



**MINING INDUSTRY  
OCCUPATIONAL  
SAFETY & HEALTH**



**MINERALS COUNCIL  
SOUTH AFRICA**

# MOSH TRAFFIC MANAGEMENT LEADING PRACTICE FOR OPEN CAST/PIT MINES

Anglo American Coal - Zibulo

APPLICATION OF THE MOSH TRAFFIC MANAGEMENT  
LEADING PRACTICE FOR OPEN CAST/PIT MINES

## CASE STUDY

### FULL DESCRIPTION OF THE RISK ADDRESSED

Traffic management, or the lack thereof, has been identified as one of several factors that if dealt with appropriately, could improve the safety performance of open cast/pit operations significantly.

Notwithstanding the prevailing requirements of all relevant legislation governing the operation and use of trackless mobile machines (TMM) at any mine, the MOSH Traffic Management Leading Practice for Open Cast/Pit Mines was developed to assist the mining industry to effect improvements to existing operations.

A statistical analysis by Thungela operations of surface mines' TMM accidents over a 12-year period within the South African mining industry showed that as much as 42% of TMM fatal accidents were due to a lack of or inadequate traffic management controls. Undesirable driver behaviour accounted for a further 46% while fatigue-related incidents accounted for 28%.

The MOSH Traffic Management Leading Practice for Open Cast/Pit Mines deals exclusively with the safe movement of people and vehicles on surface operations. This case study documents the incorporation of the MOSH principles into the Thungela Collision Management Strategy.

### FINDINGS AND LESSONS LEARNED FROM THE ADOPTION OF THE PRACTICE OR IMPLEMENTATION OF THE COMPANY BEST PRACTICE

As a means of reducing the significance of the risk posed by TMMs in their mining operations, Thungela Operations Limited (previously known as Anglo American Coal South Africa) implemented the Earth Moving Equipment Safety Round Table (EMESRT) Vehicle Interaction Levels of Control (level 1-9) model and the MOSH Traffic Management Leading Practice for Open Cast/Pit Mines, as guidance for the development of the Thungela Collision Management Strategy.



“The MOSH Traffic Management Leading Practice for Open Cast/Pit Mines was developed to assist the mining industry to effect improvements to existing operations.”

### OVERVIEW

#### Mining company

Thungela Resources

#### Commodity

Coal

#### Operation/Mine

All Thungela operations

#### Health and safety case study

Application of the MOSH Traffic Management Leading Practice for Open Cast/Pit Mines

#### Number of employees affected

>7500 employees

#### Stakeholders consulted

Management, SHE committees, operators and contractors

#### Occupations affected/benefited

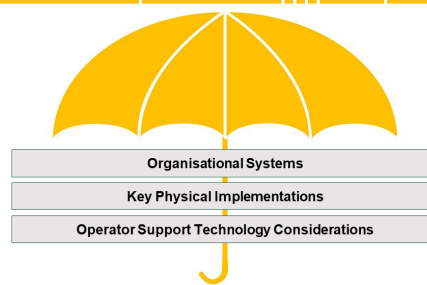
All operators and pedestrians



## FINDINGS AND LESSONS LEARNED FROM THE ADOPTION OF THE PRACTICE OR IMPLEMENTATION OF THE COMPANY BEST PRACTICE ...CONT

The Thungela Collision Management Strategy consists of three aspects:

- Organisational Systems
- Key Physical Implementations
- Operator Support Technology Considerations

