

Safety in Mines Research Advisory Committee

Project Summary : OTH 303

Project Title:	Investigation into drawpoints, tips, orepasses and chutes 120p, 3 Appendices 155p.		
Author(s):	T R Stacey and A H Swart	Agency:	Steffen, Robertson and Kirsten
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Summary

This project's objective was to provide a knowledge base regarding safety issues associated with ore handling in the other mining sector. The methodology involved a review of literature on the safety problems associated with drawpoints, tips, orepasses and chutes, study of reportable accidents and visits to mines to acquire a range of information concerning the types of ore handling arrangements and mine personnel's perceptions of the hazards.

There is very little literature dealing with drawpoints, tips and chutes although there is a satisfactory amount relating to orepasses. The information in the literature on the latter relates mainly to design aspects and the identification of problem areas, in particular hang-ups, blockages, collapses, scaling, wear and run-aways.

Records of reportable accidents as maintained on SAMRASS (South African Mines Reportable Accidents Statistics System) revealed that, over a seven and a half year period from January 1988 to June 1995, 651 reportable accidents took place at the locations of drawpoints, tips, orepasses and chutes. Some 53 of these accidents resulted in fatalities. It was decided to include accidents on platinum mines since these mines have ore handling systems of similar natures to mines extracting commodities in the other mining sector. However, in performing the analysis, accidents were excluded if it was considered that they could not be attributed to the location. A total of 48 accidents were relevant to drawpoints, 288 to tips including both centre gully and shaft tips, 143 to orepasses including boxholes and 50 to chutes.

Fall of ground and falling material or rolling rock are types of accident frequently experienced at all of the location types, with slipping and falling being substantial for tips and orepasses, and vehicle accidents and scraper winches being sizeable categories for tips. The major causes of accidents identified in SAMRASS are inadequate examination, inspection or test and failure to comply with standards or instructions, with lack of caution or alertness being of subsidiary importance. However, the underlying reasons for non-compliance, which is identified as the key issue for improving safety, cannot be obtained from the available data. It is interpreted that the prevalence of these causes is indicative of limitations in the effectiveness of training.

Eleven mines, being a representative cross section of the other mining sector, were visited to obtain information on the type of ore and waste handled, the mining method and ore and waste handling arrangements used, the orebody geometry and perceptions of the safety problems experienced and the accident types actually experienced in each environment. Eight of the 11 mines were trackless operations and 10 of the 11 could be considered to be massive orebody operations.

The major problems associated with operation of the various elements of the rock handling system were identified as blockages and hang-ups, especially in orepasses, as is also indicated in the literature review. These problems are normally cleared either by pinch bar, impact breaker or blasting. However, none of the reportable accidents recorded on SAMRASS could be directly related to these problems.

Based on the information obtained, the importance of several areas of latent failure were considered encompassing environmental issues, design, procedures, worker involvement in procedures, induction and training, attitudes towards procedures and safety and the relationship between procedures and accidents. While environmental issues were not considered to be significant contributors to safety problems, significant deficiencies were identified in the other areas. The issues were

of the rock handling system. These were system design, procedures, training and management.

Adoption of a more robust design process is proposed incorporating formal internal and external reviews at various stages of the design process. Establishment of a detailed functional specification, covering issues such as the characteristics of the material to be handled and the planned operating and maintenance methods, in advance of the design work itself is also identified as an important element of the design process.

On the issue of procedures, the research has shown that existing procedures on mines tend not to be logically prepared and appear to be reactive. In addition, it was identified that there was only limited worker involvement in preparation of procedures. A proactive basis for preparation of procedures in a standard logical format with emphasis on visual format and minimizing the written content is recommended.

Under the heading of training, most of the training provided was identified to be on-the-job training, with general induction and refresher induction training also being given. In certain cases, training was provided in specific job functions. This approach is subject to problems as it has no defined syllabus, assumes that supervisors and colleagues are well trained and capable of passing on the required knowledge, relies on the willingness of colleagues to pass on knowledge to new workers and does not provide feedback on training effectiveness. A need for more formal training is therefore identified, encompassing hazard recognition, understanding of procedures and understanding of why compliance with procedures is necessary. The effectiveness of training should also be monitored to ensure that the trainees have acquired the necessary information and understanding.

Under the heading of management, while a strong and genuine commitment to safety from management was observed in spirit, it was identified that this was not carried through into operational practice. For example, it was identified that a relatively low status tended to be assigned to safety departments, there was a lack of processes for maintaining and reviewing procedures and procedures tended to be disregarded by management. Establishment of safety as a high profile corporate portfolio, with management setting an example by complying absolutely with procedures, is considered to be a route to improvement.

It is concluded from the nature of the needs identified that generalized research is not warranted, with specific research into the development of improved approaches to training being the preferred approach.

Conclusions

- X The major types of accident associated with the rock handling system are fall of ground, rolling rock and material and slipping and falling.
- X The major causes of accidents are failure to comply with standards or instructions and lack of caution or alertness.
- X The main issues leading to accidents in the drawpoints, tips, orepasses and chutes environment are design, procedures, training and management.
- X It is recommended that the most critical area for change is in the content and approach to training of mineworkers