

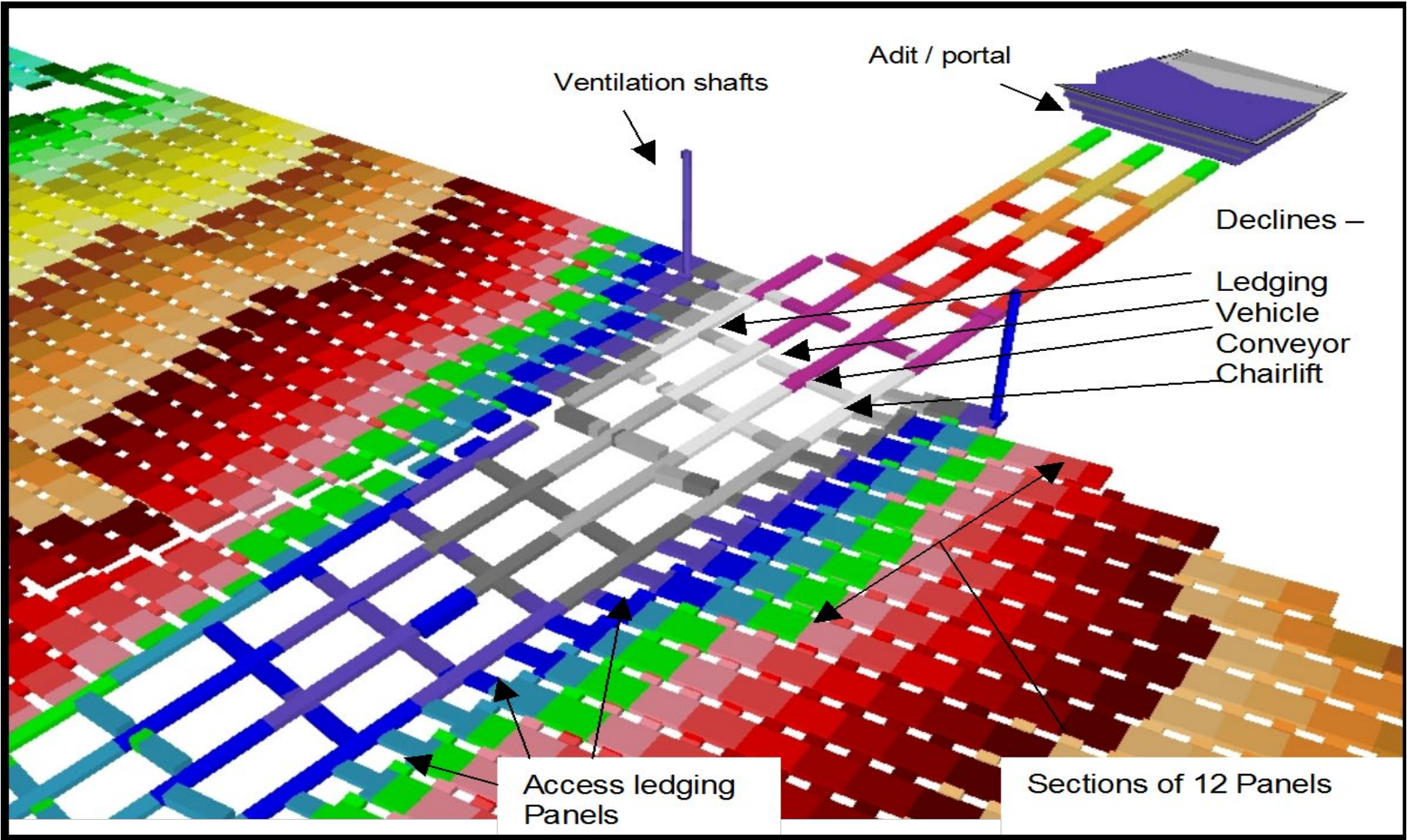
FOG Strategy at Glencore Mining Division



