

# AUDITS OF MINE SAFETY AND HEALTH USING QUALITY TECHNIQUES

**PRESENTER:**

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## **1. INTRODUCTION**

Questions may be asked why Inspectors of Mines are concentrating on auditing instead of inspecting? The answer is that the Inspectors are still inspecting but in an organised way. They are inquiring into the systems which make things happen at mines. These audits (organised inspections) are testing whether the systems are:

- in place
- suitable
- really working throughout the organisation from managers to supervisors and all the way to the operators and miners.

The ultimate purpose of an audit is to provide the organisation with factual information about the suitability and performance of its safety and health management systems so that improvements based on addressing the root causes of problems can be implemented. The mine can then use the audit report as the basis of a continuous improvement program.

The systems audits being carried out by the Inspectors:

- use quality management auditing principles
- identify areas of excellence
- identify non-conformances against company policies, systems, procedures or statutory requirements
- set up a framework for management to take early corrective action on non-conformances and further action to prevent a recurrence
- set up a system for the Inspectors to follow up to confirm the success or otherwise of the corrective action.

## 2. DEVELOPMENT

In 1989 "compliance" audits were started using a check list based on the legislation and regulations. This was the first step to organised inspections. Later that year "subject" audits were commenced as an organised approach to address particular problem areas eg cyanide, conveyors and explosives.

In 1992 the Mount Isa Inspectors were advocating that safety and health should be an integral part of management, from the first day of planning a mine right through to every aspect of its operations. They also advocated that safety and health should not be a "bolt on" item or an afterthought. They suggested that Inspectors focus on encouraging the development of safety and health systems as an integral part of a company's planning, design and operations. They developed a check list for an audit based on safety and health systems rather than compliance with legislation and regulations.

In 1993 two audits of safety and health systems were carried out at Mount Isa Mines. The results of these audits were reviewed by the Metalliferous and Coal Inspectors with the help of the National Safety Council of Australia, Queensland Division (NSCA). This review was influenced to a great extent by many coal mining companies and quarries becoming quality accredited under the Australian Quality Standard. It became obvious that the format of safety and health systems audit should be based on the principles of Australian Standard AS/NZS ISO 9001 Quality Systems. However, it is not intended that formal quality assurance accreditation will be a requirement for safety and health matters in the industry. An audit document based on the 20 elements of AS/NZS ISO 9001 was developed. The Inspectors agreed to carry out two audits at metalliferous mines and two audits at coal mines after further auditor training.

In 1994 Metalliferous, Coal and Explosives Inspectors attended Quality Assessor/Auditor training courses and gained skills in professional quality auditing. This training course was a quantum leap for the Inspectorate because it demonstrated how to undertake a systems audit which included a process for action planning to correct and improve.

Also in 1994 Metalliferous Inspectors carried out two audits based on quality principles at Mount Isa Mines (Ore Handling Section) and at Red Dome Gold Mine. Unfortunately, the tragic accident at Moura caused the Coal Inspectors to postpone the audits which were due to start the day after the accident.

In late 1994 a review of the first audits based on quality principles at Mount Isa Mines and Red Dome was carried out by the Metalliferous and Coal Inspectors and NSCA with help from an external quality management consultant. It was noted that the Construction Industry Development Agency (CIDA) and SafetyMAP (Victorian Occupational Health and Safety Authority) had developed systems based on the same principles. It was decided to:

- continue using quality management principles and improve the 1993 document
- encourage industry to develop safety and health management systems and self auditing as an integral part of their management systems and
- develop an information package for industry.

### **3. WHERE WE ARE NOW - SafeGuard**

**SafeGuard** has been developed to allow managers, supervisors and workers:

- to self-assess the safety and health management systems
- to use as a guide in setting up and improving safety and health management systems
- to encourage mines to carry out detailed self audits of their safety and health management systems using quality auditing principles.
- to encourage audit team members to gain training and understanding in formal quality auditing procedures.

**SafeGuard** is based on the 20 elements in AS/NZS ISO 9001 Quality Systems. The definition of "Product" in the Quality Systems Standard has been changed. For the safety and health system the "product" becomes the safe and healthy employee who is able to walk out of the mine gate at the end of each day in a healthy state, not adversely affected by the employment in both the short and long term. It also includes the maintenance of a safe and healthy work environment to minimise workers' exposure to hazards.

The 20 elements are below, however for further details refer to **SafeGuard**.

