

---

**Annexure A: Questionnaire****SOUTH AFRICAN MINING INDUSTRY  
ACCIDENT PREVENTION QUESTIONNAIRE****Instructions**

*Please answer all the questions, as this will contribute to the validity and reliability of the research results*

*Researchers have found that the best results are obtained if you record the first answer that comes to mind as that reduces any ambiguity that may be read into the questions.*

*There are NO CORRECT ANSWERS to the questions in this questionnaire. The aim of the research is to establish the opinion of the members of the industry.*

*The content of questionnaires will be kept anonymous. Please do not write your name or any other form of identification anywhere on this questionnaire.*

*The questionnaire is divided into different sections as follows:*

- Section 1 - Deals with the opinion of the respondent regarding accident investigations.*
- Section 2 - Deals with the use of accident and accident investigation information*
- Section 3 - Deals with the experience and training of the respondent*

*The type of answer you are required to record is indicated in brackets after each question.*

*Please send the completed questionnaire to the following address:*

*The Deputy Director: Management Support & Internal Control  
Accident Investigation Research Project  
Department of Minerals and Energy  
Private Bag X 59  
Pretoria  
0001*

*Fax: 012 317 9152*

*e-mail: smimar@mepta.pwv.gov.za*

Section 1

The aim of this section is to establish which issues of importance should be established during accident investigations to reduce the occurrence of similar types of accidents. You should give your own opinion based on your experience with accident investigations. Remember there are NO CORRECT answers to these questions. Please only use the "No Opinion" options if you truly do not know what to answer.

1. 1. Proper accident investigations can reduce accidents.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 2. During accident investigations it is important to determine who was at fault.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 3. Establishing whether the physical conditions prevailing at the time of the accident, is an important feature of an accident investigation method.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 4. During accident investigations it is important to determine whether the procedure prescribed by the mine could have been the underlying cause of the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 5. During accident investigations it is important to determine whether the design of the equipment or the mine layout could have caused the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 6. During accident investigations it is important to determine whether inappropriate task directives could have been the underlying cause of the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 7. During accident investigations it is important to determine whether any person carried out an unsafe act that could have been the underlying cause of the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 8. Establishing whether a lack of correct training caused the accident is an important feature of an accident investigation method.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 9. During accident investigations it is important to determine what energy sources and/or hazardous materials were responsible for the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 10. During accident investigations it is important to determine whether the accident was caused by any part of the safety management system that failed.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 11. During accident investigations it is important to determine whether any human factor caused the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 12. During accident investigations it is important to determine whether any barriers failed that caused the accident.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 13. Establishing whether non-compliance with the maintenance programme of the mine caused the accident is an important feature of an accident investigation method.

(Indicate your opinion with an X)

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	No Opinion

1. 14. Rank in order of importance. During correct accident investigations, I am of the opinion that the issues that should be focused on, are:  
 (Rank from 1 = most important to 11 = least important)

- To determine **who was at fault**.....
- The **physical conditions** prevailing at the time of the accident.....
- The mine **procedures**.....
- The **design** of the equipment or the layout of the mine.....
- Compliance with the **maintenance programme** of the mine.....
- Incorrect **task directives**.....
- Incorrect **training**.....
- To determine the **energy sources** involved in the accident.....
- To determine what **systems failure** caused the accident.....
- To determine whether an **unsafe act** caused the accident.....
- To determine which **barriers failed**.....

1. 15. List any other issues of importance not mentioned in the above questions that you feel are important to establish during accident investigations in order to prevent similar accidents in the future.

---



---



---



---



---

## Section 2

The aim of this section is to determine how effective information regarding accident investigations can be utilised by production personnel to improve safety. Please only use the “No Opinion” options if you truly do not know what to answer.

2. 1. How often are you officially informed that a **fatal** accident occurred on the mine that you work on?

(Indicate your opinion with an X)

Always	Regularly	Sometimes	Seldom	Never	No Opinion

2. 2. How often are you officially informed that a **reportable** accident occurred on the mine that you work on?

(Indicate your opinion with an X)

Always	Regularly	Sometimes	Seldom	Never	No Opinion

2. 3. How often are you officially informed that a **lost time** accident occurred on the mine that you work on?

(Indicate your opinion with an X)

Always	Regularly	Sometimes	Seldom	Never	No Opinion

2. 4. How often are you officially informed about the outcome of **fatal accident investigations** held on the mine that you work on?

(Indicate your opinion with an X)

Always	Regularly	Sometimes	Seldom	Never	No Opinion

2. 5. How often are you officially informed about the outcome of **reportable accident investigations** held on the mine that you work on?

(Indicate your opinion with an X)

Always	Regularly	Sometimes	Seldom	Never	No Opinion

2. 6. How often are you officially informed about the outcome of **lost time accident investigations** held on the mine that you work on?

(Indicate your opinion with an X)

Always	Regularly	Sometimes	Seldom	Never	No Opinion

2. 7. How important is knowledge regarding **accidents** that occurred on your mine to you in your normal daily task?

