



**DRAFT**

**MDG 28**

**SAFETY REQUIREMENTS.**

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## **PREFACE.**

These Guidelines were prepared by  
Representatives of :-

- i) Camberwell Coal Pty. Ltd.
- ii) Department of Mineral Resources,
- iii) Department of Resource Industries, QLD.
- iv) Electricity Commission, N.S.W.
- v) Saxonvale Coal Pty. Ltd.

Preparation has been coordinated by The Department of Mineral Resources, Coal Fields Inspectorate, Singleton.

## **SECTION 1. SCOPE AND GENERAL.**

### **1.1 SCOPE.**

This document provides guidelines which apply to the design, construction, installation and safe operation (under normal and abnormal conditions) of coal handling systems and associated earth moving machinery where material is stockpiled above reclaim tunnels.

The document details safety recommendations for :-

- i) Design.
- ii) General operation.
- iii) Safe Work Procedures.
- iv) Inspection.
- v) Maintenance.
- vi) Operation of mobile machinery.
- vii) Fire Protection.
- viii) Lighting.
- ix) Communications.
- x) Training.

These guidelines do not apply to above ground reclaim systems such as "stacker/reclaimers".

### **1.2 PURPOSE.**

The purpose of these guidelines is to establish uniformity of practice with respect to bulk coal stockpiles with reclaim tunnels throughout the coal mining industry of NSW.

The guidelines have been drafted to provide bulk coal stockpiles and reclaim tunnel systems with practical and adequate safety measures and to stipulate conditions for safety in design, installation, operation and maintenance.

### **1.3 APPLICATION.**

Reclaim tunnels located on mines in NSW should be evaluated against these guidelines and where ever reasonably practicable brought in to compliance. Variations from the guidelines should be supported by engineering and risk assessment.

## **SECTION 2. GENERAL REQUIREMENTS - STOCKPILE.**

### **2.1 GENERAL.**

It is recommended that a preliminary study be undertaken to develop a Stockpile/Reclaim Tunnel Management Plan (SRT plan). The study would be conducted using risk assessment methods, utilising the engineering design and the contents of this guideline and referenced documents as resource material. For existing installations the condition of the plant and equipment needs to be determined for consideration in the study.

The plan would be modified with time following:-

- Changes to the installation,
- Planned review or Audit,
- Accident or undesirable event investigation.

A SRT plan may be considered to be comprised of:- General requirements, Plan elements; Processes. Engineering design and standards.

- General requirements - provide a basis for the development and implementation of SRT plan through policy, resourcing, documentation and compliance requirements.;
- Plan Elements - are the 'glue' that holds SRT plan together and provide the broad management framework. They are analogous to system elements and procedures of the ISO 9000 series standards.
- Processes - are those activities and equipment that form the day to day operation of an SRT plan and which are to be performed under controlled conditions.
- Engineering design and standards determine the physical characteristics and constraints relating to the installation.

#### **2.1.1 SRT PLAN REQUIREMENTS**

This section describes mandatory and discretionary requirements considered appropriate to be in place for effectively operating an SRT plan. As far as practicable, requirements are framed in performance terms; outcomes rather than outputs, i.e. what is to be done rather than how to do it.

Every mine (the mine) must have systems for control of risks relating to the operation of a coal stockpile/reclaim tunnel installation to be known collectively as the Stockpile/Reclaim Tunnel Management Plan (SRT plan) for the mine and which must be put in effect at the mine. The mine must only work in accordance with any SRT plan in effect at the mine.

#### **2.1.2 GENERAL REQUIREMENTS**

The following general requirements for the SRT plan must be met:

- Policy - The SRT plan must contain a policy statement. The policy statement should contain an expression of the broad objectives of the plan together with the corporation's commitment to the attainment of those objectives.
- Effective Documentation - The SRT plan must be effectively documented as a means to ensure that processes and standards at the mine for management of risk proceed in accordance with the plan. This would begin with an organizational chart and a process flow chart.
- Compliance Records - The SRT plan must address all requirements of this code and records must be maintained to indicate that this has been done. The degree to which any particular requirement is addressed may be modified commensurate with the risk of the mine as determined by evaluation of the risk to be managed.

- Plan Integrity - The SRT plan must be in a form which is durable, communicable and able to be updated. In this context durable: means resistant to loss or erasure; communicable means that relevant information from the plan can be effectively transferred to those required to act upon it by the plan; and able to be updated means that the plan is capable of reliably accommodating modification arising from change in operations.
- Resourcing - The SRT plan must be adequately resourced in terms of resources for plan development, implementation and ongoing maintenance.

### 2.1.3 MANDATORY SRT PLAN ELEMENTS

The mine must develop and implement the following elements in the operation of the SRT plan. These elements must be considered mandatory although the mode and degree of implementation of any element may be tailored to the assessed needs of the mine and the risk to be managed.

#### 2.1.3.1 ORGANISATION

The responsibilities, authorities and duties of all persons who manage and perform work within the ambit of the SRT plan are to be defined. In particular, those who make strategic decisions with regard to plan operation or who initiate or participate in processes for change of the SRT plan should have authorities and responsibilities defined.

Note: In fulfilling these requirements such devices as organisation charts, job or position descriptions in relation to the SRT plan, or statements of duties with respect to the SRT plan may be useful.

#### 2.1.3.2 REVIEW

There must be means in place for the timely and effective review of the content and operation of the SRT plan with the aim of assessing the plan's continued suitability and effectiveness in managing risks associated with operating a reclaim tunnel at the mine.

In order to achieve this the mine must prepare a review protocol conforming to the following requirements:

- The protocol must define who is to participate in reviews;
- Reviews must cover all aspects of the SRT plan including general elements, required processes and technical standards;
- The protocol must define review triggers (conditions to cause a review to be conducted);
- There must be two types of review triggers defined: time based and event based;
- Event based review triggers must include, as a minimum requirement, the triggering of a review on failure of the SRT plan to control serious accident, on significant change in operating systems, conditions or circumstances and may include such factors as change of equipment, or change of management structure.
- The protocol must indicate who must decide if significant change has occurred, and to what criteria that decision is to be made.

The mine must conduct SRT plan reviews in accordance with the review protocol and must maintain records of such reviews. Those records must be made available to relevant statutory authorities seeking evidence of review conduct.

Where the conduct of any review indicates that the SRT plan is no longer suitable and effective in managing the risks associated with operating a reclaim tunnel then management must implement corrective action to amend the plan to make it suitable and effective for this purpose.

Note 1: Mines are advised that external facilitation and/or expertise may be desirable as an aid to the effective conduct of SRT plan reviews.

Note 2: The results of all reviews undertaken should be routinely supplied to CEO's with corporate responsibility for the mine.

Note 3: It should be noted that effective, and timely, reviews are a valuable means to give management, and others, assurance that the SRT plan continues to adequately cater for the conditions and risks prevailing at the time of the review.

#### **2.1.3.3 VERIFICATION (AUDIT)**

There must be means in place to ensure the effective verification or audit of the SRT plan operation. In particular, a schedule of both internal and external audit must be prepared and adhered to.

Internal audits must include sufficient persons independent of those with direct responsibility for the aspect of SRT plan which is the audit subject. The mine should maintain sufficient trained personnel for effective conduct of the internal audit schedule.

External audits must be carried out by those with independence from the mine's operations. It should be noted that a statutory authority may impose an external audit regime separate from, or involved with, the mine's external audit schedule.

The mine must maintain records of all internal and external audits. Those records must be made available to parties with a valid interest seeking evidence of audit conduct.

Note 1: External audits may be conducted by those external to a mine but still within the corporate entity owning or operating the mine.

Note 2: Effective, and timely, audits are a valuable means to give management, and others, assurance that requirements of the SRT plan are being adhered to in practice.

#### **2.1.3.4 INFORMATION CONTROL / COMMUNICATIONS**

There must be means in place to ensure that up to date information is effectively communicated to those needing such information for effective SRT plan operation and that means are implemented to maintain objective evidence of those information transfers. In particular, current issues of information must be available at all locations where operations dependent on that information are conducted, and obsolete information must be promptly removed from all points of issue or use.

Note 1: Information in this context includes both paper and computer based information. This includes, but may not be limited to, procedures, standards and plans.

Note 2: Appropriate care should be taken with the form, content and level of conveyed information to ensure that effective communication of the information occurs.

#### **2.1.3.5 GOODS/SERVICES ACQUISITION CONTROL**

There must be means in place to ensure:

- that equipment acquisition is effectively reviewed with the aim of ensuring that such equipment is compatible with the SRT plan and meets any relevant statutory requirement; and
- that services to be provided (by contract arrangement) are reviewed with the aim of ensuring that they are consistent with the SRT plan and that work is to be conducted to standards consistent with the aims of the plan.

#### **2.1.3.6 PLAN OVERVIEW**

There must be means in place to enable all persons involved in the operation of the SRT plan to have a role in overview of compliance to, and performance of, the plan with respect to:

- the plan being followed at all times; and
- physical and other circumstances continuing to be adequately catered for by the plan.

As part of plan overview, means must be established and maintained to enable all personnel involved in the operation of the plan to report:

- instances where the SRT plan is not followed; and
- instances where physical, or other, circumstances are not adequately catered for in the plan;

to persons with sufficient authority to initiate action with respect to the plan. Such instances must be considered non-conformities to the plan.

#### **2.1.3.7 CORRECTIVE ACTION**

There must be means put in place to ensure that causes of non-conformities to the plan are investigated and that corrective actions are developed, implemented and recorded.

#### **2.1.3.8 TRAINING**

There must be means put in place to ensure that training is developed and delivered sufficient to result in persons having a role in relation to the SRT plan having, and maintaining, competencies sufficient to safely and effectively perform that role.

Note 1: Appropriate arrangements must be made to ensure that persons new to the mine are effectively trained in the necessary aspects of the SRT plan for the mine.

Note 2: The mine must develop and document training as an internal standard.

#### **2.1.3.9 PROCESS RELIABILITY**

There must be means put in place to ensure that the mine generates and maintains records as to the reliability of processes intended for the control of risks associated with operating a reclaim tunnel.

### **2.2 ACCESS CONTROL.**

#### **REFERENCE INFORMATIVE APPENDICES:-**

- Appendix 'A' Dozer Report Book.
- Appendix 'B' Stockpile Worksheet.
- Appendix 'C' Stockpile Access Book.

These guidelines recommend that the "Coal Stockpile Area" be defined and delineated.

Such definition should be detailed on a designated plan kept at the offices of the installation and also displayed in prominent positions at the installation, for example, muster areas, control rooms, and access points.

The means of delineation could be by sign posting, fencing, or utilisation of a prominent feature, for example, a road or substantial drain, or a combination of these. However, such delineation of the "Coal Stockpile Area" should be clear and unambiguous. Sign posting shall conform with clause 1.5.3 of the Australian Standard AS 1319 - Safety Signs for the Occupational Environment, and should be in accordance with Clause 1.5.2 and of the form "CAUTION, COAL STOCKPILE WITH REMOTELY OPERATED UNDERGROUND FEEDERS. AUTHORISED ACCESS ONLY."

In addition the "Access Point" to the 'Coal Stockpile Area" should also be defined, entry to and exit from the "Coal Stockpile Area" shall only be made via the "Access Point".

A procedure should be developed and implemented so that access to the "Coal Stockpile Area" is controlled.

Such procedure should :-

- i) Define the conditions of access to the coal stockpile area. Sign posting at access points should highlight these procedures.

- ii) Require persons to obtain authority prior to entering the coal stockpile area.
- iii) Clearly identify all persons that are in the coal stockpile area.
- iv) Provide for a means of communication so that all persons who are on, or who could remotely affect the "coal stockpile area" are aware of all persons on the "coal stockpile area" at all times.
- v) Ensure that persons entering the coal stockpile area read and initial previous reports.
- vi) Provide for special access/egress control during emergencies.

### **2.3 SAFE WORK PROCEDURES - NORMAL CONDITIONS.**

#### **REFERENCE INFORMATIVE APPENDICES:-**

- Appendix 'A' Dozer Report Book.
- Appendix 'B' Stockpile Worksheet.
- Appendix 'C' Stockpile Access Book.

A recording of all activity on the "Coal Stockpile Area" shall be kept to ensure that the status of the stockpile can be communicated to oncoming persons. Both persons on the stockpile and who remotely affect the stockpile shall record details of how their activities have affected the status of the stockpile. Persons operating reclaim conveyors are within this category.

#### **2.3.1 SAFE WORK PROCEDURE (1) - STOCKPILE DOZING, NORMAL CONDITIONS**

##### **2.3.1.1 FAMILIARISATION PRIOR TO WORK.**

Prior to any persons operating a bulldozer on a coal stockpile, that person should be made aware of the conditions likely to be encountered on the stockpile.

Steps in this familiarisation process could include :-

- i) Reading and initialing any report book provided for this purpose, detailing previous work done and conditions on the stockpile. (Reference Informative Appendices listed above).
- ii) Determine the location of feeder points prior to work.
- iii) Determine which feeder points are in use or will be in use and when.
- iv) Ensure that visual/audible warnings are intact and operational. (for example "feeder on lights")
- v) Determine the location of overhead discharge points.
- vi) Determine which overhead discharge points will be in use and when. It may be necessary to have these relocated if they will interfere with the assigned task.
- vii) Determine the overall work program for the coal stockpile including discharge onto the stockpile, reclaiming from the stockpile and other functions to be undertaken, for example any maintenance programs.

##### **2.3.1.2 GOOD WORK PRACTICE - DOZER - GENERAL.**

- i) Assess the need to maintain a windrow around the top edge of the stockpile.
- ii) Do not drive any machine through falling coal or under an operating overhead discharge point.
- iii) Do not drive over a feeder, this is particularly important in the case of an operating feeder. Some present installations that involve slot or plough feeders have been designed and built so that the driving over of feeders can not be avoided. It is strongly recommended that the need to drive over feeders be eliminated at the design stage.
- iv) Avoid "trenching" beyond the height of the blade and/or the height of the cab floor of the machine. (Reference is made to Section 2.4.3 "Bridging & Ratholing").

