MINING INDUSTRY
OCCUPATIONAL
SAFETY & HEALTH

MINERALS COUNCIL
SOUTH AFRICA

MOSH TRAFFIC MANAGEMENT LEADING PRACTICE FOR SURFACE OPERATIONS

DRDGOLD – Far West Gold Recoveries

HOW TO CONDUCT TRAFFIC FLOW AND RISK ANALYSIS

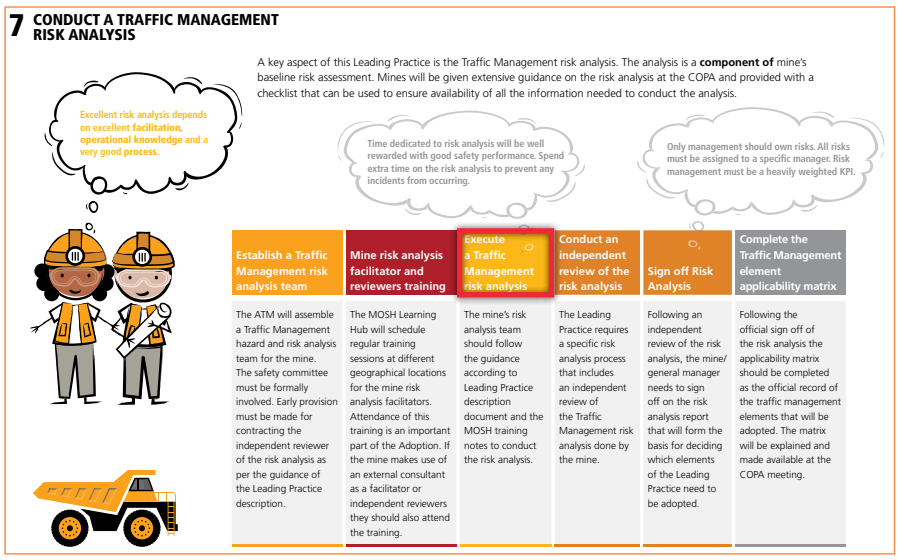
"The notion that a specific unwanted event has not occurred in any number of years of operation does not justify ignoring a hazard or unwanted event."

INTRODUCTION

Traffic management has been identified as one of several factors that, if dealt with appropriately, could improve the safety performance of open cast/pit operations significantly. The **MOSH Traffic Management Leading Practice for Surface Operations** has been developed to deal exclusively with the safe movement of people and vehicles. A key aspect of the leading practice is the **Traffic Flow and Risk Analysis.**

The guidelines of conducting a traffic flow and risk analysis are listed as step 7 in the MOSH traffic management leading practice adoption guide. Although it is key in the achievement of lowering traffic incidents, it has proven to be a challenging step to achieve.

This document is aimed at guiding mines on the requirements to successfully conduct a traffic flow analysis coupled with the respective risk analysis.



7 CONDUCT A TRAFFIC MANAGEMENT RISK ANALYSIS

A key aspect of this Leading Practice is the Traffic Management risk analysis. The analysis is a **component of** mine's baseline risk assessment. Mines will be given extensive guidance on the risk analysis at the COPA and provided with a checklist that can be used to ensure availability of all the information needed to conduct the analysis.

Excellent risk analysis depends on excellent facilitation, operational knowledge and a very good process.

Time dedicated to risk analysis will be well rewarded with good safety performance. Spend extra time on the risk analysis to prevent any incidents from occurring.

Only management should own risks. All risks must be assigned to a specific manager. Risk management must be a heavily weighted KPI.

Establish a Traffic Management risk analysis team	Mine risk analysis facilitator and reviewers training	Execute a Traffic Management risk analysis	Conduct an independent review of the risk analysis	Sign off Risk Analysis	Complete the Traffic Management element applicability matrix
The ATM will assemble a Traffic Management hazard and risk analysis team for the mine. The safety committee must be formally involved. Early provision must be made for contracting the independent reviewer of the risk analysis as per the guidance of the Leading Practice description.	The MOSH Learning Hub will schedule regular training sessions at different geographical locations for the mine risk analysis facilitators. Attendance of this training is an important part of the Adoption. If the mine makes use of an external consultant as a facilitator or independent reviewers they should also attend the training.	The mine's risk analysis team should follow the guidance according to Leading Practice description document and the MOSH training notes to conduct the risk analysis.	The Leading Practice requires a specific risk analysis process that includes an independent review of the Traffic Management risk analysis done by the mine.	Following an independent review of the risk analysis, the mine/general manager needs to sign off on the risk analysis report that will form the basis for deciding which elements of the Leading Practice need to be adopted.	Following the official sign off of the risk analysis the applicability matrix should be completed as the official record of the traffic management elements that will be adopted. The matrix will be explained and made available at the COPA meeting.

