
DIESEL TRANSPORT, STORAGE AND REFUELLING UNDERGROUND

GUIDELINE

MOSHAB Approved

December 1997

Document No: ZMA565BN



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FOREWORD

This Department of Industry and Resources (DoIR) guideline is issued to assist in understanding the safety requirements for diesel transport, storage and refuelling in underground mines, and to provide guidance, at the practical level, on essential design aspects and operating practices.

It is not a comprehensive technical document and does not deal in detail with specific tasks or operating procedures.

The procedures outlined in the body of this guideline are not regulations, and compliance with them is not mandatory. However, adherence to the procedures indicated should ensure a high level of worker safety. Procedures different from those set out in the guideline may also be acceptable.

Comments on, and suggestions for, improvements to the guideline are encouraged. The guideline will be revised as appropriate, to accommodate comments and to take account of new information on improvements in technology and operational experience.

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1.0 INTRODUCTION

In the design of a diesel fuel storage and refuelling facility for an underground mine a number of factors need to be considered; the location, method of construction, transportation of fuel to the installation, ventilation, hazards to persons and other facilities, fire procedures and emergency plans.

The Mines Safety and Inspection Regulations 1995 contains regulations dealing in Part 4 Division 3 with emergency plans, and in part 10 Division 4 covers specific requirements with respect to diesel fuel underground.

Preparation of emergency plan

Regulation 4.30

- (1) The principal employer at, and the manager of, a mine must ensure that a plan for dealing with emergencies at the mine is prepared -
- (a) in the case of an existing mine, as soon as is practicable after the commencement day; or
 - (b) in any other case, before mining operations commence at the mine.

Penalty: See regulation 17.1.

- (2) The plan referred to in subregulation (1) must -
- (a) identify hazards that might cause an emergency at the mine;
 - (b) assess the risk of such an emergency occurring; and
 - (c) consider means by which any such emergency may be prevented or dealt with, including by -
 - (i) the provision of appropriate facilities and equipment;
 - (ii) the provision for effective alarm systems;
 - (iii) the testing of alarm systems;
 - (iv) the development of procedures to deal with emergencies;
 - (v) the training of employees in emergency procedures;
 - (vi) the training of employees in fire fighting, mine rescue and other relevant emergency response functions; and
 - (vii) the review of facilities, equipment and procedures.

- (3) The principal employer at, and the manager of, a mine must ensure that the plan is updated and revised whenever it is necessary to do so due to any change in mining operations, equipment, systems or procedures at the mine.

Penalty: See regulation 17.1

Diesel engines only to be used

Regulation 10.48

- (1) Each responsible person at an underground mine must ensure that no internal combustion engine, other than a diesel engine, is used underground in the mine.

Penalty: See regulation 17.1.

- (2) Each responsible person at an underground mine must ensure that only automotive diesel fuel is used in diesel engines used underground in the mine.

Penalty: See regulation 17.1

Fuelling and servicing

Regulation 10.58

- (1) The manager of an underground mine must ensure that the district inspector is notified in writing of the location and details of each proposed automotive diesel fuel service and storage facility that is to be installed underground in the mine.

Penalty: See regulation 17.1

- (2) The manager of an underground mine must ensure that the location, method of construction and means of ventilation of an automotive diesel fuel service and storage facility that is underground in the mine is such as to reduce the risk of hazards from that facility and conforms with AS 1940.

Penalty: See regulation 17.1

Fire suppression

Regulation 10.59

- (3) The manager of an underground mine must ensure that, so far as is practicable, automatic fixed fire suppression systems are installed and properly maintained at all underground locations in the mine where oils, fuels or lubricants are stored or dispensed.

Penalty: See regulation 17.1

Fuel transport and storage

Regulation 10.60

- (1) The manager of an underground mine must ensure that if any Class 3 Flammable and Combustible liquids (within the meaning of the Third Schedule to the Explosives and Dangerous Goods Act 1961) are taken underground in the mine, the liquids are -
- (a) taken underground in containers that do not leak; and
 - (b) transported in a secure manner.

Penalty: See regulation 7.1

- (2) The manager of an underground mine must ensure that at any time the quantity of automotive diesel fuel stored underground at the mine does not exceed the quantity required to do one week of work at the mine.

Penalty: See regulation 17.1

A formal risk assessment should be undertaken covering all aspects of the installations and the system.

Precautions should be taken for the safe control of hazards caused by static electricity.

2.0 STORAGE

Storage bays should be bunded to provide for a minimum retention capacity of not less than 150 per cent of the largest tank's capacity. The bund wall should be impervious to distillate and designed to withstand the hydrostatic head when full. Masonry blocks will require sealing.

Drainage valves should be constructed at the base of the wall and be secured in a closed position.

Tanks for the storage of diesel fuel should comply with AS 1692 (Tanks for Flammable and Combustible Liquids) or an equivalent standard, and comply with any relevant hazardous substances regulations. The tanks should be inspected periodically and where a tank is found

to be leaking it should cease to be used for storage of dangerous goods until that leak has been repaired.

Each tank should be labelled appropriately and identified with a reference number.

The floor of the storage area should be constructed of concrete and sloped so that any spillage will flow to a sump contained within the bund.

3.0 REFUELLING

Unless vehicles are captive underground or slow moving, it is preferable that they be refuelled at a surface installation to avoid the risks associated with refuelling underground.

Vehicles should be refuelled underground with their engines stopped, and only while they are within the designed refuelling bay where the ventilation is adequate and spillage can be controlled. The dispensing hose length should be restricted accordingly.