1. Management Responsibility
2. Safety and Health System
3. Duty of Care Review
4. Design and Planning
5. Document Control
6. Purchasing and Employment
7. Not applicable
8. Identification and Traceability
9. Work Method Control
10. Inspection, Monitoring and Testing
11. Inspection, Monitoring and Testing Equipment
12. Inspection Monitoring and Test Status
13. Reporting and Control
14. Corrective and Preventive Action
15. Handling, Storage, Transport and Accommodation
16. Safety and Health Records

17. Safety and Health Audits
18. Training
19. Not applicable
20. Statistical Techniques

The Metalliferous Inspectors of Mines have completed three systems audits during May and June using **SafeGuard** as a guide. These were carried out at Gunpowder Copper Mine, Mount Leyshon Gold Mine and QMag Magnesite Mine. Metalliferous Inspectors are planning further audits during 1995/96 in the Mount Isa, Charters Towers, Mareeba, Rockhampton and South East Queensland areas.

#### 4. TECHNIQUES AND METHODS

##### 4.1 Planning and Preparation

Effective planning and preparation is the key to a successful audit. Activities are as follows:

- Establish the audit team approximately six months ahead with the Lead Auditor to take overall responsibility. Discuss the process and objective with the mine
- Approximately two months before the audit establish a list of activities, an understanding of the systems and sub systems and their interactions. List and discuss with the mine the documents to borrow such as policy, safety management plan, systems and procedures. Discuss in general terms the interview program
- Approximately one month before the audit notify the mine in writing including:
  - scope and objective
  - auditors
  - proposed timetable with some flexibility
  - list of who should attend entry/exit meetings
  - facilities needed, eg office, guides
  - request a response to confirm details and the timetable

- Approximately 10 days prior to the audit obtain all the documents ready for auditors preparation
- One week prior to the audit, the audit team (usually three Inspectors)
  - reviews documents
  - develops a strategy to focus on critical systems
  - develops check lists (not tick sheets) using **SafeGuard** as a guide to assess compliance with:
    - company policy
    - company systems and procedures
    - recognised standards
    - good mining practice
    - legislation and regulations
  - prepares entry meeting presentation
- Familiarisation tour/induction.

#### **4.2 Entry Meeting**

The Lead Auditor gives a half hour presentation to a representative cross section of all management, supervisors and workers. The Lead Auditor explains:

- the scope and objectives
- the method of audit
- the corrective action process (see 4.6, 4.7 and 4.9)
- that it is a sampling exercise and therefore not all matters of excellence or non conformances will be identified.

### 4.3 Interviews and Observations (see appendix 1 for copy of audit timetable)

The audit assesses the level of compliance with or non conformance against:

- company policy
- company systems and procedures
- recognised standards
- good mining practice
- legislation and regulations

Interviews and observations of activities are conducted using check lists as a guide and looking for objective evidence as follows:

- Senior management to gain an overview of the organisation's policies, systems and procedures
- Technical staff and Supervisors to:
  - obtain more details of procedures
  - check effectiveness of systems and procedures
- Operating and maintenance workers to determine whether:
  - systems and procedures are being used
  - systems and procedures are effective ie how they are working in practice
  - improvements are needed
  - additional procedures are required

Determine if systems and procedures are working by

- asking people open ended questions using check lists as a guide
- studying documents and records and asking "show me" and not using hearsay
- observing activities

A record of interviews is kept on different coloured sheets for management, supervisors and workers. Individual sheets for each interview and each of the **SafeGuard** elements are used. Each sheet is filed by element number ie 1-20

As interviews progress a system is developed for listing the points to be followed up for verification in subsequent interviews

It must be emphasised that the audit is not a "nit picking" compliance exercise to find "one off" faults.

#### **4.4 Daily Auditor Meetings**

Daily half-hour meetings of auditors are held to:

- evaluate results
- list areas of excellence and shortcomings
- commence preparation of corrective action request forms (CARs)
- list items of a "do now" nature which cannot wait for the report eg immediate hazards
- prepare for next day's interviews.

#### **4.5 Daily Briefing to Management**

Daily quarter hour briefings to management are held to:

- advise of the day's results
- advise of "do now" items
- discuss matters requiring clarification

#### **4.6 Corrective Action Request (CAR) Forms**

These are the forms which set up the system for management to take corrective action on non-conformances and further action to improve management systems and procedures to prevent a recurrence. In other words, correcting the root cause of problems.

When all the audit interviews have been completed, the audit team prepares the CARs. These state concisely and briefly the nature of the non-conformance against a policy, system, procedure or regulation with one or more examples (see 4.9). See appendix II for copy of example CAR.