(Indicate your opinion with an X)

Extremely Important	Very Important	Important	Seldom Important	Not Important	No Opinion

2. 8. How important is knowledge about **accident investigation results** that occurred on your mine to you in your normal daily task?  
 (Indicate your opinion with an X)

Extremely Important	Very Important	Important	Seldom Important	Not Important	No Opinion

2. 9. How important is knowledge about **accidents** that occurred on your mine to you in order to prevent accidents in your section?  
 (Indicate your opinion with an X)

Extremely Important	Very Important	Important	Seldom Important	Not Important	No Opinion

2. 10. How important is knowledge regarding **accident investigation results** that occurred on your mine to you in order to prevent accidents in your section?  
 (Indicate your opinion with an X)

Extremely Important	Very Important	Important	Seldom Important	Not Important	No Opinion

2. 11. List any other important issues you feel will improve the effective use of information resulting from accident investigations in order to improve safety.

---



---



---



---



---

Section 3

This section should reflect your total experience and training in the mining industry.

3. 1. I am **currently** employed as a (*indicate with a X*)

Section/Underground Manager.....	<input type="checkbox"/>
Inspector of Mines.....	<input type="checkbox"/>
Mine Overseer.....	<input type="checkbox"/>
Shift Boss.....	<input type="checkbox"/>
Miner/Mineworker.....	<input type="checkbox"/>
Other ( <i>Please specify type</i> ).....	<input type="checkbox"/>

3. 2. I have the following **total** experience in the mining industry  
(*Number of full years in each sector*)

Gold Mines.....	<input type="checkbox"/>
Platinum Mines.....	<input type="checkbox"/>
Coal Mines.....	<input type="checkbox"/>
Other Mines ( <i>Please specify type</i> ).....	<input type="checkbox"/>

3. 3. I have the following **mining related** qualifications (*indicate with a X*)

3-Year Diploma Metalliferous Mines.....	<input type="checkbox"/>
4-Year Diploma Metalliferous Mines.....	<input type="checkbox"/>
3-Year Diploma Coal Mines.....	<input type="checkbox"/>
4-Year Diploma Coal Mines.....	<input type="checkbox"/>
South African Mining Degree.....	<input type="checkbox"/>
Other Mining Degree.....	<input type="checkbox"/>
Mine Overseer Certificate of Competency.....	<input type="checkbox"/>
Mine Managers Certificate of Competency.....	<input type="checkbox"/>
None.....	<input type="checkbox"/>
Other ( <i>Please specify type</i> ).....	<input type="checkbox"/>

3. 4. I have personally been involved in the following number of accident investigations done by the **Mine’s Safety Department** over the last 12 months.(*number*)

3. 5. I have personally been involved in the following number of accident investigations done by the **Inspector of Mines** over the last 12 months.(*number*)

3. 6. I have personally been involved in the following number of accident investigations done by my **Direct Supervisor** over the last 12 months.(number)

3. 7. I have **personally** carried out the following number of accident investigations over the last 12 months.(number)

*Thank you for taking the time to complete this questionnaire. It is only with efforts like this that we can make our mining industry a safer place.*



Annexure B

for

DBA

## Annexure B: Covering letter for questionnaires

MD460

Republiek  
van  
Suid AfrikaRepubliek  
of  
South Africa
 DEPARTEMENT MINERALE EN ENERGIE  
 DEPARTMENT OF MINERALS AND ENERGY  
 DEPARTEMENTE YA TSA DIMINERALI LE ENEJI  
 IDIPHATIMENTI YESAMINERALI NEZE-ENEJI  
 PRIVAATSAK X 59  
 PRIVATE BAG X 59  
 PRETORIA  
 0001

 Mr. «Initial» «Name»  
 «Address1»  
 «Address2»  
 «Address3»  
 «Code»

 ☎  
 Navrae  
 Enquiries

317-9000

Faks . Fax

320-0357

C. Marx

 Uitbreiding  
 Extention

152

 Datum  
 Date

2 August, 2003

**ACCIDENT PREVENTION RESEARCH PROJECT : SOUTH AFRICAN  
 MINING INDUSTRY**

The Department Minerals and Energy is embarking on a process of developing a better accident investigation system for the industry.

You have been randomly selected to participate in the research project that aims to establish the most important issues in accident investigations. The attached questionnaire should not take you longer than 15 min. to complete.

Individual information contained in the questionnaire will be treated in the strictest of confidence. To ensure that all scientific research principals are being adhered to, please do not record your name or any other form of identification anywhere on the questionnaire.

In order to ensure the validity and reliability of the research results it is important that you return the questionnaire to the above address immediately after completion.

PLEASE DO NOT IGNORE THIS QUESTIONNAIRE AS YOUR OWN SAFETY MAY ONE DAY DEPEND ON THE OUTCOME OF THIS RESEARCH.

It is important to answer all the questions. Researchers have found that the best results are obtained if you record the first answer that comes to your mind as that reduces any ambiguity that may be read into the questions.

REMEMBER there are no right or wrong answers, the truth is that your opinion is important as you represent in your own way your colleges and the rest of the mining industry's views on accident investigations.