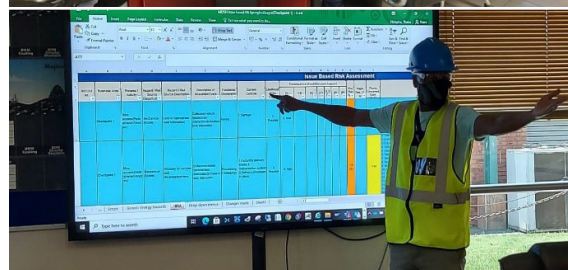
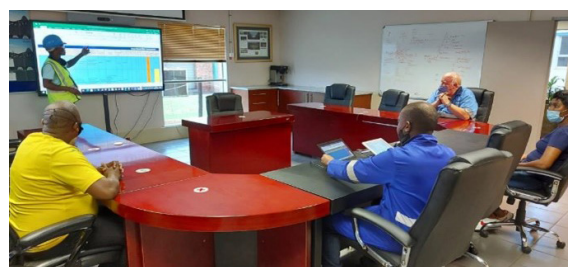


### ORGANISATIONAL SYSTEMS

The Thungela Collision Management Strategy kicked off with an in-depth gap analysis of the effectiveness of existing controls with regards to managing the risk of collisions. The process included considering controls from the MOSH Traffic Management Leading Practice, Thungela's own critical controls as well as the Thungela Operator Support Technology control strategy.

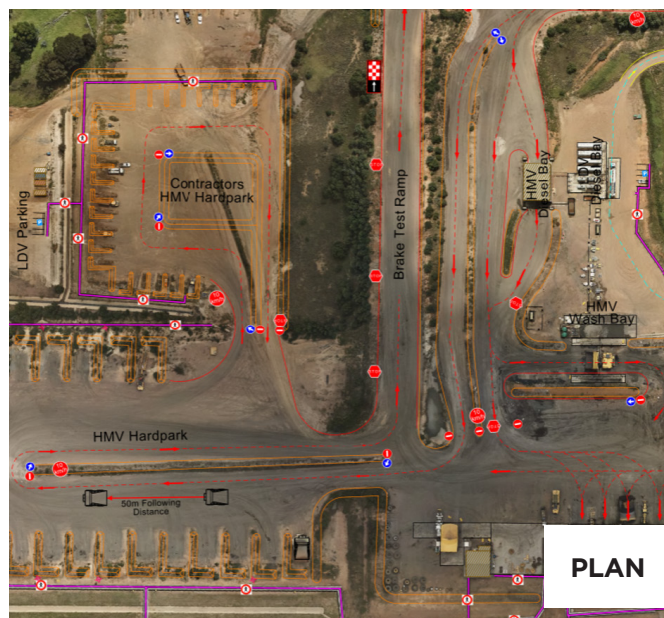
The activities undertaken included multiple stakeholder sessions to cover, amongst others:

- A deep dive analysis per site
- Traffic flow analysis and the associated risk analysis (who is going where, with what and what could go wrong in terms of vehicle and pedestrian movement)
- Review of site operating philosophies, concepts and rules
- Use of block plans and site/flow designs
- Fitness for work management
- Review of operator selection, competence and authorisation processes
- Operator training and communication
- Monitoring and evaluation of driver behaviour



### KEY PHYSICAL IMPLEMENTATIONS

The findings from the organisational systems review phase had to be implemented in a systematic manner. This entailed detailed designs of desired traffic operating arrangements, the installation of selected safety devices on TMM (Operator Support Technology) as well as physical site construction according to new plans.



At the heart of the Thungela Collision Management Strategy lies some of the key principles contained in the MOSH Traffic Management Leading Practice. These principles were adopted and implemented in site-specific fashion, ensuring the following:

