests and measurements  
AS 2956 Earth moving machinery - instrumentation and operator's controls  
AS 2957 Earth moving machinery - operation and maintenance  
AS 2958 Earth moving machinery - safety  
AS 2971 Serially produced pressure vessels  
AS 3000 Electrical installations (SAA wiring rules)  
AS 3570 Automotive diesel fuel  
AS 3676 Portable fire extinguishers - guide to servicing  
AS 3791 Hydraulic hose  
AS 3868 Earth moving machinery - design guide for access systems  
AS 3920 Assurance of product quality  
AS 4211.1 Recovery and recycling equipment. Refrigerants from automotive airconditioning systems  
AS/NZS 4240 Remote controls for mining equipment  
AS 4242 Electrical wiring systems at extra low voltage  
AS 4297 Underground mining - stationary air compressors  
AS 4457 Earth moving machinery - off highway rims and wheels - maintenance and repair.  
ADR 35/00 Commercial vehicle brake systems

## **APPENDIX A2**

### **DIESEL ENGINE REGISTRATION**

#### **APPLICATION FORMS**



**APPLICATION FOR U/G DIESEL UNIT REGISTRATION**

To the District Inspector:

Perth

Collie

Kalgoorlie

Karratha

- 1. **COMPANY NAME.** \_\_\_\_\_
- 2. **UNDERGROUND MINE(S)** \_\_\_\_\_  
for which the unit is to be \_\_\_\_\_  
Registered \_\_\_\_\_  
\_\_\_\_\_
- 3. **DIESEL UNIT OWNER** \_\_\_\_\_
- 4. **ASSET/REFERENCE NUMBER** \_\_\_\_\_
- 5. **DIESEL UNIT MAKE** \_\_\_\_\_  
(eg Elphinstone)
- 6. **DIESEL UNIT MODEL** \_\_\_\_\_  
(eg R2800 LHD)
- 7. **ENGINE MAKE** \_\_\_\_\_  
(eg CATERPILLAR)
- 8. **ENGINE MODEL** \_\_\_\_\_  
(eg 3406 DITA)
- 9. **ENGINE NUMBER** \_\_\_\_\_
- 10. **APPROXIMATE FLY WHEEL POWER** (eg 485 kW) \_\_\_\_\_ kW
- 11. **EMISSIONS** YES/NO  
Do the maximum emissions contain less than 1000 ppm NOx and less than 1500 ppm CO \_\_\_\_\_

**SIGNED** \_\_\_\_\_  
(Registered Manager or Authorised Representative)

**PRINT NAME** \_\_\_\_\_

**DATE** \_\_\_\_\_

**PHONE NO** \_\_\_\_\_

**FAX NO** \_\_\_\_\_

ZMM480BK/M



**REQUEST FOR CHANGE OF REGISTRATION**

To the District Inspector:

Perth

Collie

Kalgoorlie

Karratha

**RE UNDERGROUND DIESEL UNIT REGISTRATION NUMBER:-**

--	--	--	--	--	--

Diesel Unit Make \_\_\_\_\_

Diesel Unit Model \_\_\_\_\_

Asset/Reference Number \_\_\_\_\_

**A. In accordance with Regulation 10.51, I advise that an engine change has taken place on the abovementioned registered diesel unit.**

The details are as follows:

	<b>Previous Engine</b>	<b>Replacement Engine</b>
Engine make:	_____	_____
Engine model:	_____	_____
Engine number:	_____	_____
Fly wheel power (nominal)	_____ kW	_____ kW

**B. I request that the diesel unit registration be varied by:**

a) registering it for the following additional mine(s)

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

Or b) cancelling the Registration.

**SIGNED**

\_\_\_\_\_  
(Registered Manager or Authorised Representative)