Your co-operation is highly appreciated and therefor it has been decided to inform you of the outcome of this research personally, once all the data has been analysed and interpreted

Yours faithfully

Chief Inspector of Mines  
 Department Minerals and Energy

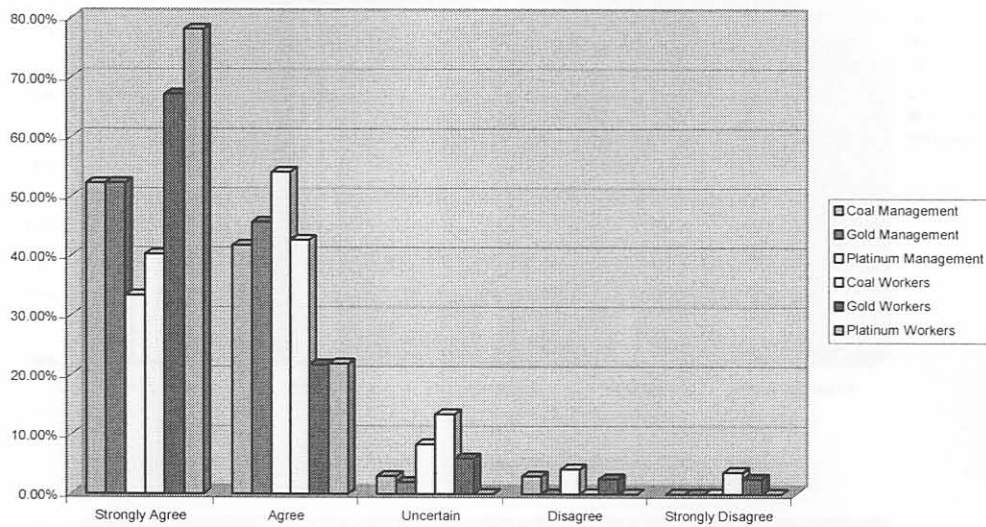
Graduate School of Management  
 University of Pretoria

Annexure C: Graphs for questions 1.3 – 1.13

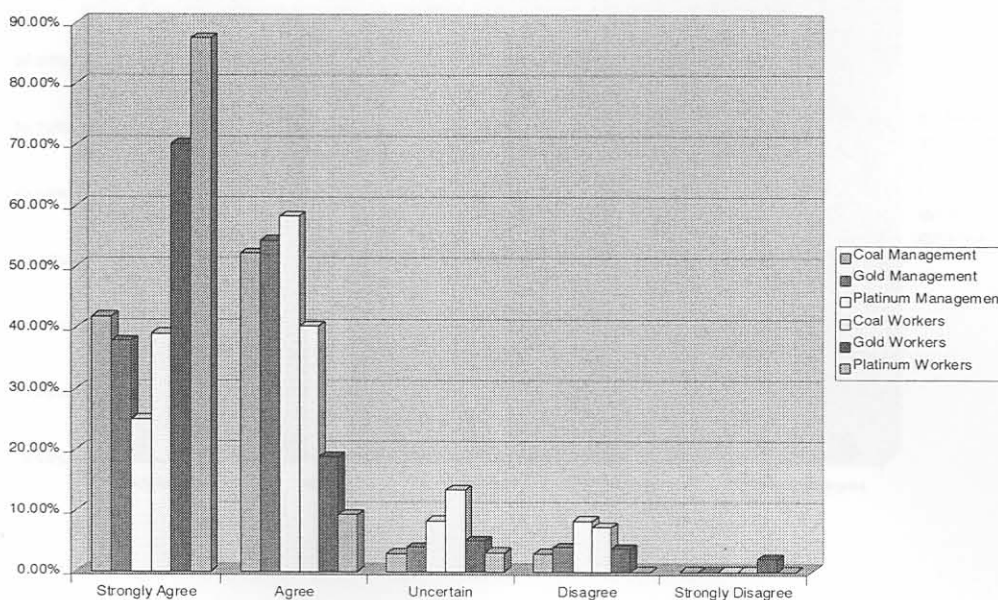
GRAPHICAL RESPONSES TO QUESTIONS 1.3 TO 1.13

The following graphs represent the responses obtained for Questions 1.3 to 1.13. These questions aimed to establish whether the identified fundamental contributing factors should be included in accident investigations.