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- Mining comprises of three underground mechanized bord and pillar operations, namely Thorncliffe, Magareng, Kroondal and Helena
- Located in the Eastern and Western limb on the Bushveld Complex
- The mines utilize a bord and pillar mining method to exploit the MG1 and MG2 Chromitite seams. In the East and MG6 in the west
- Extraction on the MG1 commenced in 1997 whilst the mining in the MG2 commenced in 2020
- The stoping panels are mined with 8m wide bords and 8m holings
- Mining depths ranging from 80m to 650m below surface
- Utilize stable non-yield pillars to support the overburden to surface, (minimum FOS design criteria of 1.5)
- The main shaft system comprise of 3 main declines, i.e., Chairlift, Conveyor beltway and main access roadway







Safety

We never compromise on safety. We look out for one another and stop work if it's not safe.



Integrity

We have the courage to do what's right, even when it's hard. We do what we say and treat each other fairly and with respect.



Responsibility

We take responsibility for our actions. We talk and listen to others to understand what they expect from us. We work to improve our commercial, social and environmental performance.



Openness

We're honest and straightforward when we communicate. We push ourselves to improve by sharing information and encouraging dialogue and feedback.



Simplicity

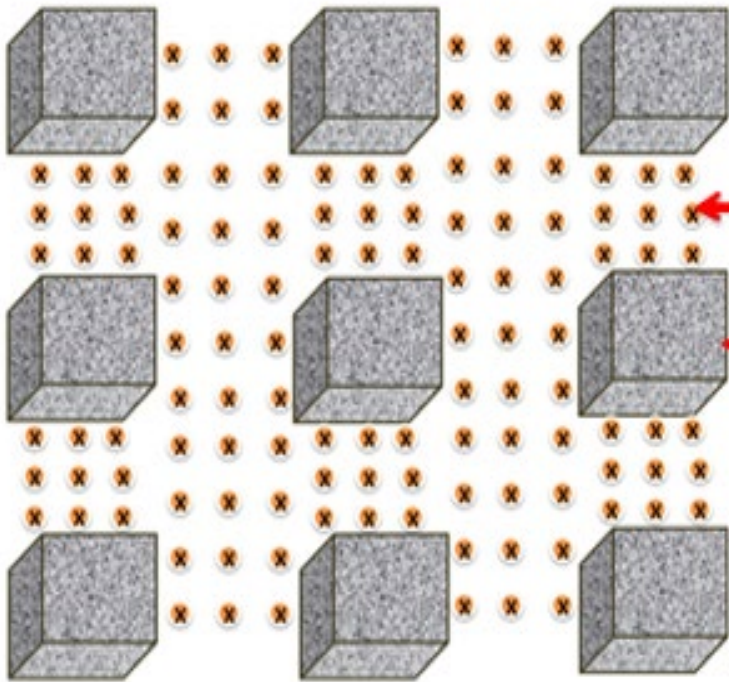
We work efficiently and focus on what's important. We avoid unnecessary complexity and look for simple, pragmatic solutions.



Entrepreneurialism

We encourage new ideas and quickly adapt to change. We're always looking for new opportunities to create value and find better and safer ways of working.

Typical Bord and Pillar Layout



- The orebody geometry is favorable for mechanized mining using bord and pillar layout
- Primary support is through Pillars and full column Resin bolting
- Resin bolting stabilizes the beam between the pillars with additional bolts installed on geological features
- Rigid Pillar system carries full overburden weight, and the sizes are dependent on depth

Mine Design Considerations

Conservative Pillar Design approach:

- Pillar strength was calculated for all pillars using the conservative Hedley and Grant pillar strength formula, as per the design guidelines applied by the mine
- Higher thresholds of failure (i.e. W: H ratio not less than 2.5)
- Currently working on a project to optimise our pillars, using Load-Inversion and Strain Criterion Concept (numerical modelling, stress and displacement measurements) to define pillar strengths.
- Shorter Mining Spans and Lower extraction ratios (5m minimum to 8m maximum)

Closer support spacings :