- v) Avoid undercutting the stockpile edges beyond the height of the blade and/or the height of the cab floor of the machine .
- vi) Travel in the centre of any ramp. Watch for coal falling away from underneath the bull dozer tracks when traveling near edges.
- vii) If there is no ramp exit , then an exit down a natural angle of repose should be made with a full blade. When a blade is full, the material can be seen falling away over the top of the blade as the bull dozer moves forward.
- viii) Avoid leaving excessive rills.
- ix) Leave the stockpile in a safe condition.
- x) Seat belts must be worn at all times.
- xi) Keep off the stockpile base, especially when wet and when the base contains clay.
- xii) Do not park or leave the dozer on the coal stockpile. The only exception can be during breakdown maintenance. (Reference is made to Section 2.3.4.1 "Maintenance of Mobile Machinery").
- xiii) Ensure that the dozer is clean prior to entering a product stockpile.
- xiv) Ensure that coal from the stockpile is not allowed to enter or block any drainage system around the coal stockpile.
- xv) Do not allow the dozer to collide with or impact upon the supports of overhead structures.
- xvi) Avoid pushing towards the supports of overhead structures and avoid excessive build-up of coal against one side of such supports.
- xvii) Do not park the dozer close to any structure.
- xviii) Avoid pushing or traveling across grade.

### **2.3.1.3 GOOD WORK PRACTICE - DOZER - PUSHING TO FEEDER HOLE.**

These guidelines recommend that holes and voids within the coal stockpile be filled as they are created. Whenever possible, the bull dozer shall remain on the stockpile until reclaiming has ceased and the remaining voids are filled. If a hole is to be left over a feeder/coal valve then this must be highlighted on the Dozer Report Book. At the earliest opportunity the highest priority must then be given to filling that hole using an overhead discharge or oncoming bull dozer.

A procedure shall be developed and implemented to ensure that a uniform method of pushing coal to feeder points is adopted at each operation.

Development of such a procedure should consider :-

- i) The need to maintain a windrow the size of one full blade of coal between a dozer and the hole above a feeder. This allows the operator to locate the edge of the feeder on each subsequent push.
- ii) The need to locate the feeder before commencing to push coal.
- iii) The maximum grades at which the dozer can operate pushing towards the feeder.
- iv) The need for a "down" grade or an "up" grade to the feeder. The design and geometry of the stockpile will have significant influence on the optimum and safest angle.
- v) A down grade offers the following :-
  - a. By pushing down to the feeder the overall height of the reclaim cone is reduced.
  - b. The possibility of undercut of the exposed face may be reduced.
  - c. A downhill push uses less energy than an uphill push.
  - d. Overall height of coal above the feeder is reduced, reducing the physical dimensions of the hole above the feeder.

- e. Visibility may be improved by a down hill push, particularly of visual indicators such as "sighter poles".
- vi) An up grade offers the following :-
  - a. The volume of the stockpile is generally greater for a given area.
  - b. Increased "live" storage.
  - c. Greater possibility of an undercut exposed face.
- vii) Coal should be recovered in lifts to maintain an even grade.
- viii) The need for the rate of the feeder to match the rate of the mobile machines feeding it.
- ix) Feeders generally operate better if coal is pushed into open holes rather than "heaped up" over the top of the feeder.

### **2.3.2 SAFE WORK PROCEDURE (2) - STACKING OUT, NORMAL OPERATIONS.**

#### REFERENCE:

- Australian Standard AS 1755 Conveyors - Design, Construction, and Operation - Safety Requirements. Clause 4.8.6.

In general, persons who can remotely affect conditions on the coal stockpile should communicate any intention to commence operations to persons on the coal stockpile. Any such communication should be acknowledged.

The keeping of a communication log should be considered.

The operator in charge of a control station for an overhead discharge point (for example an overhead conveyor) should contact all persons on the coal stockpile prior to the commencement of the discharge of coal. It is recommended that the Control Station be located to enhance the control and communication process by visual means.

Such communication should be acknowledged by persons on the stockpile confirming that they are clear of any affected area.

An audible warning device to indicate that an overhead discharge point is about to commence discharging shall be provided and maintained in working order. Multiple redundancy in this area should be provided.

An interlock to prevent a mobile overhead discharge point from passing over an area where work (for example, maintenance work on a feeder) is being carried out should be provided.

### **2.3.3 SAFE WORK PROCEDURE (3) - RECLAIMING, NORMAL OPERATIONS.**

#### REFERENCE:

- Australian Standard AS 1755 Conveyors - Design, Construction, and Operation - Safety Requirements. Clause 4.8.6.

In general persons who can remotely affect conditions on the coal stockpile should communicate any intention to commence operations to persons on the coal stockpile. Any such communication should be acknowledged.

The keeping of a log of such communication should be considered.

A visual indicator such as prominently placed lights shall be provided to warn personnel located on the stockpile which feeders are operating. Any such system shall incorporate multiple redundancy. If there is any indication that the indicator system is malfunctioning the feeder should be isolated and the Danger Tag Procedure applied. Such action should be recorded in a written report. (Reference is made to Informative Appendix - Dozer Report Book.

An audible warning, such as a siren should be provided, to warn persons that automatic machinery is about to start.

Navigation aids must be provided so that the precise location of feeders is easily determined.

A coal stockpile management system that includes the use of the :-

1. Dozer Report Book,
2. Stockpile Worksheet,
3. Stockpile Access Book,

would have a reclaim procedure incorporating the following elements:-

- i) The person responsible for the operation of the reclaim conveyor would obtain or be provided with a copy of the Stockpile Worksheet.
- ii) Prior to the starting of the reclaim conveyor, the reclaim tunnel and associated conveyors must be inspected, the results of the inspection being recorded in a book kept for the purpose.
- iii) If any risks to the safe operation of the reclaim system are identified, then reclaiming must not commence until they have been properly rectified.
- iv) Prior to starting the person responsible for the operation of the reclaim conveyor must sign on to the Stockpile Access Book in accordance with the requirements of its use.
- v) Coal can then be reclaimed in accordance with the Stockpile Worksheet.
- vi) Radio contact would be maintained with any persons on the "Coal Stockpile Area".
- vii) At any sign of bridging the reclaim system would be stopped and the appropriate notifications made (dozer operator first).
- viii) If there are no dozer operations during the reclaim process then the person responsible for operating the reclaim conveyor would make the appropriate entries into the Dozer Report Book.
- ix) At the completion of the reclaim process the system should be run free of coal.
- x) At the completion of the reclaim process the person responsible would sign off the Stockpile Access Book.
- xi) At the completion of the reclaim process the reclaim conveyor, the reclaim tunnel and associated conveyors must be inspected, the results of the inspection being recorded in a book kept for the purpose. Any clean up or repair work required should be scheduled for completion prior to the next reclaim period.

#### **2.3.4 SAFE WORK PROCEDURE (4) - MAINTENANCE, NORMAL OPERATIONS.**

A Safe Work procedure should be developed to provide for a safe means of access for inspection and maintenance purposes to all items of equipment within the "Coal Stockpile Area".

Written notification that maintenance work is to be undertaken in the "Coal Stockpile Area " should be provided to persons who can remotely affect conditions on the "Coal Stockpile Area".

##### **2.3.4.1 MOBILE MACHINERY.**

Mobile machinery should not be maintained on the coal stockpile or within the "Coal Stockpile Area". The only exception to this would be in the event of a breakdown where it is not possible to remove the machine prior to repairs, in such circumstances the procedure for maintenance of fixed machinery should be adopted.

Ensure that any mobile machine is stable prior to work commencing.

### 2.3.4.2 FIXED MACHINERY.

#### REFERENCE:

- Australian Standard 2865 Safe Working in Confined Spaces.
- Australian Standard 1674 Fire Precautions in Cutting Heating and Welding Operations.

This section applies to fixed items, for example Feeders, within the stockpile area that could be affected by the coal stockpile should it slump or otherwise move.

As part of the job planning, an assessment of all possible hazards should be made. Procedures for negating the identified hazard should be incorporated into the job instruction. Where the job/procedures are complex, a written step by step procedure should be prepared.

It is important that all resources required for the planned work are readily available at the work site. A check-list could be prepared for use prior to entry to the "Coal Stockpile Area".

The area surrounding the item to be maintained shall be made clear to ensure that no danger of a slump of coal will enter the work area. The work area should be pushed flat and level.

Ensure that safe access to the work area is available.

The work area shall be conspicuously defined or delineated, for example flagging or witches hats, to prevent inappropriate entry to or exit from the designated work area.

A Danger Tag Procedure (Reference:- Informative Appendix 'D' Danger Tag Procedure) and/or a Permit to Work System shall be used where the maintenance work area is located in or in close proximity to any machinery whose operation could impact on the safety of the maintenance work area, for example a feeder or overhead discharge point.

Any feeder within a maintenance work area should, if possible, be left full of coal to reduce the likelihood of persons falling into the feeder. This will not apply if hot cutting or welding is to occur in close proximity. In this event the feeder should remain closed.

#### REFERENCE:

- AS1674.

The effect of cutting or welding slag on the conveyor or loose coal in or below any feeder should be considered.

Special precautions against hot slag falling onto the coal stockpile from hot work on any overhead gantry should be formulated within the "Hot Work Permit" procedures.

Special procedures should be provided for persons required to work within a feeder. Such procedure would incorporate the Danger Tag Procedure. An assessment of the effect of the operation of an overhead discharge point or the reclaim conveyor should be made. Provision for safe entry to and exit from the feeder should be made with the exit facility permanently available whilst persons are in the feeder. A physical barrier should be erected to prevent mobile machinery from discharging material into the feeder. All relevant persons should be informed of such activity within their work area. The need for lifelines should be assessed.

Not only should the feeder energy source be removed and the equipment suitably isolated, but also that of discharge conveyors, stackout conveyors, associated powerpacks and other associated energy sources.

Where stackout conveyors discharge to a different feeder, both electrical and physical interlocks should be provided to minimize the risk of stacking out into the feeder being maintained.

### **2.3.5 GENERAL MANAGEMENT AND OPERATIONAL PROCEDURES.**

#### REFERENCE:

- Bulk Solids Handling Volume 10. Number 1, February 1990 "Improved Stockpile Performance", A.G.Mc Lean.

Where possible keep all personnel off the stockpile, only essential work, carried out under the " Safe Work Procedures" would allow persons to enter the coal stockpile area.

Under no circumstances are persons to enter potentially unstable regions above feeders.

Keep mobile equipment movements to a minimum on the stockpile, particularly raw coal with a high clay content. Watch for high clay accumulations at the periphery of the stockpile during extended periods of wet weather.

Mobile machinery should exhibit low ground bearing pressures. Specify only the use of mobile equipment fitted with wide tracks or tyres.

Grade the stockpile surface to minimize steep slopes.

Ensure that the stockpile height is such that flow zones reach the surface of the stockpile. This is particularly important if ratholing is known to occur.

Discharge material from every feeder regularly to ensure that the material is maintained in a live state. If the coal has strongly time dependent flow properties consideration should be given to the installation of recycle facilities.

### **2.4 SAFE WORK PROCEDURES - ABNORMAL CONDITIONS.**

#### **2.4.1 SAFE WORK PROCEDURE (5) - WET WEATHER, ABNORMAL CONDITIONS.**

An assessment shall be made to identify circumstances in which a combination of wet weather and stockpile configuration can create an unstable or unsafe situation.

If such a combination occurs an assessment of the stability and safety of the coal stockpile shall be made.

Considerations could include :-

- i) The possibility of a significant head of water or water / coal slurry existing above a feeder point.
- ii) The effect of reduced stability within the coal on the operation of mobile machinery, most particularly that associated with pushing coal to a feeder.

Ensure that the stockpile surface is graded to prevent the formation of central reservoirs. A partially extracted stockpile can become a perfect water collection site which at times may only be able to be discharged through the feeders.

If a potentially unstable situation exists then a pre-set procedure should be enacted so as to prevent access to areas which could be adversely affected. This could be achieved through notification of persons, signposting at relevant points and fencing off with barrier tape. Notation within appropriate access control report books should be made, detailing the circumstances and places where entry is prohibited. The most senior officer present at the installation should be informed when such a procedure is enacted.

The potential for an inrush of water or water/coal slurry will preclude persons from entering a reclaim tunnel and cause the immediate evacuation of personnel from within the tunnel.

An objective of any procedure should be to achieve a gradual release of water pressure. This would be time dependent and rely on existing drainage.

In such a situation it may not be safe (for persons and/or property) to open a feeder chute. A feeder that is designed so that it can be partially opened to achieve a restricted aperture, allowing for a gradual release of pressure, would have to be operated remotely.

A "stop / start" procedure may be possible to reduce the amount of material entering the tunnel, this would have to be remotely operated, an assessment of the possibility of a malfunction of the feeder must be made to ensure the condition does not occur that leads to the inundation of the tunnel.

It is recommended that the above assessments and considerations be undertaken at the design stage of a reclaim tunnel / coal stockpile facility.

#### **2.4.2 SAFE WORK PROCEDURE (6) - SPONTANEOUS COMBUSTION, ABNORMAL CONDITIONS.**

These guidelines do not intend to deal with spontaneous combustion in coal stockpiles in general, discussion is limited to how spontaneous combustion may affect the operation of a reclaim tunnel.

It is recommended at the design stage, that information be sought on the previous history of coal to be handled. If the coal is known to be exceptionally liable to spontaneous combustion then special consideration should be given to this in the design of every aspect of the entire installation.

An assessment shall be made to identify the circumstances under which spontaneous combustion does occur on the coal stockpile.

If such circumstances exist then a set of routine inspections should be formulated and enacted.

Monitoring should be such that information is gathered in a manner which enables a statistical analysis to be made of the behavior of all coal to be handled by the facility.

Critical factors including:-

- Incubation period.
- Degree of compaction.
- Moisture content.
- Method of stacking.
- Critical volume.

Should be analysed to determine the optimum storage methods to reduce the likelihood of spontaneous combustion.

If a material proves to be particularly active, then a review of smoke and fire protection systems and devices within the tunnel and on mobile machinery should be undertaken to ensure adequate protection is provided.