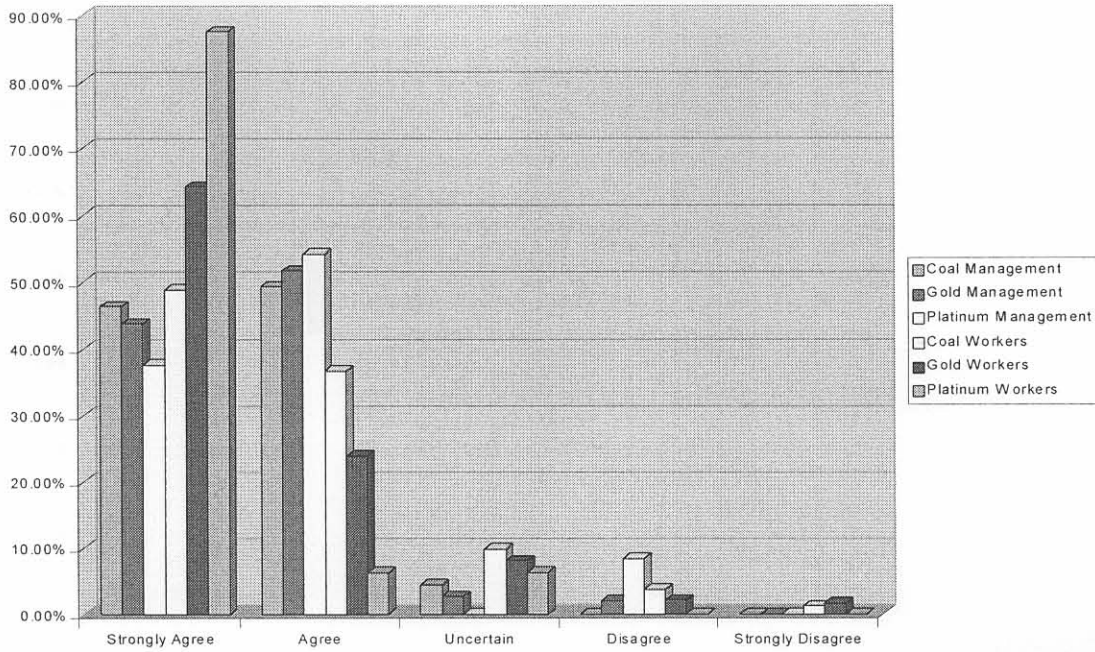
Question 1.3



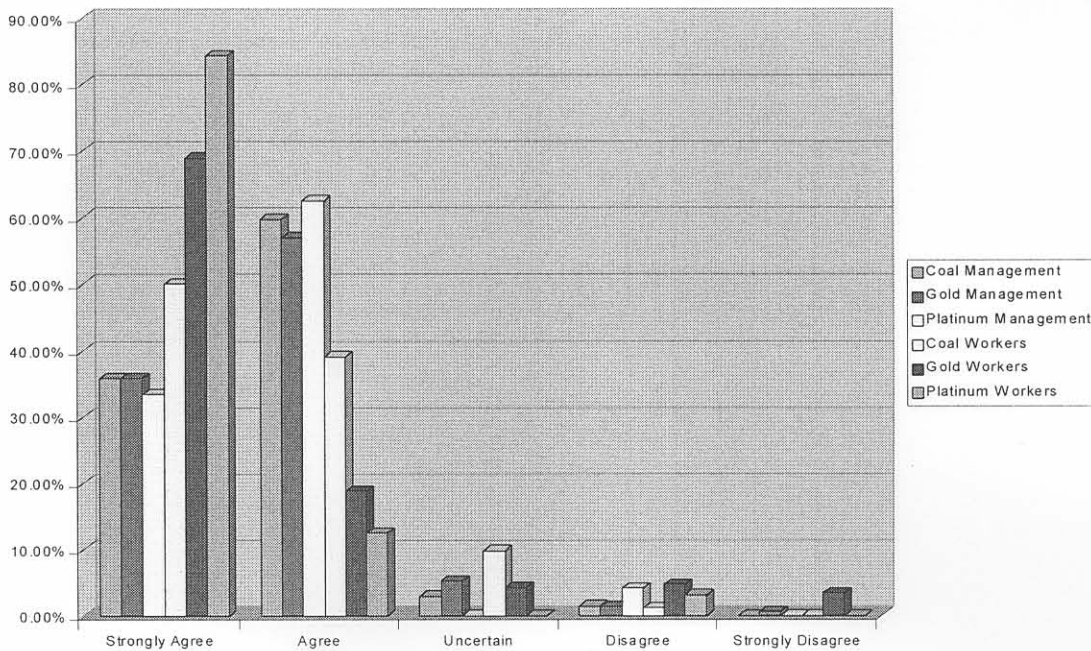
Question 1.4



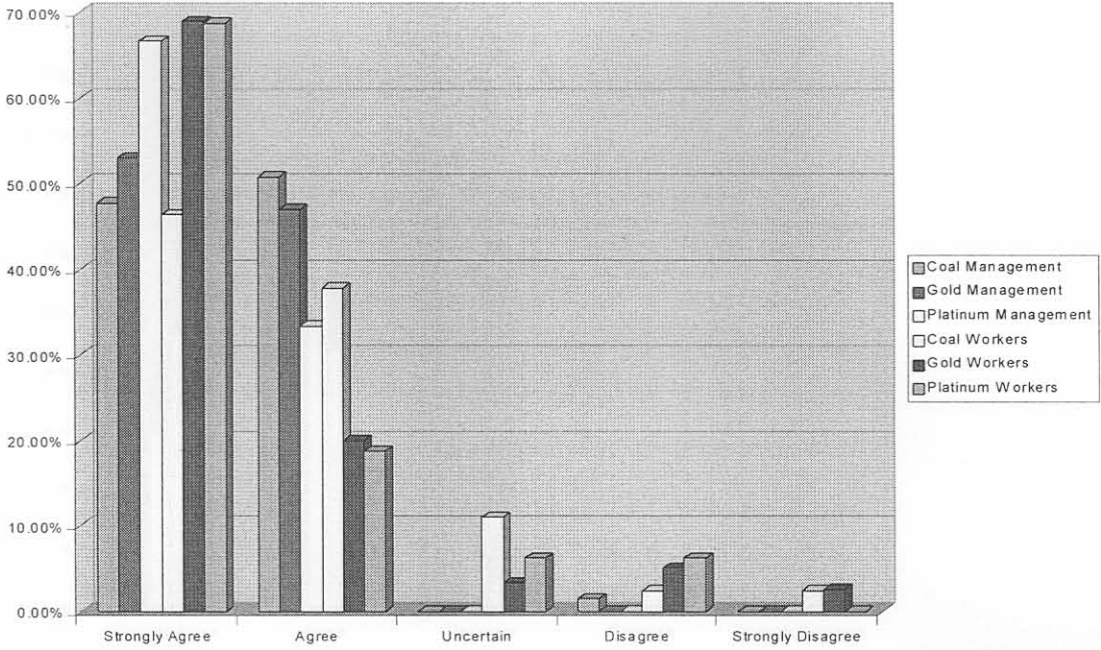
Question 1.5



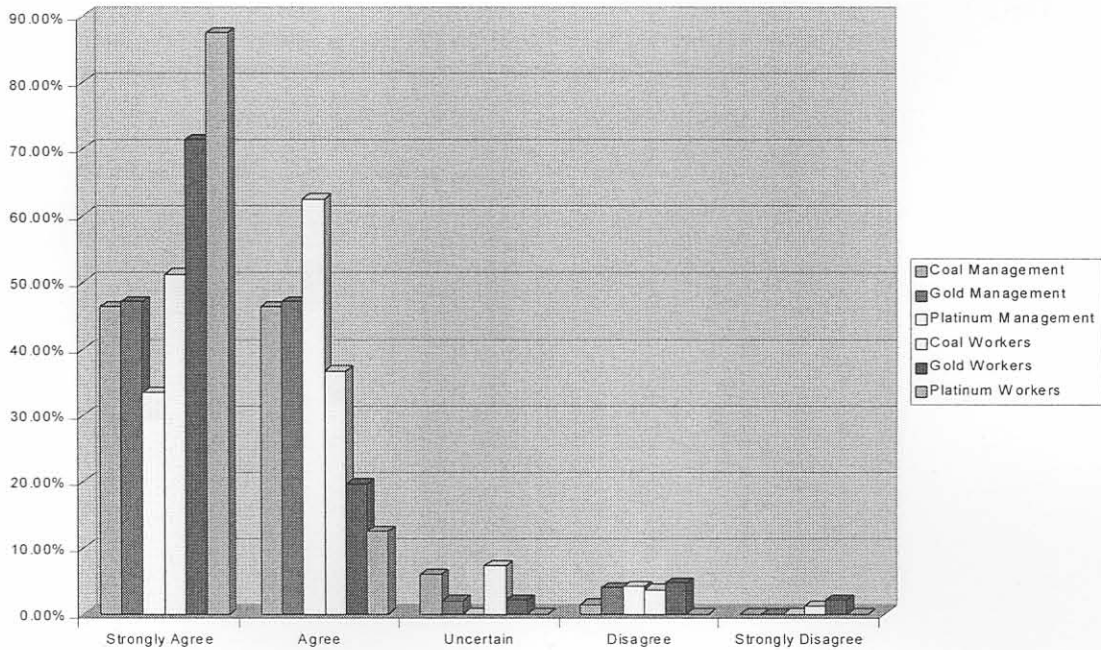
Question 1.6



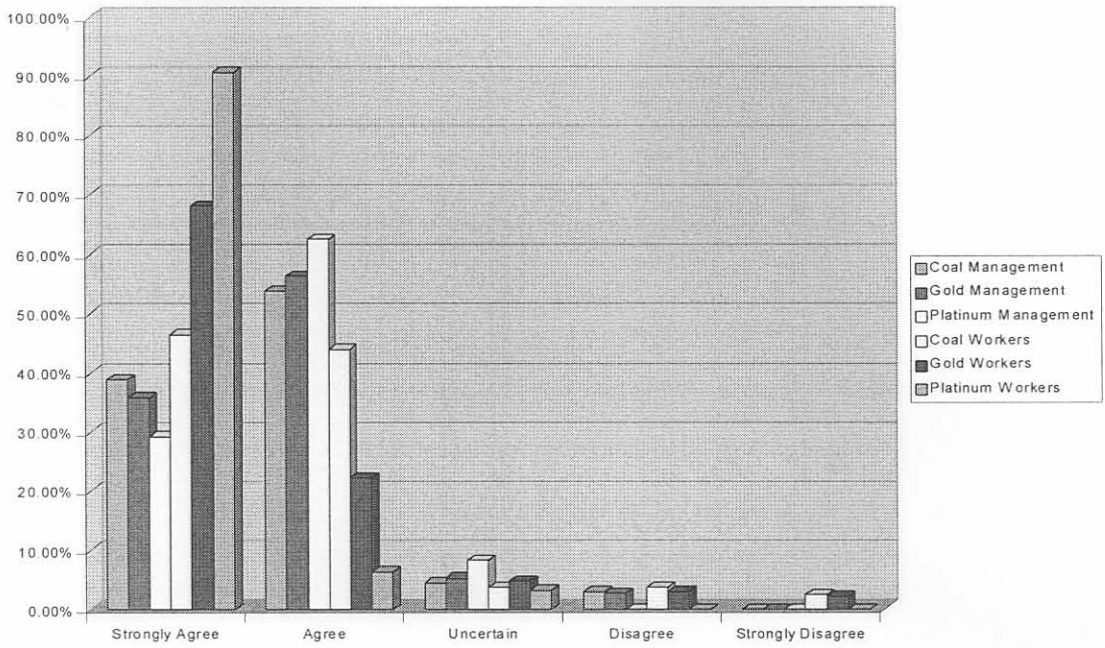
Question 1.7



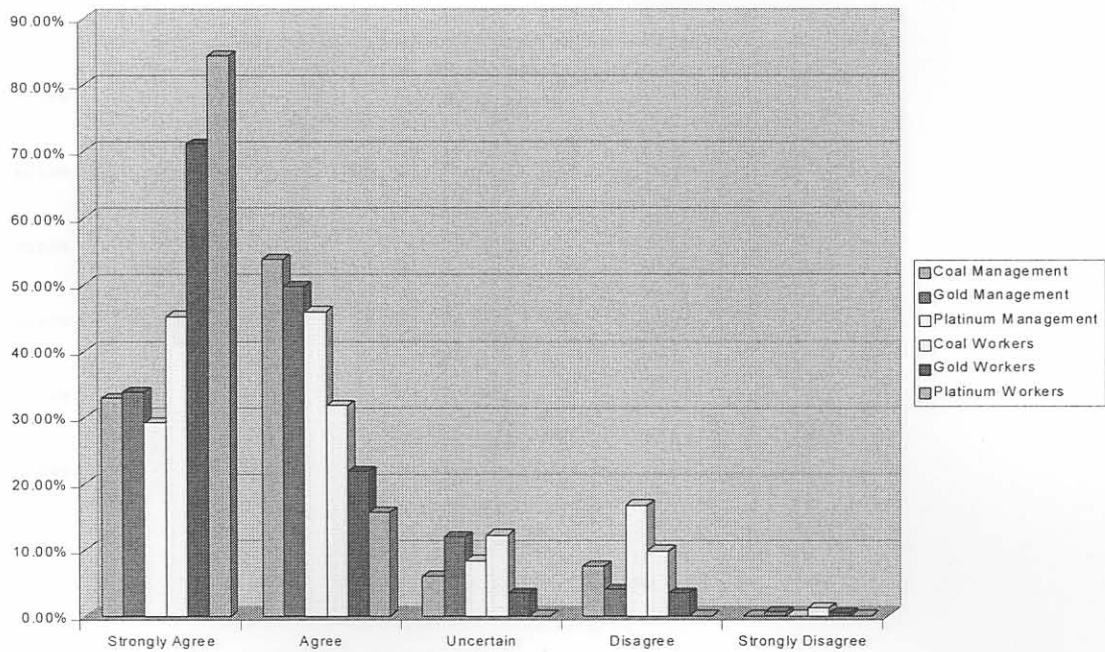
Question 1.8



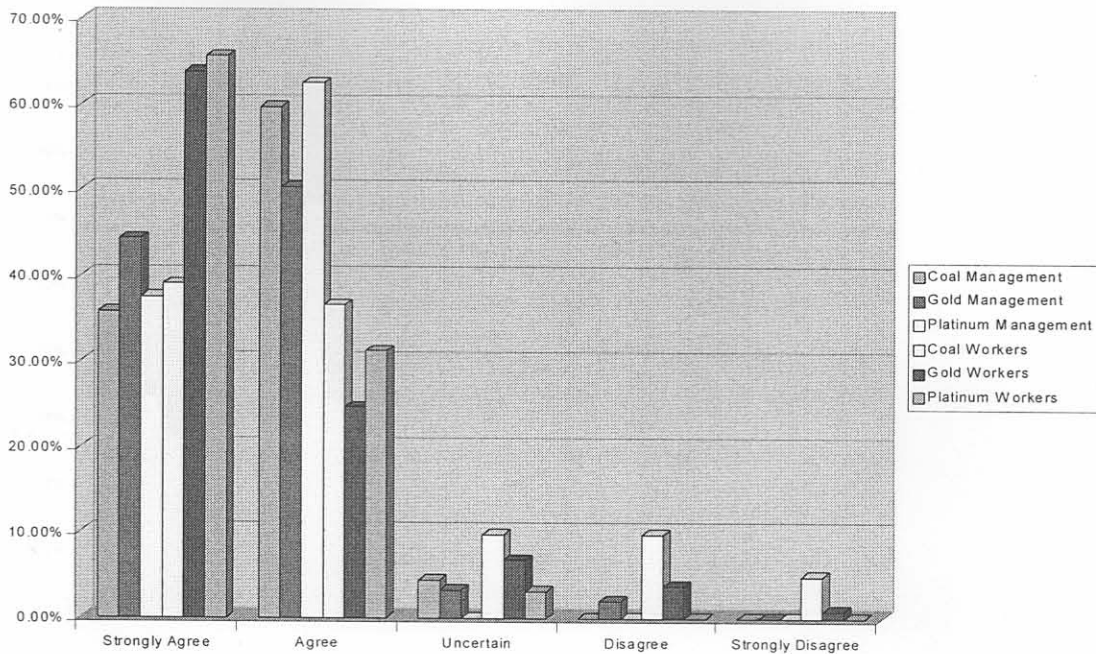
Question 1.9