- limits exposure to variations in the rock mass (1.5m to 1.5m square patterns)
- Application of areal coverage (TSL/Shotcrete) in blocky ground conditions
- Use of safety nets for face preparation and charging-up activities

Geotechnical Considerations:

- Large structures geo-physically mapped and better definitions achieved through physical mapping and underground drilling
- Re-raising/Re-establish beyond adverse structures/conditions

Equipment Selection:

Resource planning:

- Sections planned with 20% contingency to allow for negotiation of adverse ground

Monitoring and Review:

- Monthly Monitoring critical controls and visible felt leadership findings and action plan close-outs

Current Support Practice

Narrow Bord Width:

Bord widths is 8.0m (permanent openings) to 8m (temporary openings) and reducing to 6m in adverse ground .

Longer Primary Support:

1.5m long x 18mm diameter full column resin grouted bolts spaced 1.5m on dip and strike. (2.25m² / bolt) with ultimate load of 180kN

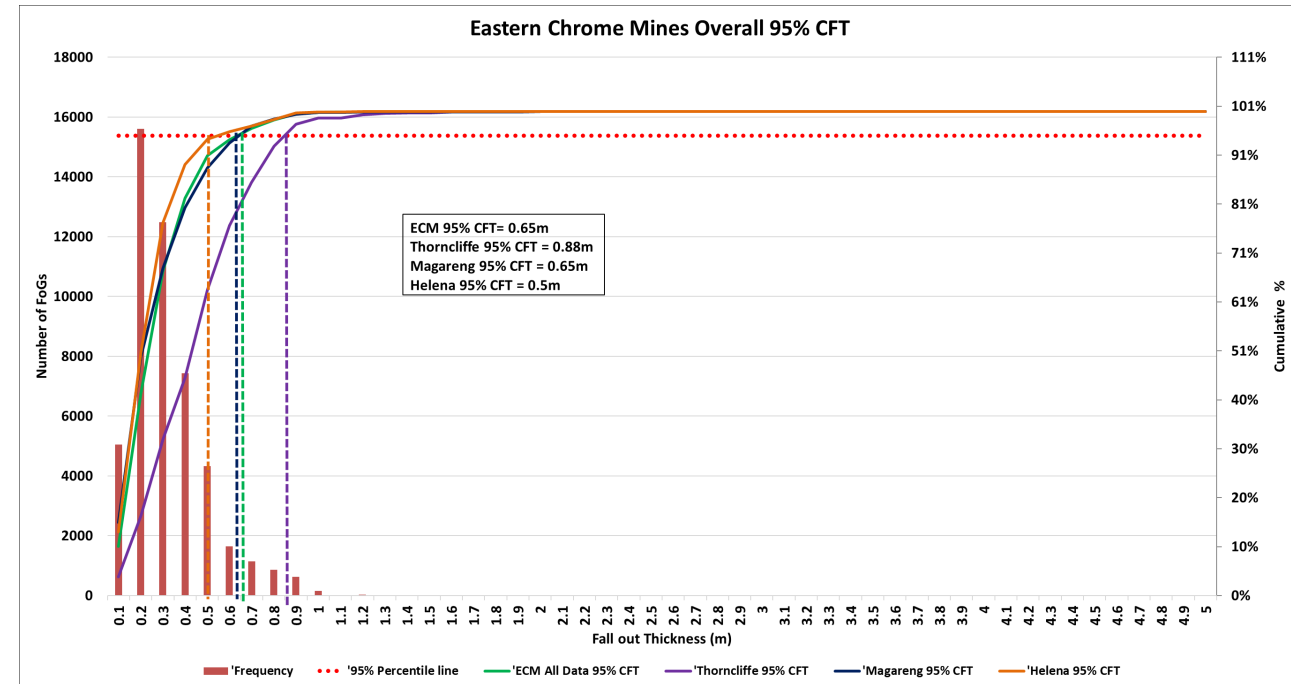
- To cater for ECM 95% cumulative fallout height (0.65m)
- Upgraded secondary support systems is determined as per TARP trigger exposed.
- Areal skin support applied in blocky friable ground conditions, pillar/hangingwall scaling conditions
- and/or large excavations (i.e., Conveyor belt Tips and head sections).