A level of activity should be determined at which remedial action is required. A pre-set procedure for dealing with hot material within the stockpile should be formulated. This procedure may have to be formulated with reference to a statutory authority.

It is strongly recommended that any procedure formulated would preclude "hot material" from entering the tunnel via the feeders. However, depending upon the definition adopted for "hot material", it is recommended that a procedure be developed addressing the discharge of coal of elevated temperature into the reclaim tunnel.

In developing a procedure for dealing with hot material that has entered a reclaim tunnel the following items should be considered:-

- i) It is not recommended that material of elevated temperature be allowed to remain for extended periods on the conveyor, once material of elevated temperature has been placed on the conveyor, the conveyor should not be stopped until all the material has been discharged.
- ii) Conveyor belting and associated rubber components shall be fully F.R.A.S.
- iii) If the potential for a fire exists then the reclaim tunnel shall be evacuated and access prohibited. It is not recommended that persons be subject to the products of combustion.
- iv) Access restrictions would involve notification of relevant persons, strategic signposting and notation within appropriate access control report books.
- v) A specific emergency procedure should be developed, a fire fighting team may be placed on stand by during discharge of material of elevated temperature.

- vi) The need for remote fire sensing equipment and remotely operated fire fighting capability, particularly within the tunnel should be assessed.
- vii) The most senior officer present at the installation should be informed when such a procedure is enacted.
- viii) The prevailing weather conditions, in particular conveyors on the surface in high wind strength conditions.

### **2.4.3 SAFE WORK PROCEDURE (7) - BRIDGING AND RAT HOLING, ABNORMAL CONDITIONS.**

#### **2.4.3.1 DEFINITIONS.**

**Bridging:-** also known as doming, voiding and cohesive arches. A condition in which the hole above an operating feeder does not manifest at the surface of the coal stockpile.

**Rat Holing:-** A condition where the void created above a feeder has near vertical sides, from the aperture in the feeder to the surface of the coal stockpile.

**Coning Out:-** A condition where the maximum void possible within free flowing material has been created above a feeder. This condition is characterised by an upside down cone shape when the void is viewed from above. The term means that no more coal will be available to the feeder without the introduction of more coal to that part of the stockpile.

#### **2.4.3.2 DETECTION OF BRIDGING.**

If a feeder is known to be operating and there is no coal movement at the surface of the coal stockpile then it is likely that the stockpile is bridging over. A lack of uniform profile across a slot feeder can be an indication of bridging. In these circumstances, the operator of a bull dozer pushing coal to a feeder would be the person most likely to detect the condition.

If a feeder is known to be operating and coal is absent from the reclaim conveyor belt then it is possible that the coal above the feeder has either bridged over or has coned out. In these circumstances the operator of a bull dozer pushing coal to the feeder or the operator of the reclaim conveyor may be the first person to detect the condition.

In the case of slot or plough feeders, bridging may be detected by inspection from within the tunnel. In such circumstances an inspection by the operator of any mobile machinery to be operated on the coal stockpile should be made prior to the commencement of work.

#### **2.4.3.3. FACTORS AFFECTING THE FLOW OF COAL AND THE TYPE OF VOID CREATED ABOVE A FEEDER.**

The best performance is obtained from free flowing coal.

- i) **Compaction** - The degree of compaction is dependent on the level of activity of earth moving machinery above a feeder. Compacting of coal over a feeder is not considered a good practice and should be avoided wherever possible. It is recommended that the need for earth moving machinery to pass over feeders be eliminated at the design stage. Establishment of roads above feeder points shall not be permitted.
- ii) **Fines** - The amount of fines or clay present in the coal will affect the free flowing properties, Fines will be in greater proportion if the coal is more susceptible to degradation or coal handling methods cause degradation.
- iii) **Moisture Content** - The free flowing properties of coal are affected by moisture content, the degree of affectation is dependent on, among other things, clay content. Therefore, coal stockpile performance is dependent on weather conditions.
- iv) **Time** - The free flowing properties of coal will change with time, particularly if the stockpile is exposed to the elements.

- v) Size and Location of feeder holes - Generally a larger aperture will promote better flow. Feeders in close proximity to one another will perform best if their area of influence is correctly overlapped.
- vi) Chemicals - In the case of coal that has been subject to a benefaction process, the use of chemicals such as flocculant and magnetite may affect the free flow properties of the coal.
- vii) Temperature - Freezing and thawing.

#### 2.4.3.4 DEALING WITH FEEDERS THAT HAVE BRIDGED OVER.

The most common mobile machine used on a coal stockpile associated with reclaim tunnels is the bull dozer, the following items have been developed with bull dozer operations in mind.

It is strongly recommended that a procedure be developed to specifically deal with feeders that have bridged out. In developing such a procedure the following points should be considered:-

- i) With reference to the detection of bridging, it is essential that there is good continuous communication between the bull dozer operator, the controller of the feeders and reclaim conveyor and the controller of any overhead discharger. As soon as bridging is suspected all the persons mentioned above must be alerted. Most commonly this communication would be via two way radio. Early detection of bridging can limit the size of the problem faced.
- ii) There is an unstable or potentially unstable region above any feeder that has bridged out. The access to this region of both personnel and machinery should be prohibited.
- iii) If the condition of bridging has been recognised then it would be prudent for the bull dozer to withdraw from the immediate area and notify an official of the situation. At the same time the feeder / coal valve should be stopped, in some circumstances this will help to limit the size of void or cavity that has to be dealt with. An overhead discharge point that is operating and can affect conditions in the area of the bridged feeder should be stopped and/or moved.
- iv) In dealing with a bridged out feeder it is essential that the precise location of the feeder be known. External navigation aids must be provided to enable a mobile machine operator to pinpoint the location of the feeder. Such aids could be in the form of sighter poles with lights and/or reflective markers, stroboscopic and/or laser lights, and may be located either adjacent to, or above the stockpile.
- v) The size of the unstable or potentially unstable region is dependent on stockpile configuration and the flow characteristics of the coal. For any given material, the potentially unstable area would be a function of the depth of the stockpile above the feeder, as would the ultimate size of any cavity.
- vi) In using a bull dozer to uncover a bridged out feeder it is recommended that work be carried out from a known stable area adjacent to the feeder. In digging out, there are three options for the direction of push:-
  - a. End on away from the area.
  - b. End on towards the area.
  - c. Tangential or at an angle to the area.
- vii) The use of "back-blading" should also be considered.
- viii) At this point these guidelines are unable to advise which method is optimum, however in using any one it is recommended that the following be avoided:-
  - a. Trenching above the height of the blade and/or the cab floor of the machine.
  - b. Creation of overhanging faces.
  - c. Creation of excessive grade.
- ix) This suggests that the final shape will be "shallow and dish-like".

- x) A person shall be stationed in a safe location where visual and radio contact can be maintained with the bull dozer operator at all times whilst clearing the bridged coal. If the dozer should fall into a void the dozer shall be shut down and a specific, predetermined emergency procedure put into action. The importance of shutting down the engine of a machine engulfed in coal cannot be overstated. (Reference is made to Section 2.9 "Safety Systems - Coal Stockpile Mobile Equipment" for recommendations on automatic shut down mechanisms.)
- xi) It shall be prohibited for persons to attempt to rectify a bridged over feeder by the application of water into the cavity or void through a feeder from within the reclaim tunnel.
- xii) It shall be prohibited for persons to attempt to rectify a bridged over feeder by 'baring down' the coal from underneath (from within the reclaim tunnel).
- xiii) It is considered poor practice to allow persons on foot onto a coal stockpile with underground outlets, however if there is any possibility that a feeder is bridged over then persons on foot shall be absolutely prohibited from entering any potentially unstable region above the feeder. (Refer to Section 2.3.4.2 for recommendations regarding Danger Tag Procedure for maintenance of fixed machinery.)

#### 2.4.3.5 COMMENTS.

It is quite possible to build a stockpile above a feeder of such dimension that it is not possible to safely address the problems or indeed routine operations normally associated with coal stockpile / reclaim tunnel facilities. It is recommended that this situation not be allowed to occur. The design height of the coal stockpile is to be defined at the design stage. Building of the stockpile above this height is to be prohibited until a re-evaluation of the design standards and operational safeguards proves that it can be achieved safely. The management control documents then need to be modified and the necessary information sharing and training carried out prior to implementation.

While it is accepted that the bulldozer is the most common or preferred mobile machine used on coal stockpiles associated with reclaim tunnels, it can be pointed out that a small dragline could more safely deal with hazards that bull dozer operators routinely encounter. Furthermore a dragline may offer a method that results in less degradation and compaction, improving the free flowing characteristics of the coal. For a large installation that plans to use two or more fully optioned large bulldozers then a small crawler mounted diesel powered dragline may prove a feasible option.

#### 2.5 STOCKPILE INSPECTION.

Critical analysis should be made of the stockpile area to ascertain the type and frequency of inspection required to safely administer the stockpile. Attention is drawn to the Regulatory Authority which may have requirements specific to the inspection of the stockpile.

These guidelines recommend that a formal recorded system of inspection and communication be installed so that, at the critical time of persons first entering a coal stockpile, they are aware of the conditions that they will find.

#### REFERENCE INFORMATIVE APPENDICES :-

1. Dozer Report Book.
2. Stockpile Worksheet.
3. Stockpile Access Book.

In developing a system of inspection, the following items should be considered.

- i) Prior to commencing an inspection, any written report detailing stockpile status should be read and initialed.
- ii) The person most at risk on a coal stockpile associated with a reclaim tunnel is a person on foot. Therefore it is recommended that an inspection routine avoid the need for persons to traverse the stockpile. The structure supporting an overhead discharge point, quite often affords the best vantage point to assess the status of a stockpile, this may be combined with a visual inspection from a vehicle that is able to traverse the perimeter of the stockpile.

- iii) At the completion of each inspection a written record should be made of the results of the inspection. These reports should form part of a structured and formal communications system, that incorporates the operational needs and statutory requirements of the installation.
- iv) If an inspection reveals a fault or unsafe condition then the person performing the inspection should have the authority to initiate corrective or remedial action. Any unsafe condition that can not be rectified should be isolated, barriers erected and the details should be entered into the record of inspection. Any person entering the stockpile area should be given forewarning of such condition.
- v) Information gained during an inspection is of no value unless the correct information is passed to relevant persons. Ensure that clear instruction can be given to persons working on the coal stockpile.
- vi) Reports generated as a result of inspections should, as far as practicable, be integrated with reports generated by persons whose activities affect stockpile status. (refer to informative appendices.)
- vii) These guidelines recommend that, prior to issuing instructions to persons who are to enter the stockpile, supervisors appraise themselves of conditions on the stockpile.

## **2.6 TWO WAY RADIO COMMUNICATION ON THE STOCKPILE.**

These guidelines recommend that all persons who enter a coal stockpile be able to maintain two way radio communication with all other persons on the stockpile, persons who can remotely affect conditions on the stockpile and persons who monitor emergency calls. If there is a breakdown of the communication system, all persons are to immediately leave the coal stockpile area.

If persons who can remotely affect conditions on the "Coal Stockpile Area" are required to leave their control centers then provision should be made to allow them to monitor two way radio traffic on the stockpile. This could be facilitated by hand held two way radio or external speakers.

## **2.7 DESIGN ELEMENTS OF COAL STOCKPILES ASSOCIATED WITH RECLAIM TUNNELS.**

### **REFERENCE:**

- Bulk Solids Handling. Vol 10 Improved Stockpile Performance A.G.McLean.

At the design stage seek expert advice regarding the flow of bulk solids, cross check this information with the manufacturer of the coal discharge valves (feeders) to be used. The outlets should be designed for reliable flow in the actual material to be handled.

Ensure that the flow properties of the coal are known. Determine the variation in rathole dimension versus the effective head of the coal.

If the dimension of the flow zone generated by the feeders does not exceed the critical rathole dimension for the actual extent of consolidation expected then group the feeders to achieve suitable overlapping flow zones. Consideration may be given to a slot outlet with a traveling plough feeder.

Outlets work more efficiently when installed in correctly overlapping groups.

When determining the flow behavior of the coal assess the worst conditions as well as the optimum. Refer to the factors that affect the flow of bulk solids. Assessment of the effect of clay in raw coal is of particular importance.

Do not assume that the material will automatically be free flowing or that the natural rill angle will be achieved within the live storage area. Remember the coal will be well supported to the sides, particularly at feeder start up.

Avoid excessive drop heights onto the coal stockpile.

The area selected for the placement of the pad should exhibit high uniform load bearing resistance.

The long axis of the stockpile should be aligned with predominant, prevailing winds, This minimises problems with spontaneous combustion and airborne dust.

Position the centre of the stockpile in line with the discharge trajectory of the coal.

Line or construct hoppers from stable corrosion resistant materials. The use of chromium steel liners is recommended.

Ensure that the stockpile pad and immediate surrounds are well drained. The stability of the pad and surrounds is of utmost importance.

The pad should have a convex upwards base, with the reclaim feeders located in elevated positions at the highest point on the floor. The grade of the stockpile floor should be such as to promote drainage away from the stockpile contents without generating fast surface water flows.

The stockpile base should incorporate a sub-base drainage system.

Provide an adequate downstream reserve reservoir to collect and settle contained solids.

A gradual rising base to the feeders should be provided to facilitate convenient stockpile base final clean up.

Consider a substantial concrete ring around the feeder piered into the pad. This will protect the feeder from accidental damage from the blade of a bulldozer. The annulus may be filled with gravel and drained separately. This is of particular advantage to vibrating feeders.

The proximity of other installations should be considered. These guidelines recommend that Stockpiles be separated as far as practicable from other installations. Traffic flow associated with the stockpile should, where possible, be kept separate. The design stage is the best time to ensure that these aims are achieved.

If possible locate the overhead conveyor support columns or trestles out of the stockpile. If this is not possible, locate them outside the expected 'extreme' flow zone. All support columns immersed in the coal stockpile should be of large diameter tubular construction. All columns should be designed to withstand the applied service loads including the significant traction generated draw down force and expected differential lateral forces. Tubular steel columns may be filled with concrete, this acts as ballast and increases the impact resistance in the event of a bulldozer collision. Trestles with numerous horizontal members and cross bracing should not be used.