**PRINT NAME**

**MINE**

**DATE**

**PHONE NO**

**FAX NO**

## **APPENDIX A3**

### **FIRE REPORT FORM**

**SAFETY HEALTH AND ENVIRONMENT  
 FIRE REPORT FORM**

1.	<b>INSPECTORATE</b>	<input type="checkbox"/> KARRATHA <input type="checkbox"/> KALGOORLIE <input type="checkbox"/> PERTH <input type="checkbox"/> COLLIE
2.	<b>PERSON REPORTING THE INCIDENT</b>	NAME:..... POSITION:..... EMPLOYER:..... MINESITE:..... COMPANY:..... TELEPHONE NO:..... FAX NO:.....
3.	<b>DESCRIPTION OF INCIDENT</b>	FIRE LOCATION <input type="checkbox"/> SURFACE <input type="checkbox"/> UNDERGROUND MINE RESCUE DEPLOYED <input type="checkbox"/> YES <input type="checkbox"/> NO DATE OF FIRE ..... TIME ..... DETAILS:..... ..... .....
4.	<b>INJURIES (a)</b> <b>HOSPITALISATION (b)</b> <b>SELF RESCUERS USED (c)</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO    NUMBER ..... <input type="checkbox"/> YES <input type="checkbox"/> NO    NUMBER ..... <input type="checkbox"/> YES <input type="checkbox"/> NO    NUMBER ..... <i>Details:</i> ..... ..... ..... ..... <b>(If 'Yes' to 4(a) and/or (b) fill out usual Accident Report Form</b>
5.	<b>CAUSE OF FIRE</b>	<input type="checkbox"/> FRICTION <input type="checkbox"/> OIL/FUEL LEAK <input type="checkbox"/> ELECTRICAL <input type="checkbox"/> CUTTING/WELDING <input type="checkbox"/> OTHER <i>Details:</i> ..... ..... .....
6.	<b>IF VEHICLE (includes LHD's, shovels and drill rigs etc.)</b>	MAKE OF UNIT ..... TYPE..... MODEL ..... DIESEL PERMIT NUMBER (UNDERGROUND ONLY)..... <input type="checkbox"/> FUEL <input type="checkbox"/> EXHAUST <input type="checkbox"/> BRAKES <input type="checkbox"/> HYD/FLUID <input type="checkbox"/> ENGINE <input type="checkbox"/> ELECTRICAL <input type="checkbox"/> TURBO <input type="checkbox"/> OTHER ..... <i>Details</i> ..... .....
7.	<b>METHOD OF EXTINCTION</b>	<input type="checkbox"/> PORTABLE    No. USED..... No. FAILED ..... <input type="checkbox"/> AFFF <input type="checkbox"/> IN ORDER <input type="checkbox"/> FAILED <i>Details Type:*</i> ..... *Type = water, foam, dry chemical, CO <sub>2</sub> or BCF.
8.	<b>PERSON COMPLETING REPORT</b>	NAME:..... TIME:..... AM/PM                      DATE:..... / ..... / ..... SIGNATURE:.....

ZMT850GK/M

## **APPENDIX A4**

### **SAFETY BULLETINS**

- NO. 7        EARTHING OF ANFO LOADERS USED UNDERGROUND**
- NO. 8        RECHARGING OF FIXED FIRE SUPPRESSION SYSTEMS ON MOBILE  
EQUIPMENT**
- NO. 20      SEAT BELTS AND RESTRAINING HARNESS IN HEAVY EARTH MOVING  
EQUIPMENT**

## SAFETY BULLETIN

**No:** 7  
**Date:** 23/07/93  
**Subject:** EARTHING OF ANFO LOADERS USED UNDERGROUND

### Details:

### INTRODUCTION

Pneumatic loading of anfo blasting agent causes electrostatic charge to be generated at a significant rate. Without effective controls, charge accumulation on the delivery hose can rapidly exceed energy levels capable of initiating explosive devices.

Acceptable practice for safeguarding against this hazard is to prevent charge from accumulating by providing an efficient discharge path to ground through the use of semi-conductive hosing and effective earthing of the loader.

### REQUIREMENTS

**(Note: The original Safety Bulletin No. 7 has been modified for inclusion in this Guideline to reflect the new Regulations).**

Detailed in MSIA Regulation 8.41 are essential requirements necessary for safeguarding against this hazard:

These requirements accurately reflect recommendations detailed in the "SAA Explosives Code" AS2187.2.

### COMMENTS

It is recognised that certain non-electric initiating techniques are much less susceptible to static than equivalent electrical systems. However they are not to be regarded as immune and the requirements should be applied equally to all blasting systems.

### Hoses

Semi-conductivity of the hosing is necessary for two purposes:

- (a) To provide an adequate discharge path to ground for static charge generated during operation of the loader.
- (b) To present a sufficiently high resistance to other extraneous ground currents which may be present and transmitted to the blast hole via the hose.

Fully conductive hose is hazardous. To safeguard against unsatisfactory replacement, semi-conductive hose should be readily identifiable. The brand of hose referred to as "LO-STAT" is black with a prominent yellow stripe along its length.

Hose conductivity is known to vary with age and usage. Periodic testing is necessary to ensure safe values are maintained.

## **Earthing**

The discharge path to ground is not complete unless the loader is effectively earthed. Earthing is to be effected via a flexible electrical cable connected between metal parts of the loader in contact with the hose and an electrode in fixed contact with the ground. The cable, electrode and connections are to be appropriate for the environment (robust) and afford the required resistance. Crocodile clips and the like are not acceptable.

Earthing provided by physical contact of the loader with ground and contact of the hose within the borehole are not regarded as satisfactory earthing.

Earthing of the loader to rail, air, water and electricity services are prohibited to prevent lightning surges, distribution earth faults and other stray currents from being dangerously transmitted to the blast hole.

It is recommended that a prominent notice be displayed requiring the "equipment to be effectively earthed prior to use in accordance with MSIA Regulation 8.41."

However remote the possibility, accidents caused by premature ignition of explosives are potentially lethal. Accordingly, it is requested that these requirements are widely communicated to all persons involved with the operation and maintenance of ANFO loaders.