#### 4.7 Exit Meeting

A half-hour meeting is held with management to present and explain each CAR and request the manager to sign each as being understood.

There should be no surprises as the daily quarter-hour briefings should have already highlighted the non-conformances.

The CARs are left with the Manager after explaining the corrective action process. (see 4.9)

A half-hour meeting is then held with the same attendees as the entry meeting, ie a representative cross section of all management supervisors and workers. The Lead Auditor presents an overview of the results of the audit emphasising the areas of excellence as well as non-conformances. It is explained that a report will be written within two weeks. The report forms part of the Mine Record Book which must be readily accessible to all employees. The corrective action process is also explained.

#### 4.8 Audit Report

The audit report should be completed within two weeks of the exit meeting and contains:

- a summary
- scope and objectives
- methods used
- corrective action process
- audit findings by each **SafeGuard** element emphasising areas of excellence as well as deficiencies
- copies of CARs

#### 4.9 Corrective Action Process (see 4.6 and 4.7)

CARs are presented at the exit meeting. The original CARs are left with the Manager. The process for corrective action is as follows:

- Manager fills in details of corrective action to be taken with date of expected completion
- Manager fills in details of planned action to prevent a recurrence with date of expected completion (it is suggested that management, supervisors and workers are all involved in this corrective action process)



- Manager returns CARs to Lead Auditor within two weeks of receiving audit report
- Lead Auditor or his representative follows up by the completion date advised by the Manager
- if Lead Auditor finds action satisfactory, CAR is closed out
- if Lead Auditor finds action not satisfactory a new CAR will be raised and the process starts again.

The importance of following this quality auditing technique is that the corrective and preventive action is aimed at correcting root causes of the problems. See appendix III for copy of the audit flow chart.

The examples of non-conformances found during the audit sampling may only be an indication of a more widespread failure of the system or procedure.

## **5. RESULTS OF AUDITS CARRIED OUT**

Feedback has been positive from all employees at Mount Isa Mines, Red Dome Gold Mine, Gunpowder Copper, Mount Leyshon Gold Mine and Qmag. Inspectors have received full cooperation and willing participation from all people at these mines. Confirmation of the value and success of these audits will in time have to come from industry. The ultimate indicator of the success of audits will be improvements at mines of management systems which integrate safety and health. It should also be noted that all Inspectors who have carried out systems audits agree that they have been the best inspections ever carried out on the mines.

Audits on some mines have taken longer than expected because safety and health management systems and procedures were not well documented. Often the organisation had good management systems and work procedures but they were scattered around the mine and difficult to find or track down. In some cases they were not written or documented at all.

The number of CARs raised after each audit is not a reflection of the state of safety and health at the mine. At better performing operations where many systems and procedures were in place and generally working, a large number of CARs were raised and are considered as "fine tuning". At other operations where non-conformances were potentially more serious, CARs were raised to address the more basic systems. Once basic systems are in place future audits may identify CARs for "fine tuning".

Further inspections carried out at mines where audits have been completed are becoming much more productive and useful than in previous years. These inspections are able to be combined with audit follow-up. This is because Inspectors have a better knowledge of the mine and its management systems and are working together with the management, supervisors and workers towards the continuous improvement of the systems and procedures.

It has been found that the approximate proportions of time taken to carry out effective systems audits is:

- Planning and Preparation 30%
- Performance of audit 30%
- Report 10%
- Follow up and Close Out of the CARs 30%

## 6. GENERAL OBSERVATIONS

Audit results are a better measure of the state of safety and health at a mine. Audits measure the degree of success of management systems in controlling and eliminating safety and health problems and hazards as well as setting up a system for corrective and preventive action and continuous improvement.

Accident statistics (LTIFR etc) are a measure of failure and are not a true indication of the state of safety and health.

Inspections are only a "snap shot" of the current state of safety and health at a mine and do not give insights into the systems that make things happen at the mine.

## 7. WHERE TO NEXT?

The review of mine safety legislation will have an emphasis on duty of care obligations, safety and health management planning, monitoring and auditing. Therefore industry will be encouraged to further develop safety and health management systems.

**SafeGuard** is being distributed throughout the mining industry to encourage mines to:

- carry out self assessment of the performance of their safety and health management systems
- develop or improve safety and health management systems
- carry out internal self auditing of safety and health management systems using quality auditing techniques. These audits should be carried out by people trained in quality auditing principles.

Inspectors will continue to audit mines and quarries with the intention of demonstrating the benefits of integrating safety and health into the overall management system as well as the benefits of using quality management auditing techniques.