Extract from the MOSH traffic management leading practice adoption guide

Bauba Platinum – Moeijelijk Chrome

Tshipi é Ntle Manganese Mining – Tshipi Borwa mine

THE PURPOSE OF TRAFFIC FLOW AND RISK ANALYSIS

The purpose of the traffic flow and risk analysis is to proactively identify hazards and unwanted events related to vehicle and pedestrian movement, that could potentially cause harm to pedestrians and vehicle operators.

The notion that a specific unwanted event has not occurred in any number of years of operation does not justify ignoring a hazard or unwanted event. For this reason, the risk analysis aims to develop and manage controls that will prevent the unwanted events. Another key aim of this exercise is to conduct a risk analysis that is specific to hazards found at specific areas of the operation.

For instance, while an existing issue-based risk assessment may be available for declines/inclines, it may not be relevant to a specific area/operation whose construction is not to standard due to geological features that necessitated a change in design. The hazards experienced by operators at that specific area/operation need to be captured and relevant controls be put in place.

RESOURCES

Mining layout/Aerial photograph

- A current (up-to-date) mining lease area layout or aerial photograph must be used as the basis of the risk analysis
- The layout must then be divided into smaller sub-sections (e.g., main gate, weighbridge, hard park, declines & inclines, intersections, benches, plant as well as into smaller portions, etc.)
- Name or number the sub-sections and address each one in a systematic fashion, either from area of highest potential risk to lowest or from area with quickest wins to the hardest. The mine adoption team has full discretion of where to start and end

Relevant personnel

The mine adoption team must have, as a minimum, weekly engagements to discuss the sub-sections above. It is important to have all relevant personnel when discussing a particular area, e.g., security to be present when discussing movement of persons and vehicles at the main gate; haul truck operator(s) to be present when discussing intersection/haul roads/declines; plant personnel to be present for plant processes, etc.

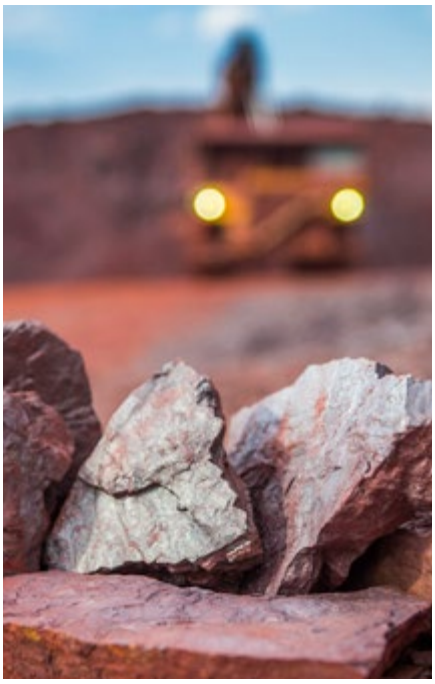
Definition of a control

The MOSH traffic management leading practice risk analysis incorporates the International Council on Mining and Metals' (ICMM) definition of a control. The ICMM definition of a control is globally accepted as "a human act; an object (engineered) or a system (combination of an act and an object) intended to prevent or mitigate an unwanted event." The following are not considered as controls but as control definitions:

- Codes of practice
- Standards
- Training and training material
- Policies
- Procedures

It is critical to scrutinize each suggested control to ensure that it fits the definition of a control to allow for the implementation of the correct control management mechanisms.