J M Torlach  
STATE MINING ENGINEER

23 July 1993

## SAFETY BULLETIN

**No:** 8  
**Date:** 07/07/93  
**Subject:** RECHARGING OF FIXED FIRE SUPPRESSION SYSTEMS ON MOBILE EQUIPMENT

### Details:

Routine maintenance of mobile equipment, fitted with fixed fire suppression systems, may necessitate the discharge and recharge of the fire suppression systems in accordance with the equipment suppliers service manuals.

In recharging a fire suppression system it is normal practice to use nitrogen bottles which contain pressures up to 25 MPa (3625 p.s.i.) whilst the design pressure of the suppression system is usually 1.2 MPa (174 p.s.i.).

To carry out the recharging process safely the following minimum requirements must be observed:

- (i) The nitrogen bottle must be fitted with a correctly rated pressure regulator properly set at the required recharge pressure.
- (ii) A correctly calibrated pressure gauge must be fitted in the recharging line, after the regulator.
- (iii) A safety pressure relief valve must be fitted, in the recharging line between the pressure gauge and the connection to the fire suppression system. The relief valve should be set to "open" at a pressure not greater than 110% of the required recharging pressure of the system.

Failure to observe the above requirements can result in very serious or fatal injuries to personnel in the immediate area of the recharging process.

J M Torlach  
STATE MINING ENGINEER

7 July 1993

## **SAFETY BULLETIN**

**No:** 20  
**Date:** 26/06/96  
**Subject:** SEAT BELTS AND RESTRAINING HARNESS IN HEAVY EARTH  
MOVING EQUIPMENT

### **Details:**

#### **THE PROBLEM**

The fitment and wearing of seat belts (as a minimum standard) is now required under Regulation 4.16 of the Mines Safety and Inspection Act Regulations (1995).

The Mining Inspectorate has formed the view that the wearing of seat belts across the industry is now a general practice (although not universal). This view is derived from both direct observation and from an examination of accidents and incidents in which persons in vehicles have been found on investigation to have worn belts or restraint harnesses and have generally escaped serious injury.

However, there is an increasing experience of injury due to:

- Seat belts or harnesses being inadequately attached or maintained, resulting in defective performance.
- Failure of the attachment of the seat to the vehicle or of a movement restraint component of the seat attachment, resulting in injury to the person. The failures have been variously attributed to poor design, inadequate maintenance, deterioration due to wear and tear and corrosion, and failure to ensure the integrity of restraint components following damage or detachment in service.

Injury has also resulted from inadequacy of the restraint itself; for example lap seat belts instead of a more comprehensive harness.

#### **ACTION REQUIRED**

1. Review the integrity of design and quality of manufacture and fitment of the system as supplied, to determine if it is adequate and fit for the application; (for example sufficiently robust and durable in service, whether a lap and sash or full harness is appropriate).
2. Maintain vigilance on the condition of the components in service, and in particular on the maintenance of the seat and restraint.
3. Ensure that the integrity of these components is not affected by other maintenance work on the equipment.
4. Ensure that all persons are instructed in the use, adjustment and maintenance of restraints and that operators wear them.

J M Torlach  
STATE MINING ENGINEER  
26 June 1996



## APPENDIX A5

### GUIDELINES FOR THE TRANSPORT OF EXPLOSIVES AND DETONATORS ON A MINESITE

A vehicle used for the transport of packaged explosives and detonators in or on a mine site shall comply with the following minimum requirements:-

1. The vehicle shall be fitted with a compression ignition engine (diesel).
2. The vehicle shall be placarded with Class 1 diamond (250 mm square) front and rear and be fitted with signs bearing the words "explosives" (in red lettering 150 mm high) on all four sides.
3. A 30B rated dry chemical powder fire extinguisher to be fitted on the vehicle.
4. The tray of the vehicle must have side and rear walls at least 250 mm high.
5. The vehicle shall be fitted with a receptacle securely fastened to the tray of the vehicle for the transport of detonators. The receptacle shall be of metal construction with either a wooden or rubber lining, be waterproof and have either side or top access.
6. The maximum number of detonators that may be transported at any one time is 2 000.
7. A barrier to separate the detonator container from the explosives is to be provided. The barrier shall be a 75 mm thick hardwood board fitted with a 3 mm steel plate on the explosives side.
8. The maximum quantity of explosives that may be carried at any one time is 1 000 kgs. The stacked height of the explosives shall not be greater than the height of the side and rear walls of the tray of the vehicle.
9. Persons travelling in the vehicle must be seated in the cabin and no tools or equipment are to be carried on the vehicle tray whilst explosives are being transported.
10. The vehicle shall not be left unattended nor shall it be parked up adjacent to site offices, underground/surface cribs, workshops etc while carrying explosives and or detonators.

**NOTE: The above guidelines apply to vehicles solely operating in or on mine sites.  
The vehicle must not be used to transport explosives on public roads.**

J M Torlach  
STATE MINING ENGINEER  
6 January 1993 - mmi669ap