Audits carried out by Inspectors will eventually be more productive as mines introduce improved safety and health management systems and internal auditing. In the longer term Inspectors will not only conduct their own independent audits they will "audit" the audits undertaken by mines themselves and take an active role in promoting best practice throughout industry.

Inspectors look forward to working closely with all stakeholders ie industry groups, unions, individual mine managers, technical and supervisory staff, workers, educational institutions and OH&S specialists to help change the culture of safety and health in the mining industry.

The culture must change to the extent where eventually safety and health management is seen as integral to and just as important as financial, production, quality and marketing management.

<b>Appendix I</b>	-	<b>Mammoth Mine Audit Timetable</b>
<b>Appendix II</b>	-	<b>Example Corrective Action Request (CAR)</b>
<b>Appendix III</b>	-	<b>Audit Flow Chart</b>
<b>Appendix IV</b>	-	<b><i>SafeGuard</i> - Management and Auditing of Safety and Health Systems in the Queensland Mining and Quarrying Industries</b>



MAMMOTH MINE - AUDIT SCHEDULE

	Time	May	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Inspector Induction & Familiarisation	1000	Auditor	RS CS JM EA														
Entry Meeting	0900-1000	RS CS JM EA															
Resident Manager	1000-1400	RS CS JM EA															
Safety and Training Co-ord.	1400-1600	RS CS JM EA															
Chief Engineer	0800-1200	JM															
Mechanical Maint. Supervisor	1300-1600	JM															
Mechanical Tradesperson	0800-1600	JM															
Electrical Maint. Supervisor	0800-1200	JM															
Electrical Tradesperson	1300-1600	JM															
Manager Mining	0800-1200	RJ CS															
Mining Engineering & Surveyor	1300-1600	RS CS															
Underground Manager	0800-1100	RS CS															
Leach Metallurgist	1100-1200	RS CS															
Underground Supervisor	1300-1600	CS															
Development Miner	0800-1200	CS															
Slope Driller/Charger	1300-1600	CS															
Loader/Truck Operator	0800-1200	CS															
Services/Nipper	1300-1600	CS															
Geologis/Assistant	0800-1200	CS															
Manager Metallurgy	1300-1500	RS															
Plant Metallurgist	1500-1600	RS															
Shift Operator	0800-1200	RS															
Day Crew	1300-1600	RS															
Service Foreman	0800-1000	RS															
Service Crew	1000-1200	RS															
Readymix Foreman	1300-1400	RS															
Readymix Operator	1400-1600	RS															
Laboratory Assistant	0800-1000	RS															
Store/Supply Officer	0800-1000	JM															
Store Person	1000-1200	JM															
Town Manager	1300-1600	JM															
Caterers	0800-1000	JM															
Exit Meeting	1000-1100																