When considering the operation of mobile machinery on a coal stockpile it is recommended the stockpile design avoid the need to travel over feeders, this will eliminate unnecessary compaction.

An essential element in control of traffic over feeders is the ability to identify the location of the feeder. These guidelines recommend that navigation aids be provided for that purpose. Common aids presently in use at some installations include :-

- i) Sighter poles located externally to the stockpile. At least two sets are required for each feeder, the intersection of the line of sight indicating the position of the feeder.
- ii) Overhead laser or stroboscopic lights.

With recent advances in commercially available electronic positioning devices it is now possible to develop and install systems that would indicate to the operator from within the cab the location of feeders relative to his position. This approach would be of benefit during times of poor visibility.

Lighting over the stockpile feeders shall comply with "Australian Standard AS 1158- Performance and Installation Design Requirements - Major Intersections".

## **2.8 SAFETY SYSTEMS - COAL STOCKPILE MOBILE EQUIPMENT.**

### **REFERENCES:-**

- Australian Standard 2956 Earth Moving Machinery - Instrumentation and Operator's Controls. (ISO 6011)

- N.S.W. Department of Mineral Resources - "Guidelines for Purchasers of New Large Open Cut Mobile Equipment".

Select, design and equip machines to operate safely in any environment encountered.

It is recommended that maintenance and functionality checks of safety systems be incorporated into a fully integrated maintenance management plan for mobile plant and equipment.

A structured risk assessment should be undertaken to:-

- i) Identify the specific hazards that mobile machinery and the operators of mobile machinery could encounter and,
- ii) Determine the control measures that must be placed.

Target - To place at least two 'hard' engineering barriers, as a minimum, against any undesirable event before safety systems require personnel to operate them, under:-

- i) Normal operations:-
  - a. Carefully select and equip machinery to ensure that it has the best performance available.
  - b. Specifically option designated machines for the specific circumstance.
- ii) Outside normal operations.
  - a. Auto shutdown when the machine is placed outside its normal mode of operation. For example:-
    1. In the event of fire.
    2. Inundation.
    3. Excessive grade or angle.
    4. Burial.  
Different types of machine require different modes of shutdown. The aim is to stop the machine quickly but safely.  
In the event of fire it is desirable to stop the engine prior to activating suppression systems.
  - b. Multiple redundancy of safety systems should be provided.
  - c. Manually activated systems to be placed clear of possible obstructions but still be easily reached should be provided. (Reference:- Australian Standard 2956.5 Earth Moving Machinery - Instrumentation and operator's controls. Zones of comfort and reach for controls.)
  - d. Examples of some safety shutdown systems:-
    1. Flight Engine Saver.
    2. Fire check system with engine snuff.
    3. Tilt switches. (These were required by the Department at one mine following a fatality and were set at 70° on bull dozers.)
    4. Smoke detectors. Linked or unlinked.
  - e. Personal protective equipment, for example:-
    1. Smoke hoods, Carbon Monoxide scrubbers.
    2. Individual oxygen supply.
  - f. Provision of Carbon Monoxide monitors with in the cab of mobile machinery should be considered.

## **SECTION 3. GENERAL REQUIREMENTS - RECLAIM TUNNELS.**

### **3.1 GENERAL.**

The provisions of Australian Standard 1755, Conveyors - Design, Construction, Installation, and Operation - Safety Requirements shall apply.

The provisions of Australian Standard AS 1657, Fixed Platforms, Walkways, Stairways, and Ladders - Design Construction and Installation shall apply.

### **3.2 DESIGN ELEMENTS OF RECLAIM TUNNELS ASSOCIATED WITH COAL STOCKPILES.**

#### **REFERENCES:-**

- Bulk Solids Handling. Volume 10 Improved Stockpile Performance A. G. Mclean.
- Australian Standard 1755. Conveyors - Design, Construction, Installation, and Operation - Safety Requirements.
- Australian standards structural.
- AS 1762.
- AS 2042.

#### **3.2.1 GENERAL.**

In addition to the design requirements of the above-mentioned Australian Standards the structure of the reclaim tunnel should be designed to withstand the vertical loads and their significant variations across the stockpile base. Significant spatial variations in the vertical loads generate significant bending moments and horizontal shear stresses on the stockpile base. Attention to these loads must be made during the structural design of the reclaim tunnel and feeder installations. Similarly, attention should be paid to the structural implications of the stockpile base and reclaim tunnel foundation settlement.

Corrugated steel tubes which rely on "hydrostatic" type loading should be installed in accordance with AS 1762 and AS 2042. Both standards specify the tunnel to be surrounded by graded, well compacted, stable fill material to a minimum cover height over the structure crown. An evaluation of the material at the base of the trench in which the tunnel is placed is also needed, the base needs to be able to withstand the projected variations in bending moments and shear stresses. A safety factor of 2.0 on seam strength, wall buckling and yield is mandated in the Australian Standards for these products.

The design of the stockpile tunnel should use the maximum stockpile height and incorporate no load reduction for stockpile shape.

Tunnel design shall be based on the maximum expected future stockpile loading. After installation, if stockpile loads are planned to increase above the original design values a structural assessment shall be made to determine the effective safety factor with reference to the existing structure condition and the original installation records. Copies of all design and installation records should be maintained as part of the management system for the Reclaim Tunnel/Stockpile.

When formulating specifications prior to the tender process consideration should be given to the end user.

Ensure that there is sufficient head room to converge the flow of coal from the width of the outlet proper to the operating width of the conveyor.

The conveyor drive should be located outside the reclaim tunnel.

The fluid coupling in the conveyor drive should have a sign affixed indicating fluid type, fill volume, fill angle and plug type.

A sign indicating the fluid type and fill volume should be placed at the fill points of hydraulic reservoirs on power packs servicing feeders / coal valves.

Consideration should be given to providing bunkerage between the tunnel conveyor and any conveyor onto which it is required to feed. The bunkerage should be of such capacity to easily hold the maximum amount of coal that could be on the tunnel belt at any one time. This enables the tunnel belt

to be cleared even if the conveyor to which it is feeding is stopped. (Reference is made to Sections 3.5 and 3.7).

Sufficient clearance to enable safe continuous access to both sides of the belt is recommended. Australian Standard 1755 places a minimum requirement of 600 mm clearance, this however is an absolute minimum. Sufficient room to safely change major components in the system should be provided from both sides of the conveyor.

When assessing clearance requirements at the design stage, consideration should be given to:-

- i) Movement of persons.
- ii) The movement of 2 persons with a stretcher, ensure that they can transfer from the tunnel to the 2nd means of egress.
- iii) Tunnel maintenance, involving:-
  - a. Movement and installation of equipment (including the largest item, for example the tail roller).
  - b. Movement of lubricant.
  - c. Feeder / Outlet maintenance.
  - d. Cleaning.
- iv) Conveyor elevation.
- v) Ventilation conduits.
- vi) Fire lines and Hydrants.
- vii) Lighting.
- viii) Electrical cables.

All conveyor belting and other rubber components in the coal discharger and conveyor system such as skirting, V belts, impact rollers and lagging shall be made of fire resistant anti static material.

Hydraulic rams on feeders / coal valves should have fire resistant dust boots to prevent exposure to dust.

Designing and equipping the reclaim tunnel for optimum maintenance and cleaning will undoubtedly add to the capital cost of the installation, however it is recommended that the life cycle profitability, including an assessment of loss control, of the installation be considered when designing the reclaim tunnel.

At the design stage consideration should be given to the cleaning of the reclaim tunnel. The return strand of the reclaim conveyor belt and support idlers should be sufficiently elevated to enable easy cleaning below.

Methods of cleaning fall into two categories, mechanical and hydraulic.

Persons using shovels to clean spillage are commonly employed, it is however recommended that the tunnel be designed and equipped to minimize, or if possible eliminate the need to use this option.

Consideration should be given to access for small skid steer type loaders for clean up. In normal circumstances hydraulic cleaning may be adequate but in the event of an inrush of material which causes a blocked tunnel the skid steer loader will provide the optimum means of bringing the tunnel back on line. Such access will also improve the movement of maintenance items within the tunnel. (Reference is made to Section 3.11 "Ventilation").

Hydraulic cleaning is probably the most common method adopted, involving a person with a hose cleaning deposited dust and spillage to a sump area. A "flusher" system can also be employed, this utilises a stream of water from "flusher bars" located below the conveyor to move spillage to a common sump, this method is very labour effective but requires good drainage.

Slope the reclaim tunnel to a minimum of 1 in 100 to facilitate drainage. A cross grade and gutter may be considered, this will provide increased water flow to assist hydraulic cleaning. Avoid tunnel arrangements which will form ponds or become flooded.

The pump and sump arrangement should have the capacity to handle the maximum expected flow of water and the maximum lump size of material the reclaim tunnel will be required to load. Under-design in this area will undoubtedly lead to cleaning problems and subsequently labour intensive and therefore high cost cleaning solutions.

If possible locate the base of the reclaim tunnel above the water table.

If possible design the tunnel to be self draining.

All components and fittings should be designed to minimize dust make, accumulation and material build up.

Electrical installations should comply with Australian Standard AS 3000 SAA Wiring Rules and Australian Standard AS 3007 Electrical Installations - Surface Mines and Associated Processing Plants.

Excessive touch voltage on all electrical panels should be limited by earthing at either end of the tunnel (for lightning strike) and equipotential earthing of metal surfaces.

Where required the appropriate methods of explosion protection of electrical equipment shall be adopted. Reference is made to:-

- Australian Standard AS 2380 Electrical Equipment for Explosive Atmospheres - Explosion Protection Techniques.
- Australian Standard AS 2430 Classification of Hazardous Areas.
- The electrical enclosures shall comply with Australian Standard AS 1939 Classification of Degrees of Protection Provided by Enclosures of Electrical Equipment.
- For Example, If an enclosure is exposed to strong jets of water it shall have a minimum rating of IPX6.

Consideration should be given to multiple redundancy within the electric reticulation of the tunnel because of high damage potential, particularly in systems affecting safety. For example, the provision of twin feeder, from either end of tunnel with every second light on an opposite line.

### **3.2.2 SECOND MEANS OF EGRESS.**

An easily traversed 2nd means of egress (emergency escape tunnel) should be provided in all reclaim tunnels but shall be provided in reclaim tunnels over 60m long. Such 2nd means of egress shall form part of the ventilation circuit of the reclaim tunnel. The minimum dimensions of the 2nd means of egress shall be 2 meters high by 1 meter wide. The 2nd means of egress shall be self draining and be illuminated with a lighting system that incorporates multiple redundancy and meets the provisions of emergency lighting. Any services provided through the 2nd means of egress should be kept out of the way of any traffic.

### **3.3 ACCESS CONTROL.**

These guidelines recommend that a procedure be developed and implemented so that access to the reclaim tunnel is controlled.

Such procedure should:-

- i) Identify the conditions under which a person or persons are permitted to enter the reclaim tunnel. These conditions should be signposted at the entrances to the reclaim tunnel.
- ii) Clearly identify all persons that are in the reclaim tunnel.
- iii) Require persons to either obtain authority or give notification prior to entering the tunnel. Such notification would include the number of persons entering the tunnel, the duration thereof, and the nature of the work that they intend to perform. It is recommended that such communication be logged at a suitable location, for example the control room for the remote operation of the reclaim conveyor.

- iv) Provide a means of communication so that persons who are in the reclaim tunnel remain in contact with persons who can remotely start machinery within the reclaim tunnel.
- v) Provide for special access control during emergencies.
- vi) Provide for access of persons with first aid equipment, the provision and movement of stretchers in particular should be considered.
- vii) Ensure that all entrances and exits to the tunnel are kept clear of obstructions.

### 3.4 SIGNS AND NOTICES.

Signs and Notices shall be in accordance with Australian Standard AS 1319, Safety Signs for the Occupational Environment.

Information critical to the safe operation of the reclaim tunnel should be signposted at strategic locations. This sign posting shall reflect the conditions imposed for the safe management of the installation.

Examples of such sign posting could include:-

- i) "Caution, Authorised Access Only".  
To be located at access points to the tunnel.
- ii) Signposting detailing the access conditions to the tunnel, for example, access to the tunnel is prohibited in the event that the ventilation fan is not operating.  
To be located at access points to the tunnel.
- iii) "No smoking".
- iv) "Keep entrance clear".
- v) "Emergency exit".  
Located within the tunnel at the entrance to the emergency exit and at the outlet of the emergency exit.
- vi) Signposting detailing the operation of conveyor belts, ventilation fans and other remotely operated or automatic machinery.
- vii) Signposting identifying the type and location of first aid and emergency equipment.

### 3.5 FIRE FIGHTING.

Attention is drawn to specific requirements of the Statutory Authority which may have regulations covering the installation of fire fighting equipment.

Reference is made to:-

- Australian Standard 1850. Portable Fire Extinguishers. Classification, Rating and Fire Testing.
- Australian Standard 1851.1. Maintenance of Fire Protection Equipment. Portable Fire Extinguishers.
- Australian Standard 1851.2. Maintenance of Fire Protection Equipment. Fire Hose Reels.
- Australian Standard 1851.3. Maintenance of Fire Protection Equipment. Automatic Fire Sprinkler Systems.
- Australian Standard 1851.4. Maintenance of Fire Protection Equipment. Fire Hydrant Installations.
- Australian Standard 2419. Fire Hydrant Installations. System Design, Installation and Commissioning.
- Australian Standard 2444. Portable Fire Extinguishers. Selection and Location.
- Australian Standard 2941. Fixed Fire Protection Installation. Pumpset Systems.

- Australian Standard 2220.1. Emergency Warning and Intercommunication Systems in Buildings. Equipment Design and Manufacture.
- Australian Standard 2220.2. Emergency Warning and Intercommunication Systems in Buildings. System Design, Installation and Commissioning.
- Australian Standard 1670. Automatic Fire Detection and Alarm Systems. - System Design, Installation and Commissioning.