The following site-specific strategies may include the following:

- Install support units at a higher density at 1m grid.
- Support tendons plus steel straps between tendons, where applicable because it is hazardous.
- Support tendons and Skin support (TSL / Shotcrete/Mesh).
- Steel sets/Mat Packs for deadweight support.

Secondary Support Unit Types:

- Cable Anchors (3m – 6m)
- TSL (>4mm)
- Shotcrete(>50mm)
- Mesh
- Oslo-straps
- Steel Sets
- Mat Packs

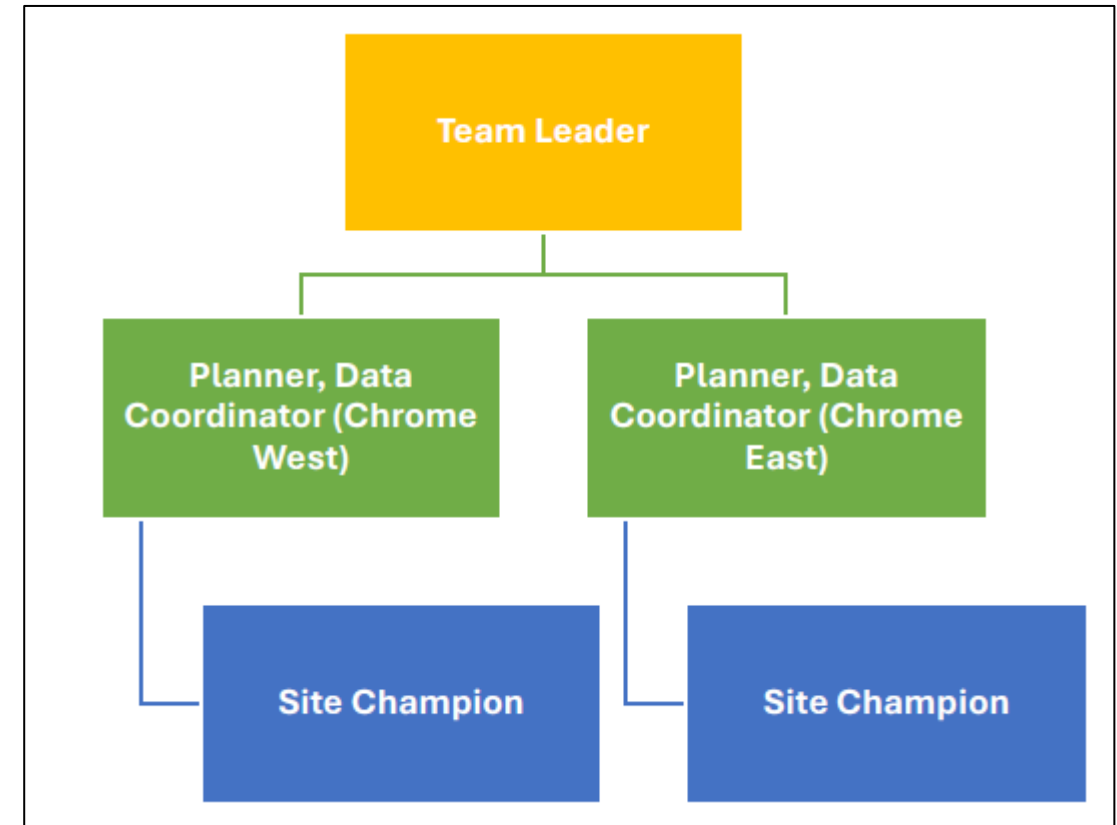


2005 Implementation	2006 Expansion	2007 Audit and review	2008 Ownership& Systems	2009 Training Focus	2010 Maturity	2019 Mechanization
•CHMP introduced in the WCM after multiple fatalities giving rise to TARP	•CHMP introduced in the ECM	•Began cross auditing and conducting annual reviews	•CHMP part of the KPA's of MO •Team Leader and site champions take ownership and drive culture	•Focused on improving training interface (VRT) and made underground training mandatory	•CHMP fully entrenched in the production culture from across all levels	•Expedited the roll out scalars and bolters after a fatal