DEPARTMENT OF MINERALS & ENERGY  
INSPECTOR OF MINES  
SAFETY & HEALTH AUDIT

STATUTORY  
REQUIREMENT

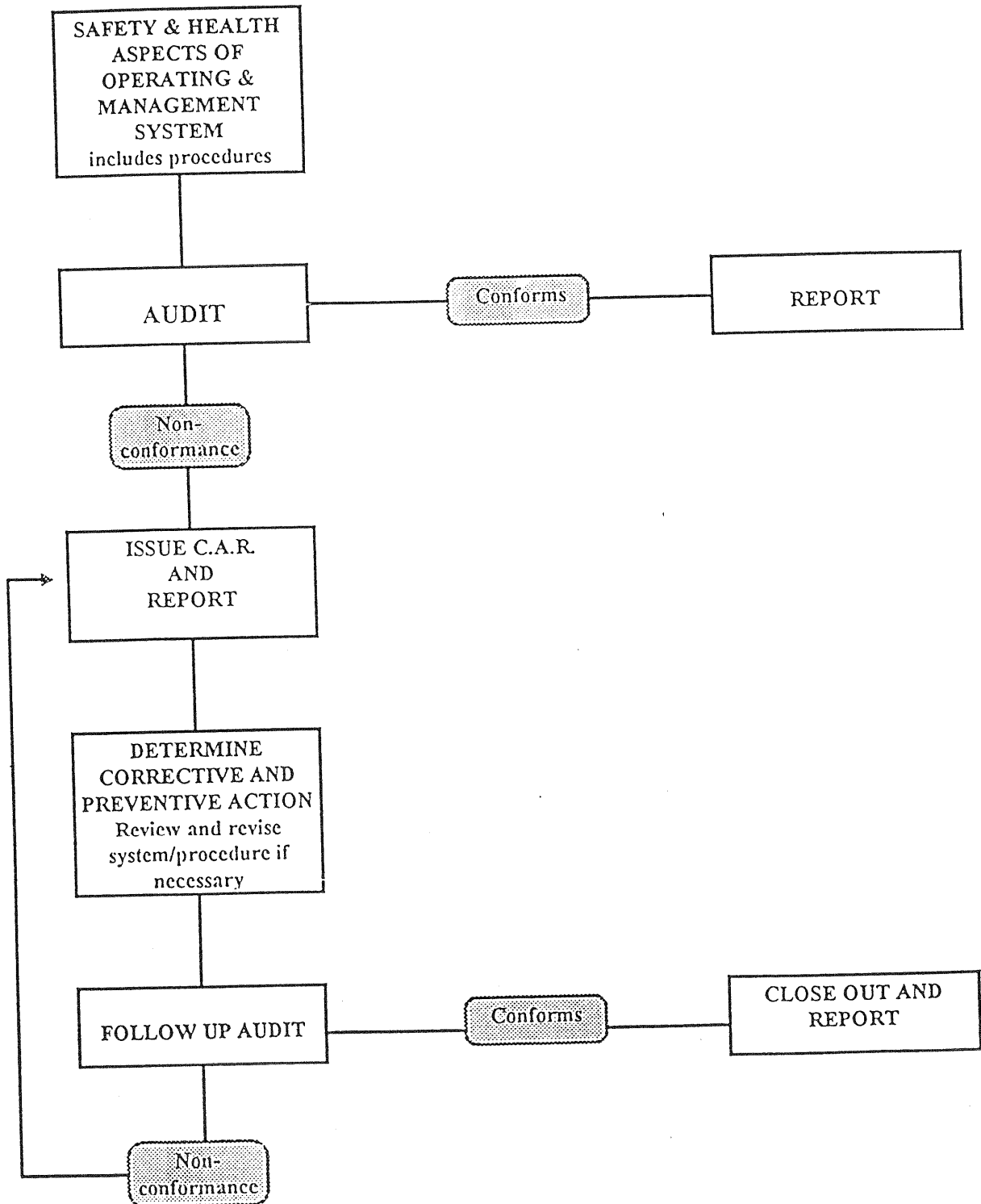
C.A.R. NO 1/94

DATE 01/02/94  
Audit No. 1

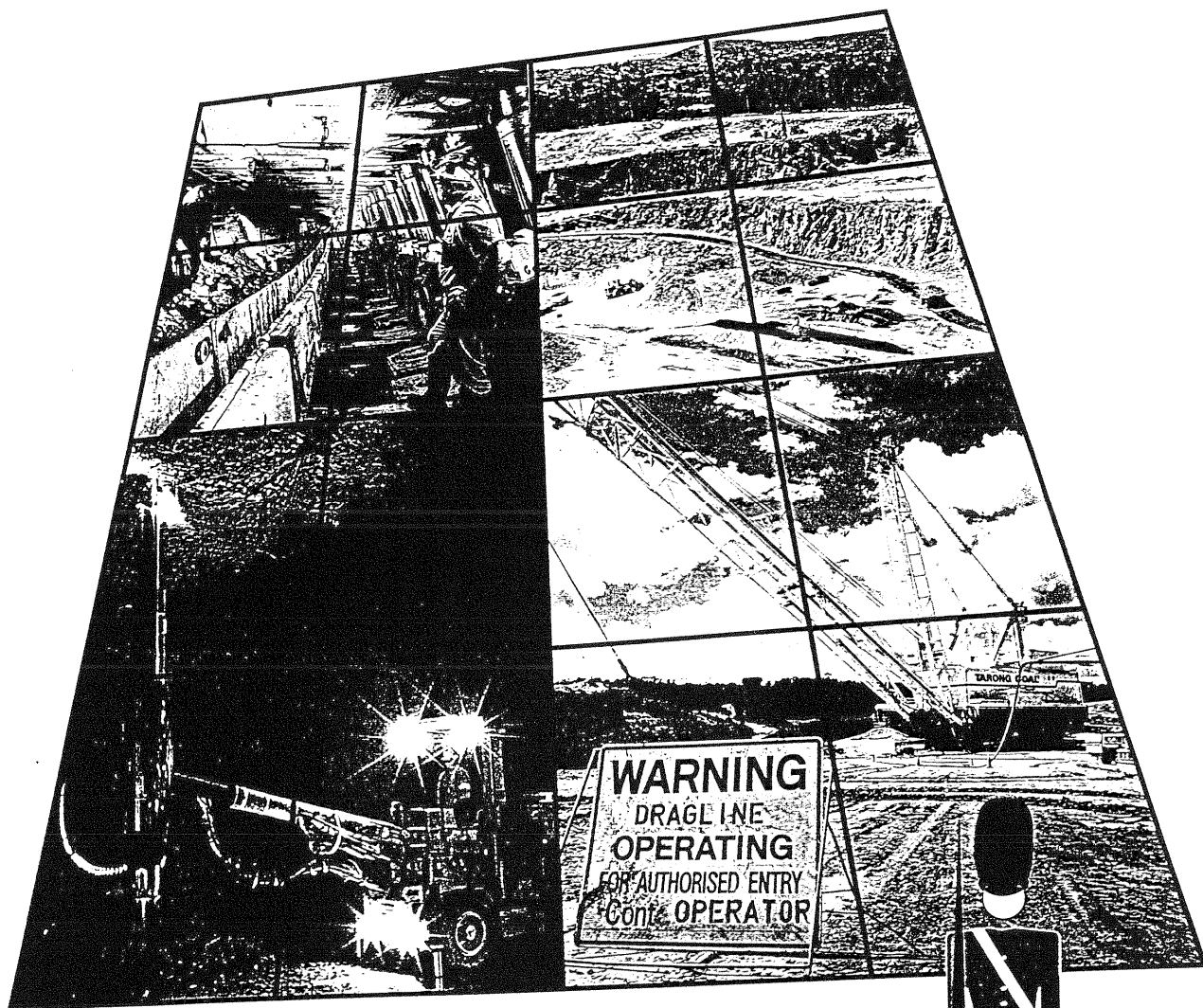
## CORRECTIVE ACTION REQUEST

COMPANY/DEPARTMENT AUDITED HI HOPE GOLD MINE		
BASIS OF AUDIT SAFETY & HEALTH SYSTEMS		
AUDITOR: A.N. INSPECTOR	COMPANY REPRESENTATIVE M. MANAGER	AUDIT ELEMENT 9.4
<p><b>NON-CONFORMANCE</b> Not all nip points on belt conveyors were guarded as required by Regulation 4.12 and company safety policy, eg: head drum on flask loading conveyor no. 1 shaft not guarded. Guard was found lying in access cross cut.</p> <p>SIGNED* <u><i>M. Manager</i></u>      SIGNED <u><i>A.N. Inspector</i></u> Appointed Manager      Auditor</p> <p>*Signature indicates understanding, not concurrence</p> <p style="text-align: right;">Stat Req. Major/Minor</p>		
<p><b>CORRECTIVE ACTION</b> The guard was replaced at time of audit. All other conveyors will be checked to see that guards are in place.</p> <p>DATE CORRECTIVE ACTION TO BE COMPLETED: 03/02/94</p> <p>SIGNED <u><i>M. Manager</i></u>      DATE: <u><i>03/02/94</i></u> Appointed Manager</p>		