Notwithstanding the above references, consideration should be given to the following when designing the Fire Protection System:-

- A reticulated water supply should be provided for the full length of the tunnel and the perimeter of the coal stockpile. The capacity of the system should be such as to provide adequate flow and pressure for the purposes of fire fighting (A minimum of 700 KPa. delivering 7 litres per second at all points in the system through a fire line having a diameter equal to or greater than 100 millimetre within the tunnel is recommended).
- The reticulated system should be connected to a reliable water supply capable of delivering a predetermined volume of water (a minimum of 200 000 litres is recommended).
- Fire Hydrants should be placed at regular intervals, so as to enable complete coverage of the installation in general and fixed items of machinery in particular.
- Sufficient fire hoses and ancillary equipment should be provided at regular intervals to enable complete coverage of the installation. The minimum length of fire hoses provided should be greater than the interval selected for the placement of hydrants.
- The need for a permanent sprinkler system should be assessed. Potential hot spots such as driveheads, conveyor tailends and loading points are locations where a fixed sprinkler system could be applied. Such system should be able to be manually activated from outside the tunnel and could be automatically activated by smoke detectors. A fixed sprinkler system provides the opportunity of fighting a fire without having persons enter the tunnel.
- Drainage should be assessed during the design stage of the fire fighting system.
- The installation of smoke detectors within the tunnel is recommended. These could be linked to a fixed sprinkler system, providing automatic fire fighting capability. The alarm given by such a system should be transferred to the control centre for the tunnel and/or persons monitoring emergency calls.
- Fire Extinguishers should be located at regular intervals in general and at fixed machinery and electrical installations in particular. Consideration should be given to the direction of the ventilation current when selecting the location of fire extinguishers, the extinguisher should be located an appropriate distance "up wind" of the potential fire hazard so that it can be accessed in fresh air.
- Suitably equipped fire fighting equipment depots should be maintained outside the reclaim tunnel but in close proximity to the entrances to the reclaim tunnel.

These guidelines recommend that a fire fighting plan be formulated. Such plan should incorporate :-

- Selection and location of fire fighting equipment referred to above.
- Maintenance and inspection of the fire fighting equipment.
- Identification of likely fire fighting emergencies and methods of effectively and safely dealing with these. A review of the investigations into and conclusions from previous serious fires should form part of this process.
- The level and nature of communication needed during a fire fighting emergency.
- Formulation of fire fighting teams and training of personnel to deal with fire fighting emergencies (Reference is made to Australian Standard 1470. Health and Safety at Work. Principles and Practices).
- Familiarisation of all personnel with the fire fighting system.

- vii) Contingency plans to be implemented when part of the fire fighting system is unserviceable due to essential maintenance or breakdown. Such contingency plan should provide for effective communication to all personnel.
- viii) Identification of scenarios too dangerous for persons to enter the tunnel placing a prohibition on access.
- ix) A procedure which identifies if and when it is appropriate and safe to remove coal from above feeders during a fire fighting emergency.
- x) The course of action with regard to ventilation of the tunnel during a fire fighting emergency.
- xi) The management and control mechanisms to be employed during a fire fighting emergency.

Reference is made to Section 3.7 "Shut Down Systems". In particular persons should be made aware of the need to clear hot or burning coal from the conveyor belt prior to manual shut down and the need to remove coal from the conveyor belt in the event of a fire caused by a collapsed roller bearing or like. In such circumstances caution should be exercised in stopping the belt as the heat source directed to a single point on the belt may cause a fire. Rectification could require the application of water to cool the area prior to the stopping of the belt. This should be the subject of a separate emergency procedure, training of all relevant persons in this should occur.

### **3.5.1 HAZARDOUS ZONE DETERMINATION.**

Reference is made to:-

- Australian Standard 2430.1. Classification of Hazardous Areas. Explosive Gas Atmospheres.
- Australian Standard 2430.2. Classification of Hazardous Areas. Combustible Dusts.
- Australian Standard 1674 Fire Precautions in Cutting, Heating and Welding Operations.
- Australian Standard 2745 Electrical Welding Safety.
- Australian Standard 2380 Electrical Equipment for Explosive Atmospheres - Explosion Protection Techniques.
- Australian Standard 1915 Electrical Equipment for Explosive Gas Atmospheres - Battery Operated Vehicles.
- Australian Standard 2290 Electrical Equipment for Coal Mines - Maintenance and Overhaul.
- Australian Standard 2275 Combustible Gas Detection Instruments for use in Explosive Atmospheres.
- Australian Standard 2236 Electrical Equipment for Explosive Atmospheres - Dust - Excluding Ignition Proof (DIP) Enclosure.
- Australian Standard 1021 Protection by Purging of Electrical Equipment for Explosive Gas Atmospheres.
- Australian Standard 1482 Electrical Equipment for Explosive Atmospheres - Protection by Ventilation - Type of Protection V.
- Australian Standard 1825 Electrical Equipment for Explosive Atmospheres - Pressurized Enclosures - Type of Protection P.
- Australian Standard 1826 Electrical Equipment for Explosive Atmospheres - Special Protection - Type of Protections.
- Australian Standard 1828 Electrical Equipment for Explosive Atmospheres - Cable Glands.
- Australian Standard 1939 Classification of Degrees of Protection Provided by Enclosures for Electrical Equipment.

- Australian Standard 2238 Electrical Equipment for Explosive Atmospheres - Non Sparking Apparatus - Type of Protection N.
- Australian Standard 2381 Electrical Equipment For Explosive Atmospheres - Selection, Installation and Maintenance.
- Australian Standard 2431 Electrical Equipment for Explosive Atmospheres - Encapsulated Apparatus - Type of Protection M.
- Australian Standard 2480 Electrical Equipment for Explosive Atmospheres - Flameproof Enclosure - Type of Protection D.
- Australian Standard 1593 Electrical Equipment for Explosive Atmospheres - Increased Safety Apparatus - Type of Protection E.
- Australian Standard 1076 Code of Practice for Selection, Installation and Maintenance of Electrical Apparatus and Associated Equipment for use in Explosive Atmospheres (other than mining).

Every part of the installation shall be assessed to determine its classification with respect to "hazardous zone".

Any electrical equipment or cables shall comply with the requirements of the relevant explosion protection standard.

Explosion protected equipment may require approval by the regulatory authority and/or certification by Standards Australia.

Electrical Equipment located in a Hazardous Area shall be maintained, overhauled and repaired in accordance with Australian Standard AS 2290, Electrical Equipment for Coal Mines - Maintenance and Overhaul.

A "Hot Work Permit" procedure shall be developed and implemented for use within the reclaim tunnel. Such procedure will include:-

- i) Written authorisation from the official in charge of the installation (or other delegated person) to perform "Hot Work" within the reclaim tunnel. Such Authorisation will :-
  - a. Detail the nature of the work to be performed.
  - b. Give the name of the person(s) who will be performing the work.
  - c. Give the date, time and expected duration of the work to be performed.
  - d. List the equipment to be used.
  - e. Detail the precautions to be undertaken.
  - f. Detail the inspections to be performed.
- ii) Ensure that the area is kept free of inflammable gasses.
- iii) Ensure that the area is cleaned and kept free of inflammable and explosive dusts and combustible materials. The hazards of deposited coal dusts are to be explained to persons performing "Hot Work" within the tunnel.
- iv) Provide for inspection before, during and after the event. The incubation time (up to four hours) of fires caused by hot slag will be fully considered.

Reference is made to Australian Standard AS 2865 - "Safe Working in a Confined Space", informative appendix "G".

### **3.6 EMERGENCY EQUIPMENT - (OTHER THAN FIRE FIGHTING).**

Attention is drawn to specific requirements of the Statutory Authority which may have regulations covering the installation of emergency equipment.

Reference is made to Australian Standard AS 2865 - "Safe Working in a Confined Space".

### **3.6.1 FIRST AID.**

A first aid room shall be provided at the installation. If the Coal Stockpile/Reclaim Tunnel is part of a larger installation then the first aid room may be that of the larger installation.

In the absence of another standard the provisions of the New South Wales "Coal Mines Regulation (General Welfare and First Aid - Open Cut Mines) Regulation, 1984." for first aid can apply.

First aid cabinets should be provided at a suitable location close to the entrances of the reclaim tunnel. These cabinets should be appropriately signposted. (Reference is made to Australian Standard 2675. Portable First Aid Kits for use by Consumers.)

A stretcher designed for use in the reclaim tunnel should be located at the entrances to the tunnel. For tunnels in excess of 60 meters length consideration should be given to wheeled trolleys. The stretchers should be placed in a suitable cover to ensure that they will be clean when required for use.

### **3.6.2 EMERGENCY LIGHTING.**

Reference is made to Australian Standard 2293.1 Emergency Evacuation Lighting in Buildings.

Provision should be made for emergency lighting within the reclaim tunnel. Also torches should be made available to persons who are required to enter the tunnel.

### **3.6.3 SMOKE HOODS.**

Consideration should be given to the supply of smoke hoods or other personal protective equipment designed to protect the wearer against the effects of smoke and carbon monoxide. These may be issued on an individual basis or stored in containers at strategic locations in the tunnel. Dead ends are of particular importance.

The provision of this type of personal protection would be for the safe evacuation of persons only, it should be made clear to all relevant persons that the provision of smoke hoods or like are not for use by persons intending to fight a fire.

(Reference is made to Section 3.11 regarding recommendations on ventilation).

## **3.7 START UP AND SHUT DOWN SYSTEMS.**

Attention is drawn to specific requirements of the Statutory Authority which may have regulations regarding starting and stop/shut down mechanisms on remotely operated machinery.

Reference is made to:-

- Australian Standard 1755. Conveyors - Design, Construction, Installation and Operation - Safety Requirements.

The tunnel conveyor shall have an audible alarm which will be activated prior to the conveyor belt starting. the alarm shall be audible for the full length of the tunnel and conveyor.

Trip/stop wires (or equivalent) shall be located along the entire length of the tunnel conveyor.

An interlock shall be provided so that machinery within the reclaim tunnel cannot be operated in the event of a ventilation fan stoppage or failure. A time delay should be incorporated into the stop mechanism for the conveyor belt in the event of a fan stoppage to allow the clearance of coal from within the tunnel. The emergency stop system should override this delay.

An interlock to a smoke detector system may be used to shut down machinery in the tunnel. A time delay between feeder closure and conveyor belt stoppage should be incorporated to allow coal to be cleared from the conveyor belt.

Belt slip protection should be provided to turn off the energy source to the conveyor in the event of there being excessive slip between the belt and driving drum. The slip level shall be set at twenty percent of the belt speed. A maximum time delay of thirty five seconds for the operation of the belt slip device is allowed at startup.

Belt drift (wander) protection should be provided to turn off the energy source to a conveyor in the event of conveyor belting drifting laterally or vertically such that the belting could rub against any fixed component.

A procedure for the methods and sequence for stoppage of machinery in the reclaim tunnel should be formulated. (Reference is made to Section 3.5 "Fire Fighting").

The belt sequencing shall:-

- i) In the event of the conveyor within the tunnel stopping coal flow onto that conveyor shall be automatically stopped.
- ii) In the event of any upstream conveyor stopping the conveyor within the tunnel shall automatically stop.

Both the tunnel conveyor and any conveyor onto which it discharges should have anti-roll back security.

The conveyor belt and feeders should be subject to condition monitoring that can forewarn of component failure allowing preventative measures to be taken. For example, thermal or ultra sonic sensors as a method of early detection of bearing failure. These would be alarm sensors without the capability of automatically stopping feeders and conveyor belts or automatically operating a sprinkler or flood system.

Reference is made to Section 3.5 "Fire Fighting" for recommendations regarding conveyor shut down in the event of collapsed and over heated rollers and the like.

The hydraulic power packs supplying the feeders should have an automatic shutdown capability in the event of :-

- i) High oil temperature,
- ii) Low oil level,
- iii) Blocked oil filter.

### **3.8 LIGHTING WITHIN RECLAIM TUNNELS.**

The lighting in the tunnel should be such that all parts of the tunnel (including access points) are permanently illuminated to the extent that maintenance and inspection can be safely carried out without the need for additional - temporary lighting to be provided.

It is recommended that a twin circuit be provided with adjacent lights on opposite circuits, the failure of one circuit would then not throw the tunnel into darkness.

### **3.9 COMMUNICATION WITHIN RECLAIM TUNNELS.**

Note. If any part of the tunnel is classified as a hazardous area, any communication equipment used shall be constructed with the appropriate explosion protection. This includes hand held radios, the appropriate sign posting shall be provided at any access point.

Reference is made to Section 3.3 Access Control. A system of communication shall be provided to enable persons to comply with access control requirements. Such system could be by telephone, intercom or two way radio.

In the event of a failure in the communication system within the tunnel, all persons are to immediately evacuate the tunnel.

In general a system of communication should be provided so that persons who enter or are in the reclaim tunnel can contact persons who can remotely affect the operation of machinery within the tunnel. What ever system is selected it must be audible and accessible from all parts of the tunnel.

A "Danger tag/Out of Service tag" procedure shall be developed and used where the incorrect operation of machinery would place persons at risk.

Audio and/or visual prestart alarms shall be provided on remotely or automatically started machinery. (Reference is made to AS1755).

### **3.10 MAINTENANCE OF THE RECLAIM TUNNEL AND ASSOCIATED MACHINERY.**

Reference is made to the Statutory Authority which may have requirements with respect to maintenance systems.

Notwithstanding, a systematic maintenance program designed to keep the entire installation in safe working condition shall be developed and implemented. Such program shall be fully documented.

### **3.11 VENTILATION.**

Positive ventilation of the reclaim tunnel should be provided as there is a possibility of noxious or inflammable gas accumulation.

In new installations the creation of dead ends is strongly discouraged. In existing installations where dead ends exist consideration should be given to installing ducted ventilation.

In reclaim tunnels that are under 60m length, free draining and have full size openings to the atmosphere at either end, positive ventilation may not be required. Reclaim tunnels over 60 meters in length shall be positively ventilated.

