



SERITI KHUTALA COLLIERY CONVEYOR BELT AUTOMATED TRANSFER POINT FOGGING DUST SUPPRESSION SYSTEM (CBAT) CASE STUDY



FULL DESCRIPTION OF THE RISK ADDRESSED

Khutala Colliery is one of a Seriti Resources mining operation located in the Witbank coalfield, about 30km southwest of Emalahleni (formerly known as Witbank) and about 100km east of Johannesburg. The mine produces thermal coal using bord and pillar method which it supplies to Eskom's Kendal Power Station.

The risk of occupational lung diseases (OLD) within the South African Coal Mining Sector remains a challenge. The sector continues to report several employees who are exposed to coal dust levels which are above the regulated occupational exposure limit (OEL) of 1.5mg/m³.

The coal sector also continues to intensify efforts to reduce employee coal dust exposure by focusing on dust controls which target dust generation at source. The MOSH Dust team worked with industry members through the Collieries Dust Working Group to develop a Coal Industry Bowtie Analysis for Respirable Coal Dust for both underground and surface operations. The transfer of coal from one conveyor (Section/Trunk Belt) to the other (Trunk/Main Belt) was identified as a threat (i.e., factors that could cause liberation of respirable coal dust) and a significant contributor of dust liberation.

The Conveyor Belt Automated Transfer Point Fogging Dust Suppression System (CBAT) is a MOSH Dust Leading Practice that was documented in 2019. The system ensures that airborne dust particles are captured and trapped by increasing the surface area of one droplet of water to create mist vapour capable of capturing respirable dust particles. This leading practice was also identified as a Critical Control for dust suppression at Transfer Points.

OVERVIEW

A

Mining Company: Seriti Resources

B

Commodity: Coal

C

Operation/Mine: Khutala Colliery

D

Health and Safety Case Study: Application of the MOSH Conveyor Belt Automated Transfer (CBAT) Point Fogging Dust Suppression System

E

Number of employees affected: Estimated underground workforce of about 1800

F

Stakeholders Consulted: Mining, Engineering, VOHE, Training and SHE Committee

G

Occupations affected/benefited: Belt Attendants and all Inbye employees i.e., Miner, Machine Operators and Engineering personnel

FINDINGS AND LESSONS LEARNED

Khutala Colliery adopted the CBAT leading practice in 2021 and despite challenges, successfully completed adoption in April 2024. Some of the factors which were key to the successful adoption, effectiveness, and sustainability of the leading practice at the operation were the approach taken in the appointment of the Mine Adoption Team, MOSH leading practice accountability at mine level, leadership buy-in, involvement of key stakeholders and continuous technology improvements. The adoption process was driven by a multi-disciplinary team – including Engineering, VOHE, and Training under the leadership of Mr. Johnny Mbodi, Outbye Section Engineer.

With 62 conveyor belts spanning approximately 40-45km underground, the team developed a comprehensive Transfer Point Heat Map to identify high dust generating areas based on transfer capacity, ventilation flow direction and air velocities. This informed the strategic installation of CBAT systems across the operation.

To ensure ongoing effectiveness, Continuous Real Time Dust Monitors (CRTM) are installed downstream of each CBAT unit. The CRTM data is transmitted in a live SCADA system, enabling Control Room Operators to track system performance and respond swiftly to elevated dust readings. High- dust events are logged in Isometrix Incident Management System, investigated, and reviewed during the operation’s weekly Assurance meetings with senior management.



Figure 1: Team viewing the Conveyor Belt Overview System which indicates the operation’s underground conveyor belt system and the location of the CBAT and CRTM System. Source: Seriti Khutala Colliery

The following key learnings have been noted from Khutala Colliery’s adoption journey for new adopters to consider:

A

Generating a Transfer Point heatmap which considers the ventilation direction, air velocities and transfer point coal handling capacity.

B

Installation of return belt sprays at each transfer point to suppress dust generated by the return belt.

C

The conveyor belt automated transfer fogging dust suppression system is activated by the presence of coal on the belt; this is achieved by using a mechanical conflow valve or electrical solenoid.

D

Careful consideration of the type of sprays to be used, Khutala Colliery has included “duff sprays” on their installation to address dust generated by the accumulated dust (duff) in the chutes.

E

Incorporating reporting of dust incidents (high dust, system availability, etc) on the current Risk Management System (Isometrix).

F

Implementation of integrated dust control measures to enhance CBAT effectiveness, including interlocking conveyor belt operation with water suppression systems based on water pressure availability thus ensuring system reliability and performance

Event Full Report

A typical mine layout of a colliery involves a network of conveyor belts at the intake airways meaning any dust generated at these installations will be carried into all the sections at the mine. Khutala Colliery has about 62 conveyor belts spanning approximately 40-45km underground. The team used a risk-based approach to inform the installation of their CBAT system. This approach enabled the identification of high-risk dust-generating areas and informed the strategic installation of CBAT units across the operation. As a result, dust levels in the intake air supplied to production sections have been reduced, contributing to improved occupational hygiene conditions underground.

Continuous Real Time Dust Monitors (CRTM) are also strategically installed with every CBAT system. These feed into a live SCADA system, enabling Control Room Operators to track CBAT system performance and respond swiftly to elevated dust readings. High-dust events are logged in Isometrix Incident Management System, investigated, and reviewed during the operation’s weekly Assurance meetings with senior management enabling the operation to be more effective in managing the dust risk.



EVENT DETAIL			
Business unit	Seriti Resources -> Seriti Power -> Khutala -> Underground 2 Seam		
Location	2E4 transfer point.		
Impact Type	Safety and Health		
Actual Consequence	Health -> 0 - Health Hazard or Near Miss	Potential Consequence	Health -> 1 - Exposure to health hazard resulting in temporary discomfort
Event date	2024-02-15	Event time	15:38:00
Reported date	2024-02-16	Reported time	13:00:00
External parties involved	No		
External parties			
Reportable to			
Responsible supervisor			
Risk			

EVENT DESCRIPTION
 it was observed that sprays at the 2e4 transfer point not working . it was also presence of high dust generated in the vicinity of the chute.

IMMEDIATE LEARNINGS AND ACTIONS
 Reported to supervisor and artisan mechanical.

INVESTIGATION DETAIL			
Due date	2024-03-14	Approval Date	2024-04-17

ABSENT & FAILED DEFENSES		
Control	Analysis	Control description
Absent Control: Control System	Control effectiveness failure	Sprays to be in operation when belt is running and loaded with coal.

INDIVIDUAL / TEAM ACTIONS			
Cause analysis	Inappropriate behaviour	Cause selection	Detail

TASK / ENVIRONMENTAL FACTORS		
Cause analysis	Cause selection	Detail

ORGANISATIONAL FACTORS		
Cause analysis	Cause selection	Detail

INVESTIGATION CLOSURE
Root cause
 Blocked sprays on the dust suppression system due to scale in the supply water.
Immediate cause

2024-04-22 20:13

1 of 2

Contributing factors

Key learnings
 Ensure that dust suppression sprays are unblocked immediately when observed. This must be treated as a breakdown in the operation.

ACTIONS					
Action description	Department responsible	Due date	Responsible person	Status	LFI
Clean or replace blocked sprays to ensure effective dust suppression system operation.	Seriti Resources -> Seriti Power -> Khutala -> Underground 2 Seam	2024-04-17		Completed	No

PHOTOS

Figure 2: An example of a High Dust Incident report which has been logged in Isometrix. Source: Seriti Khutala Colliery