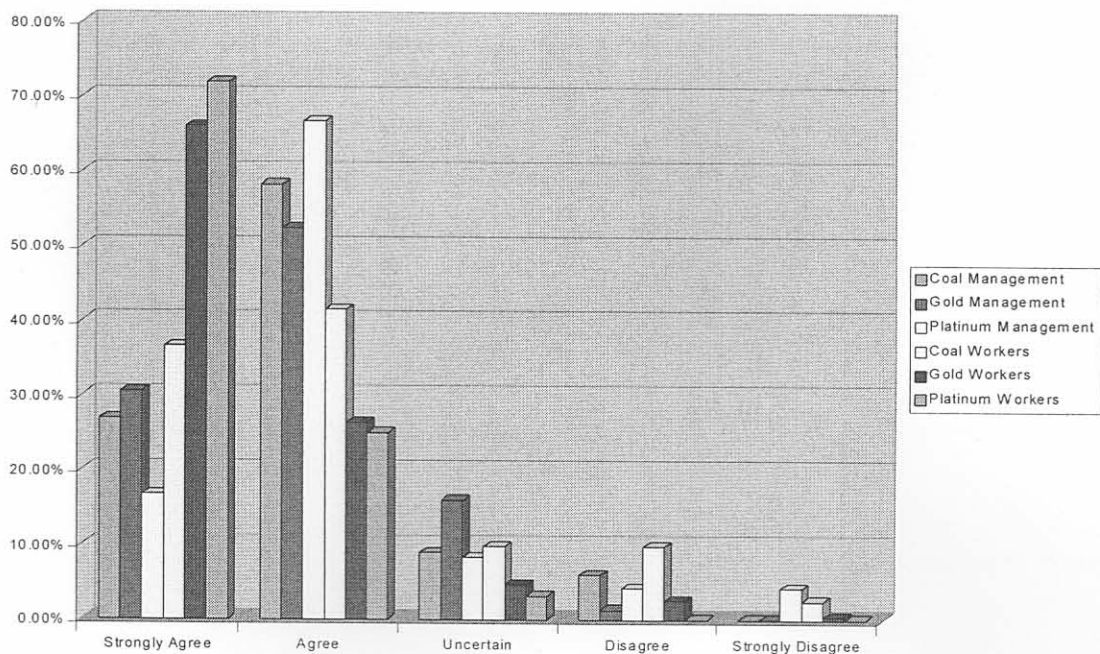
Question 1.10



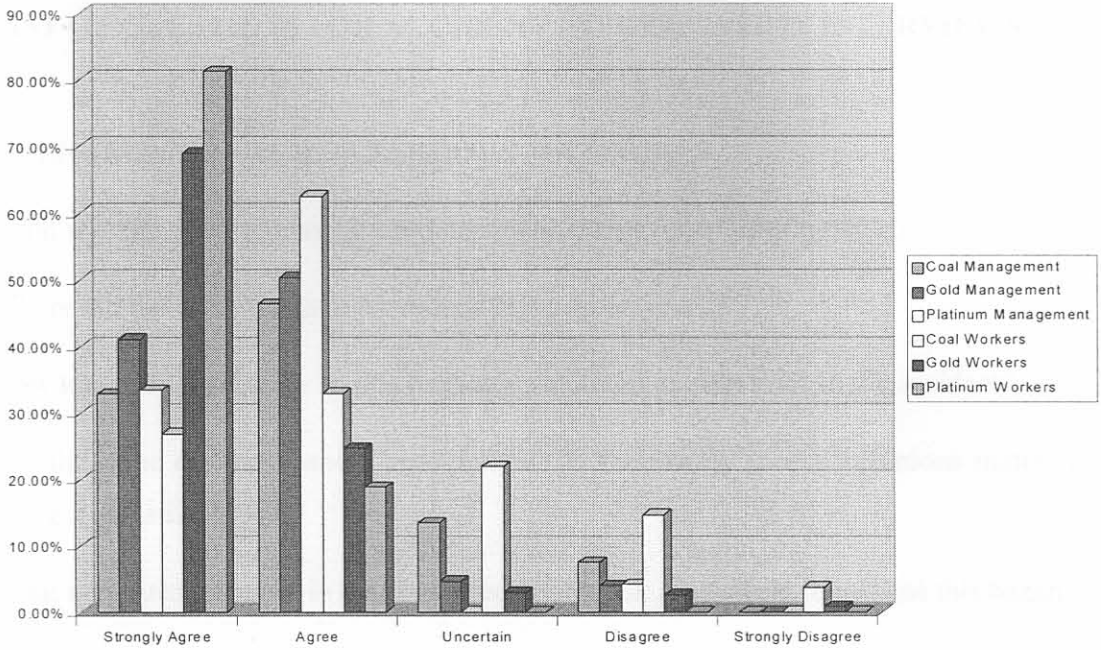
Question 1.11



Question 1.12



Question 1.13



**Annexure D: Questions for Interviews****LIST OF QUESTIONS FOR ACCIDENT INVESTIGATION INTERVIEWS****1. ENERGY SOURCE/HAZARDOUS MATERIALS**

What was the energy source/hazardous material that contributed to the accident?

Where did the energy source/hazardous material originate?

How long was the energy source/hazardous material present prior to the accident?

Did the mine risk assessment process identify the energy source/hazardous material as being a hazard?

What measures were put in place as a result of a risk assessment to address this hazard?

What resulted in the measures to be ineffective?

What is the potential exposure of the workforce to the energy source/hazardous material?

Could the energy source/hazardous material be eliminated, controlled at source or the effect minimised?

**2. SAFETY MANAGEMENT SYSTEM**

Does the mine have an adequate safety management system in place?

Does the safety management system procedure form an integral part of the daily management at all levels?

Which section/sections of the safety management system failed that resulted in the accident to occur?

