MINING INDUSTRY
OCCUPATIONAL
SAFETY & HEALTH

MINERALS COUNCIL
SOUTH AFRICA

SAFE AND DUST MITIGATING CM CUTTING SEQUENCE

GUIDELINE

KEY CONSIDERATIONS FOR DEVELOPING AN OPTIMAL CUTTING SEQUENCE

An optimal cutting sequence should support the following aspects:

- **A** Promotes safe production
- **B** CM Operator and Cable Handler safe position concerning Proximity Detection System (PDS) zones.
- **C** Establish through ventilation as soon as possible.
- **D** Splits to be mined, as practically reasonable, in the direction of ventilation airflow.
- **E** Maintain a buffer between the CM and the Roof Bolter - RB to be out of the way of the CM.
- **F** Adhering to Mine-specific Standard on support installation. (No more than 3 faces to be left unsupported whilst cutting)
- **G** Tramming routes of all three shuttle cars to be optimised.
- **H** Optimise (Continuous Miner) CM cable handling and tramming.

BACKGROUND

The DMRE Guideline for the compilation of a mandatory COP for "The Prevention of Flammable Gas and Coal Dust Explosions in Collieries" requires the ventilation layout of production sections [8.1.1.3] to include a mining sequence that compliments the ventilation flow. The requirement is in place to prevent the accumulation of an explosive concentration of flammable gas and it also benefits employees in that dust is cleared from the immediate working environment. However, the guideline is not prescriptive on the CM cutting sequence to be adhered to.

On the 7th of August 2024, a cutting sequence workshop was conducted by the Collieries Dust Working Group in the quest to achieve a cutting sequence with minimum exposure to coal dust. The workshop proved to be a valuable exercise, as inputs on practicality, possibilities and limitations of various coal cutting sequences were solicited from various subject matter experts (Mine Overseer, VOHE Superintendent, CM Operators etc,) who were in attendance. It was also noted that various mines use different cutting sequences due to ground conditions and associated mining methods.

CM CUTTING SEQUENCE WORKSHOP FINDINGS

Several cutting sequences from various mining houses and technical papers were discussed and considered with a view to identifying the sequence with minimal dust exposure to employees. The following cutting sequences were considered:

- **A** Cutting from belt route to R1
- **B** Cutting from R3 to R4
- **C** R3 to R4 with safety Cubbies which was identified to have minimal exposure to dust