In tunnels where it has been determined that forced ventilation should be provided, then it shall be prohibited for persons to enter the reclaim tunnel if the ventilation system is not operational. An audible warning should be provided at the shutdown of the ventilation system to warn persons to evacuate the tunnel. An interlock shall be provided to shut down the feeders and conveyor in the event of a fan stoppage.

In reclaim tunnels in which an emergency escape tunnel is incorporated it is recommended that a ventilation fan be installed at a fan house at the exit to the emergency escape tunnel. The fan motor should be located outside the escape tunnel.

Consideration should be given at the design stage to the shape of chambers installed to house feeders. Commonly little or no thought is given to the ventilation within these chambers and as a result a structure is provided which is "boxlike" in shape. This causes shock losses and dead spots within the ventilation current of the tunnel. A gradual rise in the roof of the tunnel proper to the roof of any chamber will reduce the likelihood of shock losses and dead spots. Design criteria for a fan evase could be successfully applied.

Regular and systematic sampling of the atmosphere within the reclaim tunnel should be undertaken. The frequency of sampling would depend upon results.

At the Commissioning stage and early operational phase of a reclaim tunnel/coal stockpile installation it is anticipated that a detailed and frequent sampling regime would be used. As the characteristics of the installation became known the sampling program would be altered to suit. Continuous monitoring may be considered for installations where a high gas make is known to occur.

The most common gasses that would be likely to occur are methane and carbon dioxide emanating from the coal and carbon monoxide that would result from any heating activity within the coal.

Carbon dioxide is most likely to accumulate in downhill dead ends and sumps with the potential to displace all oxygen. Persons entering areas with such accumulations risk asphyxia.

Methane is most likely to accumulate in uphill dead ends or overhead chambers (such as those that house the feeders). Not only does this present an explosion hazard but methane also has the potential to displace oxygen posing the same asphyxia risk as carbon dioxide.

It is recommended that the air from any induced ventilation flow travel in same direction as the top belt. This will reduce dust make from coal which is being discharged.

If the tunnel is designed so as to allow for the use of skid steer loaders then the ventilation system shall be designed so as to ensure that diesel fumes are efficiently removed and gasses are kept below THLV's.

In zones that can be defined as "non hazardous" the entire air volume of the tunnel should be changed at least six times per hour from a guaranteed fresh air source.

Assessment should be made for zones that can be defined as "hazardous", then the ventilation flow should be such so as to ensure that noxious and explosive gasses are kept to acceptable levels. (Reference is made to Section 3.5.1 "Hazardous Zone Determination").

For example 5% of the LEL and such that noxious and poisonous gasses are kept below THLV.

Efforts should be made to find and remove dead spots within the ventilation system.

Avoid routing power cables to the ventilation fan through areas of high damage potential. It is unwise to place the power cable to the fan within the reclaim tunnel. In the event of a fire destroying this cable, the fan can not be used to remove the fumes which will prevent entrance into the tunnel for investigation or fire fighting.

## **SECTION 4 TRAINING.**

Training of personnel should be in accordance with Australian Standard A.S. 1470. "Health and Safety at Work - Principles and Practices".

### **4.1 GENERAL.**

It is recommended that a structured induction and ongoing skills training program be incorporated into the management systems of the installation. Such systems should consider:-

- i) Required subject material, minimum:
  - a. Safe work systems.
  - b. Emergency procedure, general.
  - c. Use of equipment:-  
General safe system of work.  
Specific emergency procedure.
  - d. Job description.
  - e. Responsibility.
  - f. Lateral and vertical functions.
  - g. Communication.
- ii) Persons.
  - a. The trainers:-  
Has recognised expertise.
  - b. The trained:-  
Person performing the function.  
His supervisor.
- iii) Schedule.
- iv) Induction.
- v) Ongoing skills.
- vi) Assessment, good records.  
(If you can not prove it, it did not happen).
- vii) Appointment, good records.
- viii) Records, easily accessed & accurate
- ix) Management review.

#### **4.2 TRAINING OF PERSONNEL REQUIRED TO ENTER THE COAL STOCKPILE AREA.**

Reference is made to the statutory authority which may place obligations with respect to training of personnel.

Notwithstanding, a training scheme for persons required to enter a coal stockpile area should address the following matters:-

- i) Persons being trained in the use of new or unfamiliar mobile machinery shall not at the same time be trained in the use of that machinery on the coal stockpile.
  - ie. Only persons familiar with the machine are to be inducted to a coal stockpile.
- ii) Procedures for the operation of the coal stockpile required to be developed by these guidelines and any statutory authority.
- iii) Hazards peculiar to bulk free flowing material with drawpoints at the base of the stockpile.

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**INFORMATIVE APPENDIX.**

**APPENDIX 'A'**

**DOZER REPORT BOOK.**

Reference is made to Section 2.2 "Access Control".

A "Dozer Report Book" would form part of the procedure designed to control access to the "Coal Stockpile Area".

In addition to the access requirements detailed in Section 2.2 "Access Control" and Section 2.6 "Two Way Radio Communication" a procedure utilising a Dozer Report Book would also incorporate the following items:-

- i) The Dozer Report Book shall be kept at the "Access Point" or entrance to the "Coal Stockpile Area".
- ii) The Dozer Report shall be completed when:-
  - a. A dozer operator is leaving the "Coal Stockpile Area".
  - b. Reclamation has taken place without a dozer on the stockpile. Information would then be entered by the person who remotely operates the Reclaim Conveyor.
- iii) Before entering the "Coal Stockpile Area" each dozer operator shall read and initial the previous Dozer Report.
- iv) The Dozer Report Book should provide a carbon copy so that an oncoming dozer operator can take a copy of the report onto the stockpile with him. The original shall remain in the book to ensure continuity and allow for system review.
- v) Information available in the Dozer Report Book should include:-
  - a. Where coal was last reclaimed.
  - b. The work done by the last dozer operator on the "Coal Stockpile Area" and any comments.
  - c. A sketch of the coal stockpile's most current appearance (Side and Plan).
  - d. The location/s and type/s of potential hazards.
  - e. Previous dozer operators names and initials.
  - f. The date and time of departures from the "Coal Stockpile Area".
  - g. The location of overhead discharge points.
- vi) Any person who remotely operates the Reclaim Conveyor when a dozer is not present to push to the feeder shall enter the following information into the Dozer Report Book:-
  - a. Date and time.
  - b. Feeder or coal outlet used.
  - c. Tonnes removed.
  - d. Name and initials.

**DOZER REPORT SHEET**

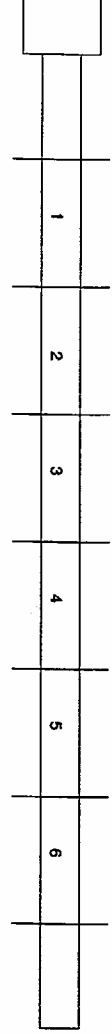
Date:	
Time Off Pile:	
Job Done:	
Push Out/Reclaim Valves Used:	
Outgoing Dozer Drivers:	
Oncoming Dozer Drivers:	

Signed .....  
Manager

SIDE VIEW



P  
V  
L  
I  
A  
E  
N  
W



DOZER DRIVERS COMMENTS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

RECLAIMING WITHOUT A DOZER				
DATE	TIME	VALVE	TONNES	NAME/INITIALS

**INFORMATIVE APPENDIX.**

**APPENDIX 'B'**

**STOCKPILE WORKSHEET.**

Reference is made to Section 2.2 "Access Control".

The Stockpile Worksheet would be designed to provide information to personnel who are responsible for the operation of the feeders and the reclaim conveyor and persons who operate mobile machinery on the "Coal Stockpile Area".

Information contained on the Stockpile Worksheet would include:

- i) The Reclaim Schedule - scheduled movement of coal off the coal stockpile.
- ii) Reclaim Locations - the feeders to be used, the specifications of the coal to be transferred.
- iii) The locations and nature of any known hazards within the "Coal Stockpile Area".

The program of coal to be delivered to the "Coal Stockpile Area" may also be included on the Stockpile Work Sheet.

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## INFORMATIVE APPENDIX.

### APPENDIX 'C'

#### STOCKPILE ACCESS BOOK.

Reference is made to Section 2.2 "Access Control".

A "Stockpile Access Book" would form part of the procedure designed to control access to the "Coal Stockpile Area".

In addition to the access requirements detailed in Section 2.2 "Access Control" and Section 2.6 "Two Way Radio Communication" a procedure utilising a Stockpile Access Book would also incorporate the following items:-

- i) The Stockpile Access Book shall be kept at the "Access Point" or entrance to the "Coal Stockpile Area".
- ii) A person would be deemed to be in the "Coal Stockpile Area" if they have signed on to the "Stockpile Access Book" as entering the "Coal Stockpile Area" but have not signed off the book as having left the area.
- iii) Before entering the "Coal Stockpile Area" each person would:-
  - a. a) Check the "Stockpile Access Book" to determine the presence of other persons in the "Coal Stockpile Area".
  - b. b) Notify all other persons in the "Coal Stockpile Area" and persons who could remotely affect the area of-  
Who is about to enter the "Coal Stockpile Area".  
The parts of the "Coal Stockpile Area" to be affected by the work.  
The expected duration of the work.
  - c. Receive confirmation from all others in the "Coal Stockpile Area" and from those who could remotely affect the area of the intended entry.
  - d. Enter the name, signature, date, time, duration and reason for entry into the "Stockpile Access Book".
  - e. Satisfy themselves that they are aware of, and understand the potential hazards in the "Coal Stockpile Area", this would involve a review of all other relevant information. For example, The "Dozer Report Book" and the "Stockpile Work Sheet".
- iv) While in the "Coal Stockpile Area", each person would maintain clear communication with all others in the "Coal Stockpile Area" and persons who could remotely affect the area.
- v) Persons who can remotely affect the "Coal Stockpile Area" would , prior to commencing any operations:-
  - a. Check the "Stockpile Access Book" to determine the presence of persons on the "Coal Stockpile Area".
  - b. Notify all other persons in the "Coal Stockpile Area of their intention to commence operations, the parts of the area that will be affected and the expected duration of their activities.
  - c. Receive and log confirmation that all persons within the "Coal Stockpile Area" are aware of their intention to commence operations and are clear of any area that may be adversely affected.
  - d. Enter name, signature, date, time, duration and work details into the "Stockpile Access Book".
- vi) When leaving the "Coal Stockpile Area" each person would:-

- a. Notify others in the "Coal Stockpile Area" of their departure.
  - b. Receive confirmation from all others in the "Coal Stockpile Area" of their departure.
  - c. Receive confirmation from persons who can remotely affect the "Coal Stockpile Area" of their departure.
  - d. Sign off and enter the time of departure into the "Stockpile Access Book".
- vii) If at any time a person who is deemed to be in the "Coal Stockpile Area" (ie. signed into the "Stockpile Access Book") cannot be contacted or located, a search must be instigated immediately. All activities that affect the condition of the "Coal Stockpile Area" are to immediately cease until all persons are accounted for.
- viii) If there is any reason to suspect that the person/s may be in danger, a preset "Emergency Procedure" must be invoked immediately.
- ix) If there is evidence that the person/s have left the "Coal Stockpile Area" then they must be located and the details of their departure entered into the "Stockpile Access Book". Such an occurrence would be deemed a "Non Compliance" and should be the subject of an investigation with the results being made available to the appropriate officials of the installation.
- x) In the event that the communication system fails within the "Coal Stockpile Area" all persons are to immediately withdraw from the "Coal Stockpile Area" and the details entered into the "Stockpile Access Book".

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INFORMATIVE APPENDIX ‘F’

**HOT WORK PERMIT**

Permit Number		Date	
Site Location			
Job Description			
Location of Hot work			
Equipment in use			
Additional Safety			
Equipment Required			

The following checks have been made:-

- ( ) Has belt been isolated?
- ( ) Have the stockpile discharger and coal valve been isolated?
- ( ) Is the ventilation fan operating?
- ( ) Has additional safety equipment been checked and laid out?
- ( ) Have combustible materials been removed from the work area?
- ( ) Is a fire watch required and organised?
- ( ) Has the area been inspected and found to be safe?

This permit is valid from    hrs   /   /   to    hrs   /   /   .

	Persons Performing Work	Responsible Person
Name (Print)		
Signature		

**RETURN OF PERMIT**

This permit was returned/canceled by:

Name (Print)	Signature

The worksite has been inspected by me at the expiry/cancellation of this **Hot Work Permit** and declared **SAFE**.

**RESPONSIBLE PERSON**                      Time    hrs   /   /   .

Name (Print)	Signature

## APPENDIX 'D'

### EXAMPLE OF:

#### INDIVIDUAL ISOLATION PROCEDURE/PERSONAL DANGER TAG PROCEDURE

##### ***STEP 1. IDENTIFY ALL EQUIPMENT TO BE ISOLATED***

You must be absolutely certain that the switched valves etc, you require to isolate **ARE THE CORRECT ONES**.

Associated equipment that could create hazardous situations if operated must be isolated and tagged.

##### ***STEP 2. DETERMINE THE CORRECT POINT OF ISOLATION***

**POSITIVE ISOLATION** can only be obtained by removing the source of energy from the equipment to be worked on.

Some switches are **NOT** positive isolating switches and will not give you sufficient protection. Such switches are control switches and may be of the push-button type emergency stop buttons, conveyor pull wire switches master controls and control switches in pulpits.

**DO NOT USE THESE AS ISOLATING SWITCHES**

##### ***STEP 3. CARRY OUT THE ISOLATION***

Remove the primary energy sources from the equipment to be worked on by switching the main isolators, operating the valves, removing the plugs etc.

Remove or support, chock and secure all secondary sources, such as conveyor's take up, springs, accumulators, elevated equipment or pressures in vessels and tanks.

Ensure all associated equipment is also isolated.

## **TEST THE EFFECTIVENESS OF THE ISOLATION**

You must test the equipment you have isolated to check that the equipment cannot operate while you are working on it.

The test could mean:-

- (a) Attempting to start the equipment.
- (b) Having someone else, perhaps your Supervision, check your method of securing and choking.
- (c) Checking the indicator on the main isolator to ensure it has fully opened.
- (d) Any other check you consider necessary to ensure the equipment will not operate.