Was the section of the Safety management system that failed identified during the mine risk assessment process?



What measures were put in place as a result of the risk assessment to address this hazard?

What contributed to the measures to be ineffective?

### **3. TRAINING**

Are all the persons associated with the accident correctly trained to do their individual jobs?

Does the training material utilised during training include sections on safety and health issues relevant to the specific task?

Where does training take place - on the job or in a training centre?

Is the equipment on which training took place the same that featured in the accident?

When last was the training material updated to include input from risk assessments done on the mine?

What was the lack in training that contributed to the accident? (i.e. HIRA)

### **4. DESIGN**

Was the equipment/section of the mine that was involved in the accident designed according to acceptable design parameters?

Was there any interaction between two pieces of equipment/different mining areas that contributed to the original design to be less effective?

Does the mine have an effective system in place to identify when deviations from the design parameters occur?

What was the identified latent design defect that contributed to the accident?

Was the latent design defect that contributed to the accident identified during the mine risk assessment process?

*Annexure D*

*for*

*DBA*

---

What measures were put in place as a result of the risk assessment to address this hazard?

What contributed to the measures to be ineffective?

## **5. MAINTENANCE**

Does the mine have an appropriate maintenance programme on the equipment involved in the accident and/or do they have a system in place to ensure the system designs are maintained correctly?

Were the maintenance/systems design maintenance programme followed?

What part of the maintenance/systems design maintenance programme was not followed that contributed to the accident?

Was a potential failure in the maintenance/systems design maintenance programme identified during the mine risk assessment process?

What measures were put in place as a result of the risk assessment to address this hazard?

What contributed to the measures to be ineffective?

## **6. PROCEDURES**

Does the mine have an appropriate procedure for the tasks that were carried out during the accident? (Permit to work etc.)

Does the procedure make provision for the specific circumstances prevailing during the time of the accident?

Was the procedure based on the outcomes of risk assessments done on the mine?

When was last update made to the procedure(s)?

Was the procedure properly communicated to the appropriate personnel?

*Annexure D**for**DBA*

---

What part of the procedure was lacking that contributed to the accident to happen?

## **7. TASK DIRECTIVES**

Does the mine have pre-use inspection checklists for all the appropriate equipment associated with the accident?

Was the checklists developed and periodically updated as a result of risk assessments done on the mine?

Which task directive was not followed that contributed to the accident?

## **8. CONDITIONS**

Is there a statutory Code of Practice requirement that caters for the conditions pertaining at the time of the accident? (I.e. Support COP)

Does the mine have standards or codes of practice defining the minimum standard for physical conditions pertaining to the accident?

Do the physical conditions conform to the standards or codes of practice defining the minimum standard?

What dangerous condition existed that contributed to the accident?

## **9. ACTS**

Did any supervisor perform any unsafe act that contributed to the accident?

Did any worker perform any unsafe act that contributed to the accident?

Which unsafe act/s contributed to the accident?

## **10. BARRIERS**

Were any physical barriers supposed to be in place to prevent contact with the energy source?

Were any time barriers supposed to be in place to prevent contact with the energy source?

Which barriers were ineffective that contributed to the accident?

**11. THE ACCIDENT**

Can the accident be re-constructed safely to confirm the evidence accumulated?

Do you need to secure any physical evidence for further testing and evaluation?

Do you need to secure any documentation for further analysis and scrutiny?



## Annexure E: Publications

### PUBLICATIONS RESULTING FROM RESEARCH

The following is a list of the articles and papers that resulted from this research:

1. A practical guide on risk assessment in the South African mining industry (1996) *SIMRAC research publication*.
2. Aide-Memoire for the compilation of Regulation in the Department of Minerals and Energy (1997) *Industry wide publication*
3. Taking the risk out of Africa (1998) *Paper presented at International conference, Sandton, South Africa*.
4. Drafting Mine Health and Safety Act subordinate legislation : A Tripartite Approach (1999) *Paper presented at Minesafe International Conference, Sun City, South Africa*.
5. An Introduction to Safety Management for Engineers, Technologists and Scientists (2000) *Chapter in textbook*.
6. Developing a Decriminalised Accident Investigation Methodology (2000) *Paper presented at Minesafe International Conference, Perth, Western Australia*.
7. The South African experience in Mine Safety (2001) *Journal of Mines, Metals and Fuels, India*.
8. Effective Workplace Risk Assessments: A Saving Grace or a Fallacy (2001) *De Beers Diamonds, Annual Safety Conference, Hunters Rest South Africa*
9. Risk for sale (2001) *Safety Management, magazine article*
10. Risk Assessment And Incident Investigation In Context (2002) *World Coal, magazine article*.
11. Effective Risk Management: The mystery exposed : A workplace risk assessment approach (2002) *Paper presented at NOSCON International Conference, Sun City, South Africa*.
12. Accident investigation and Risk Assessment : The Links (2002) *Paper presented at the CLP Guohua Power International Risk Management Seminar, Beijing, China*.

*Annexure E*

*for*

*DBA*

---

13. Effective Worker Representative Involvement In Coal Mining (2002) *Paper presented at the China International Conference on Coal Processing, Utilization and Environmental Protection, Beijing China.*
14. Reducing Blasting accidents by reducing the risks (2002) *Paper presented at Marcus Evans International seminar, Sandton, South Africa.*