Overview Of CHMP for ground Control

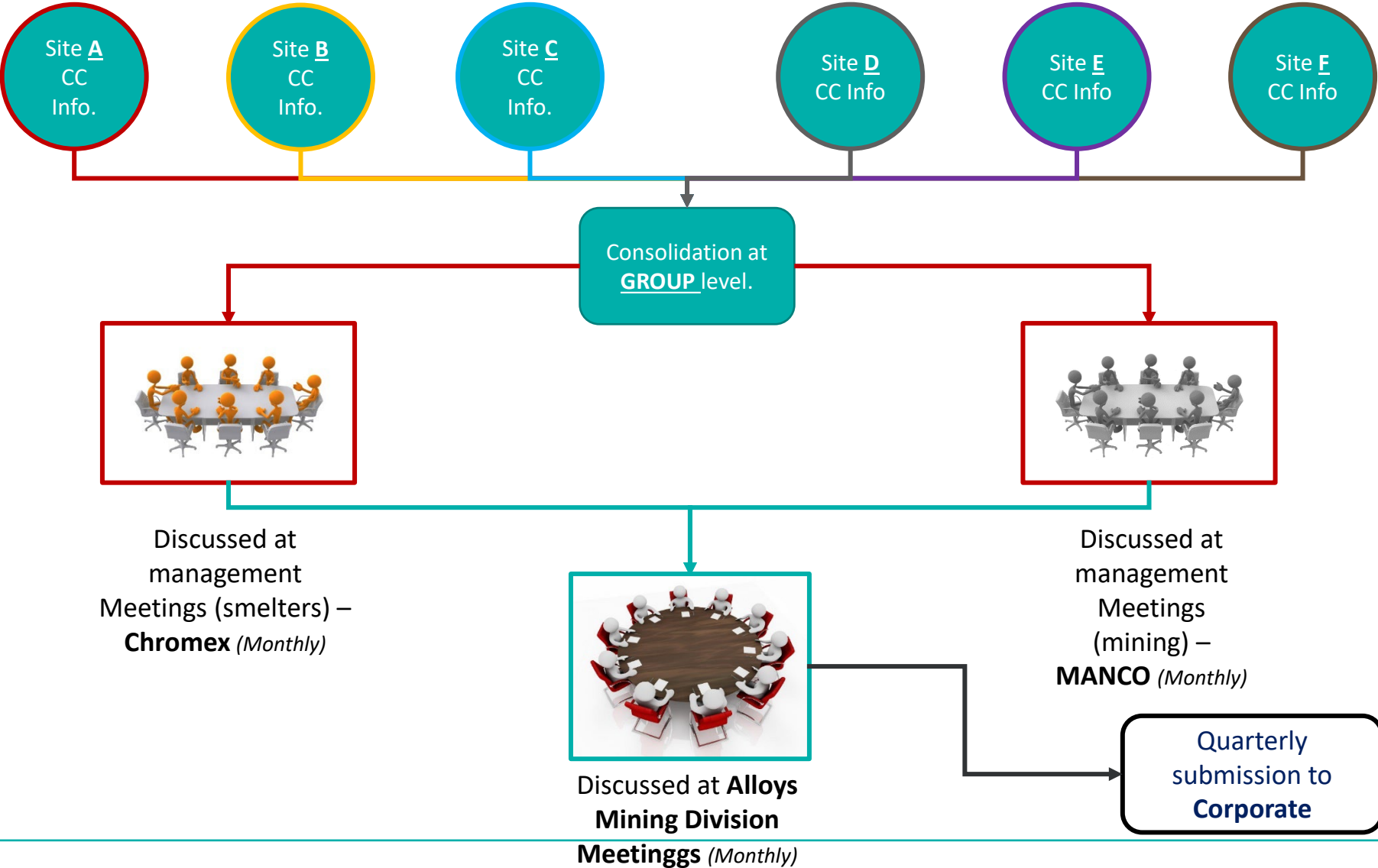


- Appointed Team Leader for CHMP
- Site Champion for each site (Mine Overseer or Production Manager)
- Leading indicators communicated to Exco and Steercom
 - Support audits
 - Hazard-ratings
 - Poor Pillar Cutting
 - FOG incidents, sizes
 - Planned Task Observations – FOG Related
 - TARP Declarations – red panels
 - GPR scans
- 4 Monthly self audits of CHMP by Site Champions
- FOG Data base kept by Team Leader
- Annual audits by Team Leader
- ICAM investigations conducted on all incidents relating to CHMP



Our Process

How we manage these Hazards (CHM Reporting)



- Following FOG fatalities at Thorncliffe in 2018 and at Magareng in 2019 the strategy of bolters and scalers was expedited