<p><b>ACTION TAKEN TO PREVENT RECURRENCE</b> Some guards will be redesigned for easier replacement. A belt cleaning device has been repaired which should reduce carry over spillage and the need for the head drum guard to be removed frequently for clean up. A system of reporting conveyor problems is in place.</p> <p>DATE ACTION TO PREVENT RECURRENCE TO BE COMPLETED: 01/03/94</p> <p>SIGNED <u><i>M. Manager</i></u>      DATE: <u><i>14/02/94</i></u> Appointed Manager</p>		
<p><b>FOLLOW-UP AND CLOSE OUT</b></p> <p>PROPOSED FOLLOW-UP DATE: 15/03/94</p> <p><b>FOLLOW-UP DETAILS</b> Conveyors inspected and all guards found in place. Employees interviewed and found to be happy with improved removable guard design. Belt cleaning device has reduced carry over spillage.</p> <p>DATE C.A.R. CLOSED OUT      SIGNED <u><i>A.N. Inspector</i></u> 16/03/94      Auditor</p>		

# AUDITS - REVIEW AND CONTINUOUS IMPROVEMENT



QUEENSLAND  
DEPARTMENT OF  
MINERALS AND ENERGY



# *SafeGuard*

Management and Auditing of  
Safety and Health Systems  
in the Queensland Mining  
and Quarrying Industries



DEPARTMENT  
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