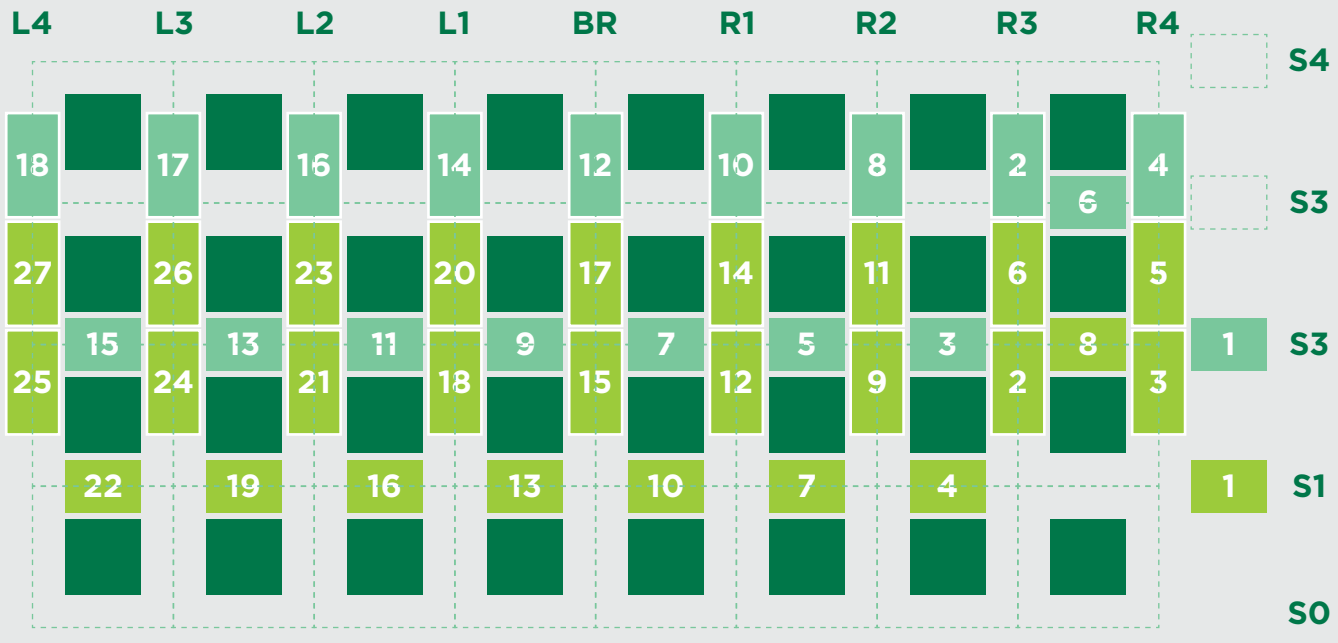
RECOMMENDED CM CUTTING SEQUENCE- CUTTING FROM R3 TO R4 WITH SAFETY CUBBIES

The CM cutting sequence below considers the following:

1. Technical aspects of cutting a nine (9) Roadway section is similar to 7 and 8 roadway sections.
2. The following pillar centres were discussed and found to be best suited for the following pillar centres; 15m X 15m, 15m X 16m, 15 X 17m, 16m X 16m, 16m X 17m, and 18m X 16m PILAR CENTRES. However, with proper risk assessment, this sequence can be retrofitted to various pillar centres as per operations requirements.
3. Cutting of 5m Safety-Cubby at point 1 is recommended to improve the positioning of the CM operator and prevent Proximity Detection System (PDS) interruption.
4. There is a buffer between CM & Roof-bolter. The Roof-bolter will not be immediately on the return side of the CM during the cutting operation. This can be achieved by delaying the roof-bolter supporting at point 2 whilst cutting point 3.
5. The use of butcher brattices at point X (tram-through) must be utilised when cutting point 3.
6. During the cutting of R3, the shuttle car exchange-point is moved to the tipping point until R2 is holed through at point-4.
7. Roof Support requirements must be in adherence to the Mine Rock Engineering Standard (STD) of the mine.

NB: Any deviation from the Mine Cutting sequence shall be approved by the Mine Manager (Section 3.1 appointee), and the appointed Section 12.1 appointee (MHSA) of that mine.

CUTTING SEQUENCE DEVIATION TO BE ALLIGNED AND FIT WITHIN THE APPROVAL PANEL DESIGNED LAYOUT



SKETCH NOT TO SCALE

BENEFITS OF THE SELECTED CUTTING SEQUENCE ARE:

A. Through Ventilation is quickly established. This means CM will be cutting against the ventilation only once in a cutting sequence thus reducing employee exposure to coal dust.

B. The Roof-bolter will not be immediately at the return side of the CM during the cutting operation. This immediately improves coal dust airflow dilution before coal dust reaches the Roof Bolter.

C. At least 70% of the cutting points in the sequence the roof bolter will be on the intake side of the CM. This means less exposure to coal dust.

D. CM cable handling is optimised.

E. Tramming routes of all three shuttle cars are not interrupted.

CHALLENGES OF THE CUTTING SEQUENCE SELECTED AT THE WORKSHOP:

A. Although this is the best cutting sequence to reduce exposure of Roof-bolt operator. The will be instances that the Roof-bolter will be on the return side of the CM. (Note split 5,11,14,17,20,23,26,27)

B. The delay of Roof-bolter supporting point 2 whilst cutting point 3 may lead to standing time.

C. A minimum velocity of 1.0m/s is required at split-1 (S1). A butcher brattice must be installed at split-0 (S0), point-X to achieve this. This will be temporarily installed until point-3 advances 10m. Then, the tramming route will be restricted to R3 - S1 until point 4 is through.

CONCLUSION

The CM sequence complements the ventilation flow and minimises the instances whereby the roof-bolt operator is on the return side of the CM. This will benefit operations in reducing employee dust exposure. The employee behavioural aspect of this cutting sequence must be investigated to ensure the smooth implementation of this cutting sequence.