## **STEP 5. PLACE TAG ON ISOLATION DEVICE**

On **YOUR** Personal Danger Tag, print clearly the following information.

- (a) your name.
- (b) date.
- (c) remarks you need to make on the remarks side of the tag.

You must fasten Personal Danger Tags securely to the isolating switch on isolation point.

## **REMOVAL OF TAGS**

When you have completed the job or shift you **MUST REMOVE** your Personal Danger Tag and destroy it immediately.

Providing the equipment is safe to operate reconnect the source of energy by switching isolating switch, valve, etc. **ON**.

On ceasing work at the end of a shift or if further repairs cannot be carried out to ensure the safe operation of the equipment, you must remove your Personal Danger Tag and place an **“Out of Service”** tag on the switch, valve etc. Notify your Supervisor of your actions.

### **POINTS TO REMEMBER**

It is your responsibility to place a Personal Danger Tag on each of the main isolation switches, valves or other controls, or on the equipment in question as necessary, **BEFORE YOU COMMENCE WORK ON THE JOB AND AFTER ISOLATING THE EQUIPMENT.**

**YOU MUST NOT OPERATE** any switch, valve, control, machinery or use equipment when there is a Personal Danger Tag attached to it.

Always use a new tag on each new job and each new shift or part thereof.

Do not erase or cross out another person's name and place your name on a Personal Danger Tag that has been used.

The only person permitted to remove your Personal Danger Tag from a switch valve, control or machine etc, is **YOU**, the person who put it there.

**INFORMATIVE APPENDIX ‘E’**

**GUIDELINES FOR THE DEVELOPMENT OF REMOTE ISOLATION PROCEDURES TO BE ADOPTED DURING THE MAINTENANCE OF MECHANICAL EQUIPMENT.**

**INTRODUCTION.**

The purpose of Isolation is to remove all sources of energy from an item of plant or equipment. An Isolation Procedure and Danger Tag/Out of Service Tag Procedure are designed to ensure that plant and equipment remains Isolated when it is essential that equipment be Isolated.

Isolation Procedures are designed to protect personnel from injury and equipment from damage.

When ever personnel are required to work on plant and equipment, where the operation of that plant and equipment would present a threat to the safety of personnel, then the source of energy must be removed.

**SCOPE.**

A need for Remote Isolation Procedures was first perceived within the Underground Coal Mining Industry within NSW in relation to the isolation of :-

- the AFC, stageloader, crusher and shearer on longwall faces.
- the longwall conveyor belt as the longwall block retracts.
- Conveyor belts and coal discharge valves in reclaim tunnels with remote isolation points.

The safe isolation of these items of equipment, for the purposes of maintenance, have traditionally been covered by a “Personal Danger Tag Procedure”. This has required that each individual affix a “Personal Danger Tag” to the Isolation Point of equipment that, if started, would cause danger to that person. The Remote Isolation Procedure is designed to replace the “Personal Danger Tag Procedure” with a practical and safe system for isolating equipment in situations where a number of people are to be protected as a group or team and when the Isolation Point is remote from the immediate work area.

There are three areas of legislation that have been traditionally utilised for the formalisation of Personal Danger Tag Procedures:-

- Clause 20 (5)“Coal Mines Regulation (Electrical-Underground Mines ) Regulation, 1984” states that “The manager of a mine shall make rules with respect to the removal and restoration of power from and to the mine and parts thereof”.
- Section 103 (1) of the COAL MINES REGULATION ACT 1982 No. 67 states that “The manager of a mine shall prepare a scheme for the systematic examination or testing of electrical apparatus and mechanical apparatus at the mine”. Part (2) makes reference to prescribed matters within the regulations.
- Section 104 (1) of the COAL MINES REGULATION ACT 1982 No. 67 states that “Regulations may be made requiring the manager of a mine to make rules or prepare a scheme in relation to any subject-matter which -
  - (a) concerns the safety, health, conduct or discipline of persons in mines; and
  - (b) is prescribed for the purposes of this section,

Whilst references to prescribed matters are made above, since the introduction of the current CMRA at no time have the formulation of Danger Tag Rules become a prescribed matter. It could be argued that Personal Danger Tag Rules should be incorporated into the Clause 20 Electrical rules as isolation involves the removal and restoration of power, however the Clause 20 rules have generally been interpreted as applying to regions of the mine and not specifically limited to single items of equipment. Also, there is a need to isolate other sources of energy besides electricity. Therefore it has been custom and practice for the Personal Danger (and Out of Service) Tag Rules to be incorporated into the 103 Schemes of the mine.

It is not intended that these guidelines be limited to the specific longwall faces and associated equipment mentioned above but **may be applied to any work site in a coal mine requiring the isolation of equipment where a number of people are to be protected as a group or team and when the isolation point is remote from the immediate work area.**

**It is not the scope of this document to cover isolation of, and work involving High Voltage Mains and Apparatus.**

## **DEFINITIONS.**

**Isolated** means disconnected from all possible sources of energy.

**Isolation** means to disconnect from all possible sources of energy.

**Procedure** means specific instructions prepared for the purpose of providing for operations or processes to be carried out in a safe manner. They specify the purpose and scope of activities and define how the activities are to be conducted controlled and recorded.

**Isolation Procedure** means specific instructions prepared for the purpose of ensuring that an item of plant or equipment is disconnected from all possible sources of energy safely and efficiently.

**Remote Isolation Procedure** means specific instructions prepared for the purpose of allowing a person, acting on the behalf of others, to ensure that an item of plant or equipment, that is in a location remote from the isolation point, is disconnected from all possible sources of energy, and remains disconnected for the period of time that the procedure is invoked.

**Isolation Point** means discrete, identifiable apparatus, within an “Energy System”, that is designed to allow a source of energy to be disconnected from a predetermined item of plant or equipment.

**Full Current Isolation** means to disconnect an electrical source of energy by causing a break in the conductors forming the main electrical circuit to an item of plant or equipment by:-

- means of a switch or isolators, forming part of the main conductors; or
- unbolting and removing or separating connections.

(Also known as whole current isolation).

**Control Circuit Isolation** means the interruption of the control circuitry of the primary power source to an item of plant or equipment. Control Circuit Isolation is not acceptable, to the Coalfields Inspectorate, as a means of Isolation.

**Personal Danger Tag Procedure** means specific instructions prepared for the purpose of allowing a person, acting on his own behalf only, to ensure that an item of plant or equipment is disconnected from all possible sources of energy, and remains disconnected for the period of time that the procedure is invoked. This procedure requires that each individual affix a Personal Danger Tag to all Isolation Points.

A **Personal Danger Tag** is a notice, completed by an individual, that is securely fastened, by that individual, to the Isolation Point, as part of an Isolation Procedure. The intent of the Personal Danger Tag is to prevent the inadvertent re-introduction of energy or power to plant or equipment that has been isolated to ensure the safety of that individual working on or about that equipment. A Personal Danger Tag is usually red, has the word “Danger” prominently displayed on both sides, contains a warning to the effect that “this must not be operated” and has provision for the printing of the date, relevant remarks and the name of the individual applying the Tag.

**Out of Service Tag Procedure** means specific instructions prepared for the purpose ensuring that an item of plant or equipment that is defective is not inadvertently operated. This procedure involves the placing of a warning notice known as an “Out of Service Tag to an Isolation Point. If more than one defect exists on an item of plant or equipment then it is usually a requirement that a separate Out of Service Tag be applied for each defect.

An **Out of Service Tag** is a notice that is securely fastened to the Isolation Point, as part of an Isolation Procedure. The intent of the out of Service Tag is to prevent the inadvertent use or operation of defective plant or equipment. An Out of Service Tag is usually black and yellow, has the words “Out of Service” prominently displayed on both sides, contains a warning to the effect that “this must not be operated” and has provision for the printing of the date, the defect, relevant remarks and the

name of the individual applying the Tag. An Out of Service Tag may, usually, be removed by a person who corrects the defect stated on the Tag.

A **Work Permit** is an element within a Remote Isolation Procedure that provides documented authority to commence work on plant and equipment where a Remote Isolation Procedure is to apply. The Work Permit:-

- Defines the purpose and scope of the job to be undertaken.
- Is completed by the Authorising Officer and the Nominated Person.
- Is a control document designed to ensure that the correct Remote Isolation Procedure is implemented.
- Provides prompts for good, structured communication.
- Provides objective evidence that can demonstrate that a set procedure has been followed and that a set objective has been achieved.
- Provides a basis for review and audit of The Remote Isolation Procedure.
- Provides a basis for analysis when developing or improving work procedures.

A **Remote Isolation Report** is an element within a Remote Isolation Procedure that is designed to ensure that the correct isolation has been provided at the correct isolation points of a previously defined energy system. The Remote Isolation Report:-

- Is completed by the Remote Isolation Person.
- Is a control document designed to ensure that the correct Remote Isolation Procedure is implemented.
- Provides prompts for good, structured communication.
- Provides objective evidence that can demonstrate that a set procedure has been followed and that a set objective has been achieved.
- Provides a basis for review and audit of The Remote Isolation Procedure.
- Provides a basis for analysis when developing or improving work procedures.

A **Remote Isolation Danger Tag** is an element within a Remote Isolation Procedure. The Remote Isolation Danger Tag:-

- Is a notice, completed by the Remote Isolation Person, that is securely fastened to the Isolation Points of an energy system.
- Is intended to prevent the inadvertent re-introduction of energy or power to plant or equipment that has been isolated to ensure the safety of a Group/Team working on or about that equipment.
- Should be red in colour.
- Should have the words “Remote Isolation Danger Tag” and “Danger” prominently displayed on both sides.
- Should contain a warning to the effect that “this must not be operated”.
- Should have provision for the printing of the date, relevant remarks, the number of the Work Permit, the name of the Nominated Person and the Remote Isolation Person applying the Tag.

The **Authorising Officer** is a trained individual who authorises the enactment of a Remote Isolation Procedure and work defined therein.

The **Nominated Person** is a trained individual who is the authorised supervisor of :-

- A Remote Isolation Procedure.
- The work defined as part of the Remote Isolation Procedure.
- All members of a Group/Team defined as part of the Remote Isolation Procedure.

- The Remote Isolation Person.

The **Remote Isolation Person** is a trained individual who is authorised to apply Isolation to defined Isolation Points within an energy system on behalf of a Group/Team as part of a Remote Isolation Procedure.

The **Work Site** is the area containing and immediately surrounding plant and equipment identified as requiring isolation as part of a Remote Isolation Procedure.

### **TYPES OF ENERGY SOURCES.**

#### **Electrical:-**

- Electricity

#### **Mechanical:-**

- Hydraulic Pressure.
- Compressed Air.
- Mechanical generated by Engines or Motors ( Powered Hydraulically, Electrically, by Compressed Air or by an Internal Combustion Engine).

#### **Chemical.**

#### **Radioactive.**

#### **Stored:-**

- Accumulators and pressure vessels.
- Springs or chains under tension.

This source may require release as well as disconnection.

#### **Gravity.**

This source cannot be truly isolated but unwanted energy flows can be checked through the removal of height for example placement on the ground or by the placement of barriers such as adequate chocking and the like.

#### **Biomechanical.**

#### **Steam.**

### **FORMS OF ISOLATION.**

Breaking Electrical Circuits, see full current isolation above.

Blanking off, or physically disconnecting pipes.

Venting pressure from accumulators and pipes.

Releasing tension or compression from springs etc.

Chocking or lowering items to safe rest position .

**RECOMMENDED ELEMENTS OF A REMOTE ISOLATION PROCEDURE.**

PERSON	ACTION	DESCRIPTION
<b>Prior to any work commencing.</b>		
<p><b>Authorising Officer.</b> (It may be acceptable that the Authorising Officer and the Nominated Person be the same person.)</p>	<p>Issues the <b>Work Permit</b>. Original issued to the <b>Nominated Person</b>. Copy issued to the <b>Remote Isolation Person</b>. <i>(It may be desirable for the Nominated Person and Remote Isolation Person to sign the Work Permit at the time of issue.)</i></p>	<p>The <b>Work Permit</b> should, at this time identify:-</p> <ul style="list-style-type: none"> <li>• Permit Number</li> <li>• The task/scope of work to be performed.</li> <li>• The items of plant and equipment and their energy sources that have to be <b>Isolated</b>.</li> <li>• The correct <b>Isolation Points</b> for the energy source on each item of plant and equipment.</li> <li>• <b>Nominated Person</b>.</li> <li>• <b>Remote Isolation Person</b>.</li> <li>• Date.</li> <li>• Location.</li> <li>• Shift/Time.</li> <li>• Communication protocol.</li> </ul>
<p><b>Nominated Person.</b> Reviews <b>Work Permit</b> and the task/scope to ensure that the information provided is correct and adequate. Identifies the group or team to which the <b>Work Permit</b> applies.</p>	<p>Authorises the <b>Remote Isolation Person</b> to isolate the items of equipment from their respective energy sources as identified by the <b>Work Permit</b>.</p>	<p>The <b>Nominated Person</b> shall identify himself at all times when communicating with the <b>Remote Isolation Person</b>.</p>
<p><b>Remote Isolation Person.</b> Reviews <b>Work Permit</b> and the task/scope to ensure that the information provided is correct and adequate.</p> <p><i>(It may be possible to incorporate the Remote Isolation Danger Tag and the Remote Isolation Report into a single document.)</i></p>	<p>Acts on the authority from the <b>Nominated Person</b> and causes the items of plant and equipment to be <b>Isolated</b> in accordance with the instructions and information on the <b>Work Permit</b>. Secures the area, where necessary and applies a <b>Remote Isolation Danger Tag</b> to all <b>Isolation Points</b> identified in the <b>Work Permit</b>. Tests the effectiveness of the Isolation. Enters the appropriate information into <b>Remote Isolation Report</b> when isolation has been completed. Contacts the <b>Nominated Person</b> and advises him that the items of plant and equipment have been <b>Isolated</b> in accordance with the instructions and information on the <b>Work Permit</b>.</p>	<p>The <b>Remote Isolation Danger Tag(s)</b> should, at this time identify:-</p> <ul style="list-style-type: none"> <li>• Number of the <b>Work Permit</b>.</li> <li>• Date that the plant and equipment was <b>Isolated</b>.</li> <li>• Name of the <b>Remote Isolation Person</b>.</li> <li>• Name of the <b>Nominated Person</b>.</li> <li>• <b>Work Site</b> phone number</li> <li>• Time that the plant and equipment was <b>Isolated</b>.</li> <li>• The reason that the plant and equipment has been <b>Isolated</b>.</li> <li>• The signature of the <b>Remote Isolation Person</b>.</li> </ul> <p>The <b>Isolation Report</b> should at this time contain the same information identified in the <b>Remote Isolation Danger Tag</b>.</p>