- To implement and utilize mechanized equipment (Bolters and Scalers with ROPS and FOPS) as far as reasonably practical to reduce worker exposure to unsupported ground.
- Monthly critical control monitoring and verification of utilization and availability of the bolters and scalers
- Each bolter and scaler allocation per active mining block section underground

Mine	Bolters	Scalers
Thorncliffe	7	6
Magareng	8	6
Helena	6	6
Kroondal	11	11

Bolter and Scaler – in the East and Man up bolter in the West



Challenges encountered with implementation of Bolter

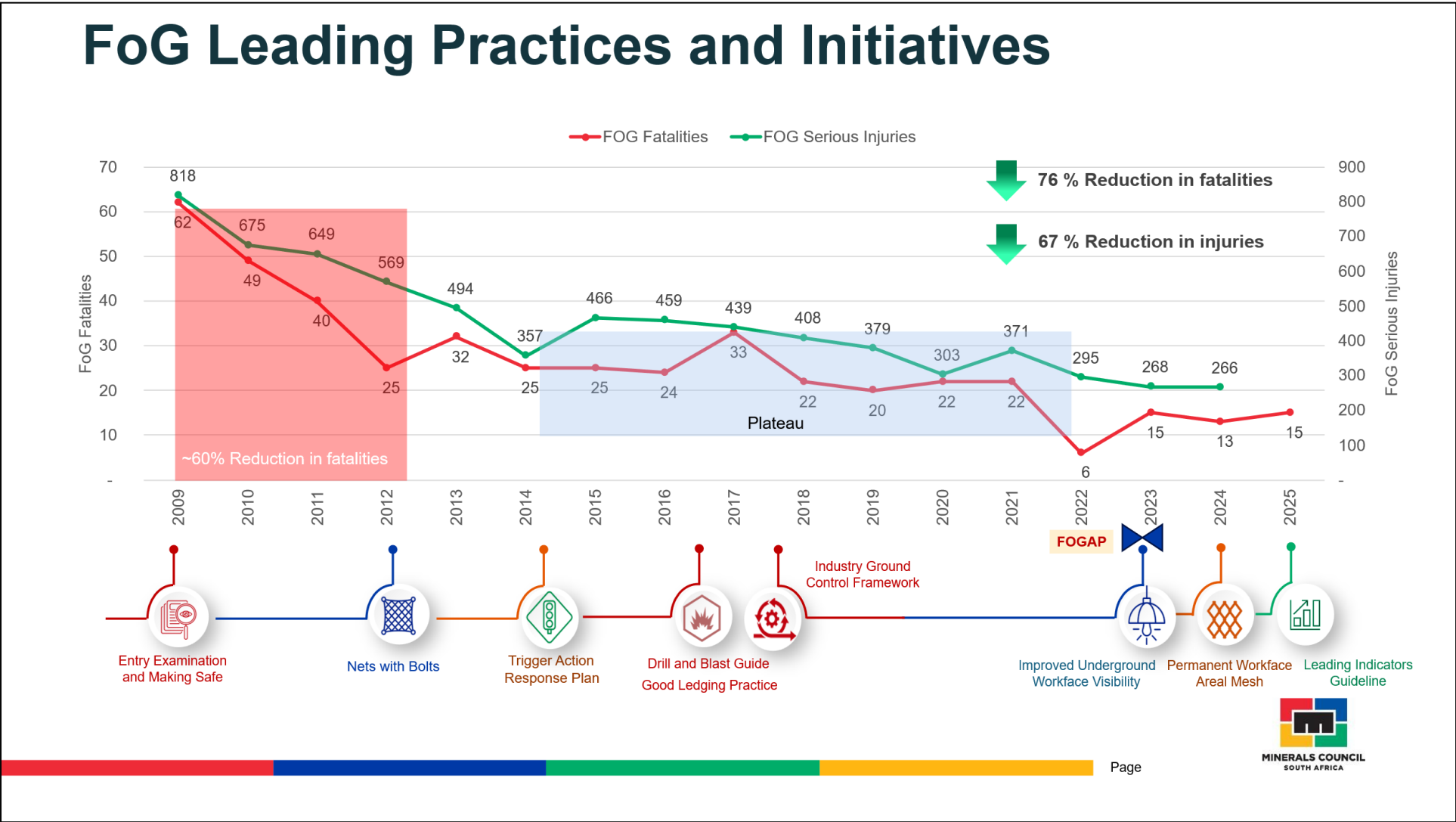
- Maintenance personnel and Operator competency due to complexity of machine
- Skills exodus especially in the Eastern valley
- Short cuts from operators leading to worse exposures to FOG