Kumba Iron Ore – Sishen



Kumba Iron Ore – Kolomela

Traffic flow analysis and management

When discussing a sub-section as determined above, it is important to know the estimated volumes of movement at different times of the shift, day, month or event (e.g. breakdowns or plant shutdowns) in order to determine the potential risk of collision (vehicle to vehicle or vehicle to person). Special attention must be given to the current layout to determine whether there are means such as:

- Sufficient waiting areas to eliminate congestion
- Optimal one directional and sequential flow, e.g. entrance, load, weigh, unload if overfilled, re-weigh (if necessary), exit without counterflow
- The minimisation of pedestrian movement in general and the elimination of pedestrians having to walk across roads to visit resting places (e.g. green areas, lunch, smoking, restrooms and etc)
- Location of parking places and movement of pedestrians to and from it

This is the ideal time to start discussing ideas of how to eliminate some of the clear hazards that appear during the traffic flow analysis. All these must be documented in the traffic flow risk analysis which runs concurrently with this one.

Sedibelo Platinum Mines – Pilansberg Platinum Mine

Traffic flow risk analysis

Traffic flow risk analysis is when the hazards, unwanted events (risks), current controls and additional controls are recorded using the existing mine's issue-based risk assessment template and risk matrix. What is very key here is to discuss each sub-section in proper detail.

For instance, if the sub-section is focusing on intersections, it is not meant to discuss intersections in general. It must be approached such that each intersection found on the mine lease area layout plan is discussed individually, its own hazards listed, the unwanted events that could occur at the specific intersection listed, then existing controls listed and risk-ranked accordingly. Where necessary, additional controls must be listed after consulting the leading practice section on intersections. It is important for the additional controls to be assigned to the responsible person(s) to effect the suggested changes and placed on a plan (Step 8, found in Page 19 of the Leading Practice Adoption Guide).

Please refer to the appended brief example of a traffic flow risk analysis conducted for declines/inclines on an open pit mine. A similar template may be used for all other identified sub-sections as discussed before.

Pretoria Portland Cement

CONCLUSION

The purpose of the traffic flow and risk analysis is to proactively identify all hazards and unwanted events related to vehicle and pedestrian movement that could potentially cause harm to pedestrians and vehicle operators. Conducting this step of the leading practice allows the mine adoption team to get a view of the amount of work necessary to complete the project. It is therefore very important that this step is given enough attention, resources and time. Kindly consider the appended checklist for conducting traffic flow and risk analysis to ensure that the key elements are in place for this step.

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ANNEXURE A: CHECKLIST FOR CONDUCTNG TRAFFIC FLOW AND RISK ANALYSIS

The checklist below will assist operations to ensure that the fundamental areas of traffic flow analysis have been incorporated in the process.

Company name:

Mine name:

Adoption team manager:

Requirements	Available Yes/No	Comments (e.g., why not or by when, etc.)
Mining layout/Aerial photograph		
• Are you using a current/up-to-date mining lease area layout or aerial photograph to conduct the risk analysis?		
• Have you successfully divided the layout into smaller sub-sections (e.g., main gate, weighbridge, hard park, declines & inclines, intersections, benches, plant (also into smaller portions), etc.)?		
• Are the above subsections named or numbered for ease of identification?		
Relevant personnel		
• Have you assembled a mine adoption team?		
• Have you set up a weekly meeting schedule for the above team?		
• Has the team identified key personnel for invitation per subsection as identified above?		
• Have you received the relevant permission to invite the above personnel to the correct weekly analysis session(s)?		
Definition of a control		
• Does your mine subscribe to the definition of controls as defined by the ICMM when conducting risk assessments?		
• Has the entire mine adoption team been aligned on the above definition of a control?		
Traffic flow risk analysis		
• Is the team using the latest company risk assessment template?		
• Are the correct personnel available per subsection to discuss typical movement throughout the shift, day, week or month?		
• Is the analysis being conducted per sub-area of each subsection?		
• Have the current controls been tested against the ICMM definition of a control (i.e., can they be strictly classified as a human act; an object (engineered) or a system (combination of an act and an object) intended to prevent or mitigate an unwanted event)?		
• Have you allocated responsible people for the implementation of the additional controls identified?		
• Have you included the additional controls as part of the mine adoption plan?		

For further information on the traffic flow and risk and analysis process, please contact the MOSH transport and machinery (T&M) team at the Minerals Council South Africa:

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