<p><b><u>Nominated Person.</u></b> Upon receiving advice from <b>Remote Isolation Person</b> that the items of plant and equipment have been <b>Isolated</b> in accordance with the instructions and information on the <b>Work Permit</b>.</p>	<p>Shall test, by other secondary means of isolation, that all plant and equipment has been <b>Isolated</b> and <b>CAN NOT</b> be operated.</p> <p>The time and means/method of this test shall be entered into the work permit following the test.</p> <p>If the equipment is found <b>NOT</b> to be <b>Isolated</b> the <b>Work Permit</b> is to be canceled and an investigation is to be carried out to determine the reason for the failure of the <b>Isolation Procedure</b>. The Manager is to be informed of the event and the results of the investigation prior to the issuing of any further <b>Work Permit</b>.</p> <p>Following a successful test:- Inform the Group or Team under his control:-</p> <ul style="list-style-type: none"> <li>• Full current isolation has been effected.</li> <li>• The scope of work as defined by the <b>Work Permit</b>.</li> <li>• The Plant and Equipment that has been <b>Isolated</b>.</li> <li>• The location of the <b>Isolation Points</b> and the method of isolation.</li> <li>• To Sign On the Work Permit.</li> </ul>	<p>An instruction should be printed on the <b>Work Permit</b> relating to the test for the effectiveness of the isolation. This instruction could take the form of :- “Following advice from the <b>Remote Isolation Person</b> that the equipment has been <b>Isolated</b> the <b>Nominated Person</b> must test, by secondary means, that the equipment is <b>Isolated</b>.”</p> <p>These points should be printed on the Work Permit as a “Communication Protocol”.</p>
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		<b>TEAM MEMBERS</b>			
		<b>SIGN ON</b>		<b>SIGN OFF</b>	
<p><b><u>Nominated Person and Group/Team Members.</u></b></p>	<p>Each member of group must sign onto the <b>Work Permit</b>.</p> <p>This process is to be reviewed by <b>Nominated Person</b> as it occurs.</p> <p>If persons join the group later then the <b>Nominated Person</b> must give them the required information and require them to sign on.</p> <p>If a person leaves the group prior to completion of the job then the <b>Nominated Person</b> must require him to “sign off”.</p> <p>No person is to work on the specified job if they have not signed onto the <b>Work Permit</b>.</p>				

<p><b><u>Nominated Person and Group/Team Members.</u></b></p>	<p><b>Nominated Person</b> informs the team that they may now consider the equipment <b>Isolated</b> and safe to work on.</p>	<p>This point should be printed on the Work Permit as a “Communication Protocol”.</p> <p>“Following <b>Sign On</b> the <b>Nominated Person</b> shall inform his team members that they may now consider the equipment <b>Isolated</b> and safe to work on.”</p>
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<p><b><u>Nominated Person and</u></b></p>	<p>Group/team commences and completes the task as defined</p>	
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<b><u>Group/Team Members.</u></b>	by the <b>Work Permit</b> .	
<b><u>Nominated Person.</u></b>	<p>Shall, following completion of the Work as defined by the <b>Work Permit</b> :-</p> <ul style="list-style-type: none"> <li>• Inspect/check the work site to ensure that the job is completed and that the team members have retreated to a safe area.</li> <li>• Inform the team members that the equipment is to be considered powered and no longer safe to work on.</li> <li>• Cause the team members to <b>Sign Off the Work Permit</b>.</li> <li>• May now cause the isolation to be removed and the power restored, via communication to the <b>Remote Isolation Person</b>.</li> </ul>	These points should be printed on the Work Permit as a “Communication Protocol”.
<b><u>Nominated Person.</u></b>	<p>When satisfied, communicates to <b>Remote Isolation Person</b> informing him:-</p> <ul style="list-style-type: none"> <li>• That the job is complete</li> <li>• All persons are clear and</li> <li>• It is safe to remove isolation and restore power to the plant and equipment.</li> <li>• Unless the job is not completed, then the Nominated Person must advise The Remote Isolation Person to apply an “<b>Out of Service</b>” <b>Tag</b>.</li> </ul> <p>Completes the <b>Work Permit</b> by:-</p> <ul style="list-style-type: none"> <li>• Identifying on the <b>Work Permit</b> if the job is “Complete and Power Restored” or “Incomplete and Out of Service”.</li> <li>• Noting the time that the power was restored <i>(if applicable)</i>.</li> <li>• Placing his signature in the designated position.</li> </ul>	<p>This point should be printed on the Work Permit as a “Communication Protocol”.</p> <p>“ If the work is not completed the “<b>Out of Service</b>” <b>Tag</b> is to be applied at the <b>Isolation Points</b>.”</p>
<b><u>Remote Isolation Person.</u></b>	<p>Acts on advice from the <b>Nominated Person</b> <u>only</u> and:-</p> <ul style="list-style-type: none"> <li>• Removes the <b>Remote Isolation Danger Tags</b> and restores power to the items of plant and equipment, OR,</li> <li>• If advised by the <b>Nominated Person</b> that the job is not completed <b>does not</b> restore power and applies the “<b>Out of Service</b>” <b>Tag</b> to the <b>Isolation Points</b>.</li> </ul> <p><i>(The only person who is permitted to remove the Remote Isolation Danger Tag is the Remote Isolation Person.)</i></p> <p>Informs the Nominated Person that power has been restored and the time that it was restored. <i>(if applicable)</i> .</p> <p>Completes the <b>Remote Isolation Report</b>.</p> <p>Joins the <b>Remote Isolation Danger Tags</b>, the <b>Remote Isolation Report</b> and the copy of the <b>Work Permit</b> together and give these to the <b>Nominated Person</b>.</p>	This point should be printed on the Remote Isolation Report.
<b><u>Nominated Person.</u></b>	<p>Collects the <b>Remote Isolation Danger Tags</b>, the <b>Remote Isolation Report</b> and the copy of the <b>Work Permit</b> and attaches these to the original <b>Work Permit</b>.</p> <p>Gives all of these to the original <b>Authorising Officer</b>.</p>	This point should be printed on the Work Permit.

<p><b><u>Authorising Officer.</u></b></p>	<p>Reviews the documents received to ensure that the system has been complied with and counter signs. If correct files and retains for at least the period of set review and audit. If the documents received are not correct or a non conformance is found, then a report is to be made to the Manager with a statement on the corrective action taken.</p>	
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If work extends for more than one shift or the shift is cut short and the Group/Team has been withdrawn, then the **Nominated Person** shall instruct the **Remote Isolation Person** to :-

- Remove the **Remote Isolation Danger Tag** and replace it with an **Out of Service Tag**
- Terminate the Remote Isolation Procedure and close out the **Work Permit** in accordance with the set procedure.

Should it be necessary for the **Nominated Person** or the **Remote Isolation Person** to leave the site, then the **Remote Isolation Procedure** is to be Terminated and the **Work Permit** closed out in accordance with the set procedure.

A new **Remote Isolation Procedure** is to be enacted by oncoming persons

**GENERAL.**

Each “Energy System”, its associated sources of energy and **Isolation Points**, to which a **Remote Isolation Procedure** is to apply, should be precisely defined. The acceptable means of **Isolation** should also be determined for each item of plant and equipment within the “Energy System”.

Not more than one **Remote Isolation Procedure** shall be enacted in a defined **Work Site** at any one time.

**Work Permits** should be discretely and consecutively numbered.

The number of the **Work Permit** should be transferred to the **Remote Isolation Danger Tag** and **Remote Isolation Report**.

An individual must not interfere any **Isolation Point**, nor operate any switch, valve, control, or use plant or equipment that has a Danger Tag attached to it.

**VERIFICATION AND LABELING**

Verification by a second person when isolating at a complex switch board is recommended.

Correct, explicit, discrete and accurate labeling of the items of plant and equipment and their respective Isolation Points is recommended.

**TRAINING.**

Training is needed to help people develop the knowledge and skill to allow them to perform a task in a competent manner.

Persons involved in supervising or effecting a Remote Isolation Procedure have a heavy responsibility with respect to the safety of others and need the support of sound instruction and supervised experience.

Recommended elements in a training scheme for persons involved in Remote Isolation Procedures:-

- For Authorising Officer.  
Nominated Person.  
Remote Isolation Person.  
Formal off the job competency based training with assessment involving a written exam.  
On the job supervised experience with assessment of practical performance.  
Formal, written appointment at satisfactory completion of training and assessment.
- For Group or Team Members.  
Less rigorous training is needed however an element of class room training is recommended followed by some on the job coaching.
- All persons required to work in a situation where more than one procedure for isolation (ie. Personal Danger Tag, Remote Isolation and Out of Service Tag) can be used must be able to distinguish between the various procedures and accurately identify the relevant application and circumstances of each.
- All persons required to enter an area where an Isolation Procedure can be enacted, involving any form of Danger Tag System, must know and understand that an individual **must not interfere** with any **Isolation Point**, nor operate any switch, valve, control, or use plant or equipment that has a Danger Tag attached to it.

The training program should involve evaluation and feedback, both at the initial completion of the training and after a suitable period of time has elapsed and persons have had the opportunity to apply the work methods.

#### **ATTACHMENTS.**

- Attachment 1 Example of a Work Permit.  
Attachment 2 Example of a Remote Isolation Report.

#### **REFERENCES.**

- Australian Standard 1470 - 1986 Health and Safety at Work - Principles and Practices.  
Australian Standard 2467 - 1981 Maintenance of Electrical Switchgear.  
Australian Standard 1755 - Conveyors, Design, Construction, Installation, and Operation - Safety Requirements.  
Australian Standard 3904 - Quality Management and Quality System Elements.  
Health And Safety Executive (UK) Booklet HS(G) 65 Successful Health and Safety Management.  
Howick Coal -- Isolation and Tagging Procedures.  
Newstan Colliery -- Rules to be Adopted when Working in and around Coal Conveyance System. -- Remote Tagging System.  
Newcastle-Wallsend Coal Company -- Hydraulic Safety Booklet.

**ATTACHMENT 1 Example of a Work Permit.**

<b><u>NAME OF MINE - REMOTE ISOLATION PROCEDURE.</u></b>			
<b><u>WORK PERMIT.</u></b>			
Permit Number:-	Location:-	Date:-	Shift:-
<b><u>POSITION</u></b>	<b><u>NAME</u></b>	<b><u>SIGNATURE</u></b>	
AUTHORISING OFFICER:-			
NOMINATED PERSON:-			
REMOTE ISOLATION PERSON:-			
THIS PERMIT ALLOWS WORK TO BE CARRIED OUT ON:-		_____	
SCOPE OF WORK:-		_____	
THE ITEMS OF PLANT AND EQUIPMENT THAT HAVE TO BE ISOLATED:-	THEIR ENERGY SOURCES:-	ISOLATION POINTS :-	

Time Nominated Person advised of equipment Isolation: \_\_\_\_\_  
 Following advice from the Remote Isolation Person that Isolation has been effected the Nominated Person must test, by secondary means, that the equipment is Isolated.

TEST:-	Time:-	Means:-
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The Nominated Person shall in form his team:-

The Scope of the Work as defined by the Work Permit.	The Plant and Equipment that must be Isolated.
The Location of Isolation Points.	The Means of Isolation.
That Full Current Isolation has been effected.	To Sign onto the Work Permit.
TEAM MEMBERS SIGN ON	TEAM MEMBERS SIGN OFF

Following “Sign On” the Nominated Person shall inform his team members that they may now consider the Equipment Isolated and safe to work on.

**FOLLOWING COMPLETION OF WORK AS DEFINED BY THE WORK PERMIT.**

- The Nominated Person shall:-
- Inspect/check the work site to ensure that the job is completed and that the team members have retreated to a safe area.
  - Inform the team members that the equipment is to be considered powered and no longer safe to work on.
  - Cause the team members to “Sign Off” the Work Permit.
  - Cause the isolation to be removed and the power restored, via communication to the Remote Isolation Person.

If the work is not completed the “Out of Service” Tag is to be applied at the Isolation Points

Was the task completed ?	Signature Nominated Person :-
Time power restored :-	Countersign Authorising Officer:-

The Nominated Person is required to collect the Work Permit, Remote Isolation Report, All Danger Tags used and give them to the Authorising Officer for review and storage.

**ATTACHMENT 2 Example of a Remote Isolation Report.**

<p><b><u>NAME OF MINE - REMOTE ISOLATION PROCEDURE.</u></b>  <b><u>REMOTE ISOLATION REPORT.</u></b></p>
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Permit Number:-	Location:-	Date:-	Shift:-
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**To be completed by the Remote Isolation Person.**

*Note:- Prior to commencement the Remote Isolation Person must have a copy of the Work Permit.*

NOMINATED PERSON NAME:-	
REMOTE ISOLATION PERSON NAME:-	
WORK SITE PHONE NUMBER:-	
REASON FOR ISOLATION:-	

TIME ISOLATION CARRIED OUT:-	
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SIGNATURE OF REMOTE ISOLATION PERSON:-	
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TIME ISOLATION REMOVED:-	
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*Note:- Isolation may only be removed after authority to do so has been given by the Nominated Person.*

JOB COMPLETED:-	YES	NO
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*Note:- If the job is not completed then an “Out of Service” Tag procedure must be applied.*

SIGNATURE OF REMOTE ISOLATION PERSON:-	
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*Note:- The Work Permit (copy), Remote Isolation Report, and Remote Isolation Danger Tag are to be fixed together and handed to the Nominated Person (who issued the original Work Permit) at the end of the job.*