<b>Road and Traffic Separation</b> <ul style="list-style-type: none"> <li>- Full HV /LV Physical Separation</li> <li>- Pit / Workshop / General Surface Areas</li> </ul> 	<b>HV Bi- Directional Flow</b> <ul style="list-style-type: none"> <li>- Road Widths = 3 x Largest HT Width + Centre Berm</li> <li>- One Directional HV Flow on all main haul roads between HV/HV</li> <li>- Earth berm / Centre</li> <li>- Berm Combination</li> </ul> 	<b>Safety Berms</b> <ul style="list-style-type: none"> <li>- Safety Berms on all HV Roads</li> <li>- Both Sides (approx. 3m crest)</li> <li>- Drop zone Berms on all ramps</li> <li>- Arrestor Berms on Brake Test Ramps</li> </ul> 	<b>Intersections</b> <ul style="list-style-type: none"> <li>- T Intersections</li> <li>- 90 Degree Intersections</li> </ul> 
<b>Effective Signage</b>  <p>Key Positions, Quantities &amp; Frequencies</p>	<b>Workshop Lay Out Enhancement</b> <ul style="list-style-type: none"> <li>- Dedicated areas for Key activities eg. Refueling, Wash bay, Tyre Handling, Storage etc.</li> <li>- Total Separation HV/LV</li> <li>- Access Control</li> <li>- Delivery Procedures</li> </ul>	<b>Dedicated Parking Areas</b> <ul style="list-style-type: none"> <li>- Hard Park Designs</li> <li>- LV/HV Separated Parking</li> <li>- Fundamentally Stable Parking</li> <li>- Safe Pedestrian Access in Parking Areas</li> </ul> 	<b>Pedestrian Walkway Separation</b>  <ul style="list-style-type: none"> <li>- Total Pedestrian Separation</li> <li>- No Pedestrian interaction with HV</li> <li>- Hard pedestrian barriers on walkways</li> </ul>



**TECHNOLOGY CONSIDERATIONS**

Thungela's Operator Support Technology strategy is a specific, risk-informed technology approach aimed at incorporating driver behaviour monitoring, fatigue management as well as proximity detection and warning (surface vehicle-to-vehicle). This approach allows a further reduction of the risk of collisions after implementing reasonably practicable measures as contained in the MOSH Traffic Management Leading Practice.

The Thungela Operator Support Technology strategy was developed using as systematic approach:

Element Risk Assessment	Technology Type and Detail	Element per TMM Type	Reaction Protocols per Element	Installation Programme and Plan
<ul style="list-style-type: none"> <li>Identifying relevant elements associated with TMM</li> <li>Examples: alcohol tests, use of seatbelts, brake testing, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Determine suitable technologies per element identified</li> <li>The details of such technology in terms of availability, efficiency, quality, cost, etc</li> </ul>	<ul style="list-style-type: none"> <li>Determine applicability of elements identified for each TMM type in use</li> <li>Assess the need and practicability of each element per TMM type</li> </ul>	<ul style="list-style-type: none"> <li>Determine how the technology and the operator should react to triggers per element identified</li> <li>Determine what organisational processes will be triggered per element</li> </ul>	<ul style="list-style-type: none"> <li>Identify all TMM to be fitted with relevant element technologies</li> <li>Plan installation schedules</li> <li>Install, commission and roll-out</li> </ul>

Below is an example of the elements identified as well as a dashboard Thungela developed to monitor each technology type as applied per TMM type for the Operator Support technology:

Nr	Element
1	Alcohol Detection
2	Seatbelt Detection
3	Over speeding Detection
4	Adherence to Brake Testing Procedures
5	Electronic Key Control Linked to License Validity (Interlocked)
6	Proximity Detection Warning
7	Tyre Pressure Warning
8	Active Fatigue Monitoring & Driver Distraction Monitoring



## BENEFITS AND IMPROVEMENTS REPORTED BY AFFECTED STAKEHOLDERS

Thungela was able to identify priority unwanted events (PUEs) per operation using the traffic flow and risk analysis process of determining who is going where, with what and what could go wrong while that movement is happening. This approach led to the development of plans for segregation, one-way traffic flow and other interventions to safeguard people against collisions.

The implementation of the designed controls such as the separation of heavy and light vehicles, vehicles and pedestrians as well as other traffic management changes, brought with it a new, safer way of operating, confirmed by continued stakeholder engagement.

By incorporating Operator Support Technology into the holistic TMM collision risk management strategy, operators are now assisted to comply with existing operating rules proactively, instead of reactively. Thungela believes that the holistic implementation of a Collision Management Strategy has and will continue to reduce and manage the risk of collision with relation to TMM priority unwanted events.

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