The "Fast Fill" system of refuelling is preferred but where another system is used the delivery nozzle for the fuel dispenser shall be a type which cannot be latched open during delivery, and will shut off the fuel flow automatically when the level of liquid in the receiving vessel reaches the end of the nozzle; (AS 1940 6.4.2).

The floor of a refuelling bay should be constructed of concrete and sloped so that any spillage will flow into a concrete drain then into a sump within the refuelling bay.

Diesel fuel should be pumped from the storage tank to the service bay, not gravity fed, and any pump supplying diesel to a second storage tank or a vehicle shall be provided with a shut off device which is readily accessible, clearly identified and capable of shutting off power to the pump in an emergency (AS 1940 6.2.4).

4.0 TRANSPORT

4.1 Transport of Diesel Fuel by Pipeline

Where tanks on surface are used to supply diesel fuel to the tanks underground via a pipeline:

- ◆ The combined capacity of the surface batch tank and pipeline feeding the underground tank should not exceed 50 percent of the largest underground tank capacity;
- ◆ Protection should be provided on surface against the hazards arising from lightning strikes;
- ◆ The surface tank should be fully bunded to comply with AS1940 and should be securely fenced;
- ◆ Filling of the surface batch tank should not take place while diesel is being transferred to the underground storage tank.
- ◆ The pipeline between the surface batch tank and the underground storage tank should contain no other valves or devices that may create a blockage or restriction. This will ensure that there is no risk of the formation and auto-ignition of air fuel vapour and that the pipeline contains diesel fuel only while the underground tank is being filled;
- ◆ The filling pipeline should discharge onto a splash plate located in the lower portion of the underground tank; and
- ◆ A communication system should be provided between the surface batch tank and the underground storage area, outside the bunded areas.

Pipes carrying diesel fuel underground should be either screwed or welded steel and restricted to a maximum diameter of 25 mm to reduce spillage in the case of failure. Pipework should be firmly supported and positioned so as not to be exposed to mechanical damage, or routed through a borehole where practicable. Precautions should be taken to guard against corrosion. The installation should be tested to ensure that siphoning is not possible.

4.2 Transport of Diesel Fuel by Vehicle

Where vehicles are used to transport diesel fuel to the underground storage tanks:

- ◆ The vehicles should be well maintained and kept clean of diesel fuel spillage and other flammable material;
- ◆ The diesel fuel being transported should be contained in sturdy, purpose built, leak proof containers;
- ◆ The transfer of diesel fuel to the storage tank should be done by a pump and hose incorporating a nozzle with an automatic cut-off facility unless a manual pump is used; and
- ◆ Signs and flashing lights should be placed in the vicinity of the vehicle to warn others that diesel fuel is being transferred to the storage tank.

Vehicles transporting diesel fuel for underground refuelling should transfer the fuel only into a storage tank and not into another vehicle's fuel tank unless the refuelling bay and the transporting vehicle and associated equipment comply with the Dangerous Goods Regulations 1992.

5.0 FIRE PROTECTION

The diesel fuel storage area and refuelling bay should be so located that in the event of a fire or explosion in either of them, there will be a minimal effect on working areas of the mine

and on underground installations including any shaft, magazine, refuge station, or transformer installation. It should be noted that in the event of a fire smoke and fumes will travel up declines due to the convective effect, regardless of the direction and quantity of air in the decline.

The diesel storage area should be walled completely on the fresh air side with an access hatch or door that is sealable in case of fire. Both the wall and door, or access hatch, should be constructed of fireproof materials and the door or access hatch should open only outwards.

The storage area and refuelling bay should be kept clean. Waste oil, grease or spillage should not be washed into the mine drainage system but should be collected and sent to the surface in secure containers daily. Pumps for spillage removal may be either electric or air powered, and in the case of the storage area located outside the bund. The pump and valve should be manually operated, not automatic.

Suitable equipment should be installed for the control and extinction of fire, and tested and maintained in accordance with the appropriate Australian Standards. The fuel storage area and the refuelling bay should have fire extinguishers with a combined minimum rating of 200B(E) located upwind and within easy access of the entrances. The pump installation for handling diesel shall be provided with a 2A 60B(E) powder extinguisher (AS 1940 10.5.1). A hydrant and hose should be provided at a location where the water it supplies can reach every part of any tank, pump, valve or other component of the installation.

A foam fire suppression system should be installed in each diesel storage bay and refuelling bay, together with a system incorporating fusible links which when activated will allow baffles to close preventing any movement of air into or out of the storage bay.

5.1 Work Permits

Except for routine work of a non-hazardous nature any work required in a diesel storage or refuelling bay should be authorised by means of a Work Permit (AS 1940 9.8.2.1). The person designated should issue the Work Permit and be responsible for

safety at that site until the work is completed and the site restored to a safe condition (AS 1940 9.8.2.1, 9.8.2.4 and 9.8.2.5).

6.0 EMERGENCY RESPONSE

An emergency response plan should be prepared for any emergency involving the storage use or transport of diesel, and the plan should be maintained and periodically tested by conducting regular fire drills. Persons employed underground should understand their responsibilities with regard to the emergency plan and be competent to operate all the safety equipment they may be required to use in dealing with an emergency. Emergency response equipment provided should be of an adequate design and manufacture, conform to an Australian Standard and be maintained in an operable condition.

Appropriate warning signs and emergency instructions detailing the action to be taken in the event of a fire, explosion or major leak should be posted in conspicuous places.