HSEC Performance

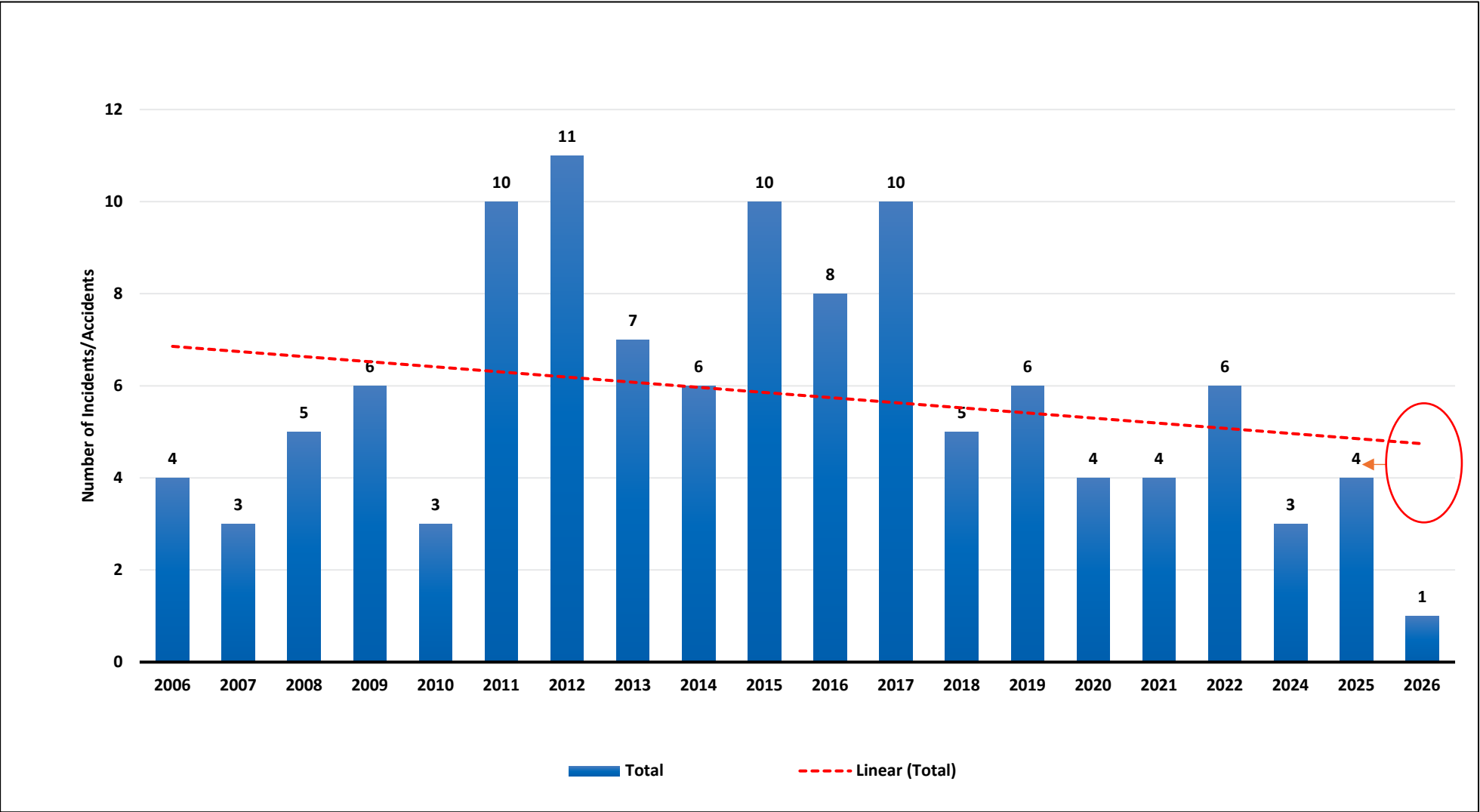
FOG Injuries Stats



Industry FOG Statistics from 2009 – 2025



FOG Statistics from 2006 – Y.T.D (All Shifts)



FOG Workshop Action Plan - 2026

Problem Statement	Action
Misalignment of the GCOM process with the Underground Procedures.	Align sequence of GCOM with the Entry Examination as well as Underground Production Procedure
	Retrain the relevant mining supervisors on the GCOM process
Quality of Handover from one shift to another	WCM - Investigate and align / improve, if possible, the shift handover according the ECM process.
Volume and logistics of paperwork	Issuing shift supervisors (mining division) with tablets to test the filling in of forms electronically
Large influx of supervisors (introduced ; (culture dilution)	Conduct PTO's on all new supervisors / mine overseers to assess and identify gaps in their workings, retrain with feedback received where required to close the gap
Quarterly Self Assessments and Annual Cross Audits	Reinstate quarterly self assessments and annual cross audits
People are not barring	Competent A Person added to each mining team on each shift to enforce the barring being done
	Develop a job profile and process flow on how to utilize the experience people used (must perform oversight for barring)
	ECM investigate a Best Practice team per Mine (entry examination being done correctly)
Availability of Rig, Bolters and Scalers	Trail - Use of artisans as an operator (ECM)

FOG Workshop Action Plan - 2026

Problem Statement	Action
In-stope Illumination	Reporting on implementation
Gap on strata identification for Team Leaders, Mine Overseers Shift Supervisors	To schedule and arrange on training completed
Full aerial coverage	Spread Sheet Development with different products what the potential costs, accessibility, practicality, additional people and implementation process will be (Frikkie to share his analysis that he has conducted already)
	Nets to be installed for face preparation and charging up activities at ECM and WCM
Poor Blasting Practices	Optimize blasting design (Best Practice Team)
New Technology available	Investigate alternative technology available i.e. drilling, blasting, barring etc.

Take Aways

- Need management support – cascade of interventions from the top
- Plan sections with at least 20% contingency to allow negotiation of adverse ground.
- Grow your own timber - train your own people – don't wait for others to train and then you steal.
- Create an environment where people want to work here – be **very intentional** in what you want to achieve.
- Listen to inputs from operators – they know more than you anyway

Take a step back and act swiftly when you detect an issue.

- Employee centered Leadership as opposed to production centered Leadership (Player 23)
- Jonnie Warker MANTRA – **keep on walking** –with the belief that **Zero Harm is possible**



GLENCORE

Thank You

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