



**MINING INDUSTRY
OCCUPATIONAL
SAFETY & HEALTH**



**MINERALS COUNCIL
SOUTH AFRICA**

ADVANCING ZERO HARM THROUGH TARP-DRIVEN GROUND CONTROL AT MASAKHANE D1 SHAFT

MINING COMPANY

SibanyeStillwater

COMMODITY

Gold

OPERATION

Driefontein Operation
Masakhane Shaft

HEALTH AND SAFETY SUCCESS STORY

TARP

(Trigger Action Response Plan)

NUMBER OF EMPLOYEES AFFECTED BY SUCCESS STORY

± 1500 (UG workers)

STAKEHOLDERS CONSULTED

Unions and
Health & Safety Structures

STAKEHOLDERS AFFECTED

Mining & Engineering

- Team Leaders
- Safety Reps
- Miners
- Shift bosses
- Foreman's
- Mine Overseers
- Managers
- Service Departments
(Safety, Geology, RME, Survey)

TOPIC

**TARP Driven Geotechnical
Risk Management:**

Masakhane D1 Shaft Case Study

EXECUTIVE SUMMARY

Driefontein Operation's eleven year falls of ground record shows what disciplined, systems led risk management delivers: FOG accidents fell from a peak of 31 in 2017 to single digits in recent years, with one in 2023 and none recorded year-to-date in 2026, see figure 1 for FOG accident trend at Driefontein Operations. As mining moves off the depleted Carbon Leader Reef onto the structurally harder Venterspost Contact Reef (VCR), where accidents have crept up to five in 2025, the Trigger Action Response Plan (TARP) is what keeps that migrating risk from converting into harm.

This case documents TARP's application at the VC3825 10W panel, a top ten producing panel on the VCR affecting some 1,500 underground workers. A steeply rolling reef ($\approx 45^\circ$) produced excessive stoping width, a fractured and overhanging hangingwall, brows, and overextended omni props, compounding hazards that degraded both safety and grade. A frontline crew escalated the conditions, triggering a TARP Level 3 specialist investigation, and the seven step response followed: enforcement of the approved support standard, full reef exposure, strict stoping width control, and reinforced steep area controls (lifelines and mandatory safety belts).

The panel is now mined with the reef fully exposed, support installed to specification, and hangingwall stability restored, improving safety and ore grade together, with no injury. The operation's results earned external recognition for best improved safety performance and best adopter mine for FOG leading practices. The transferable lesson is that proactive frontline escalation, backed by training, routine MOSH assessment and visible TARP tracking, is what turns a leading practice into a measurable result.

FOG ACCIDENT TREND - DRIEFONTEIN OPERATIONS

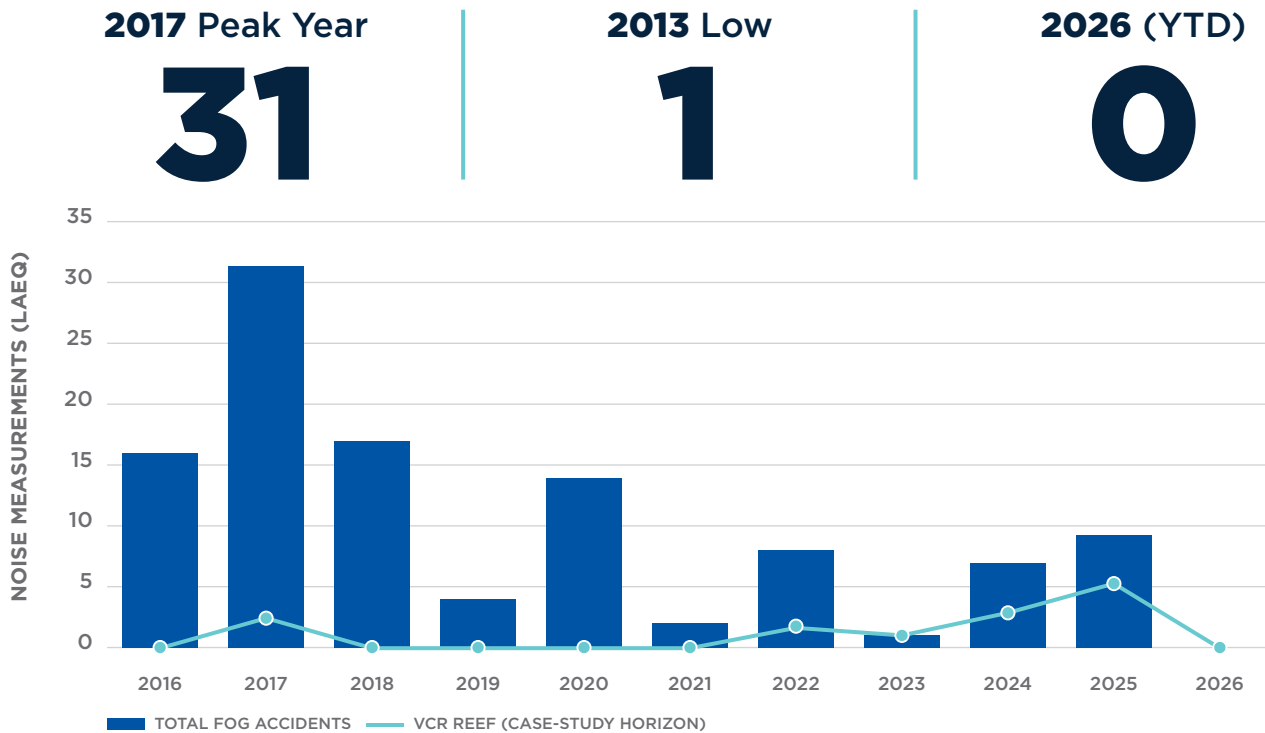


Figure 1: FOG Accident Trend - Driefontein Operations.

INTRODUCTION

Sibanye Stillwater Gold has adopted the Trigger Action Response Plan (TARP) as a structured risk management system to identify, assess, and control high risk geotechnical hazards, including rolling reef conditions. TARP forms part of the company's proactive approach to managing hazardous ground conditions and ensuring a safe and healthy underground working environment in line with the Zero Harm strategy.

This report documents the effective application of TARP at Masakhane D1 Shaft, specifically at the VC38 25 10W panel. In response to significant geotechnical challenges and heightened safety risks, the proactive implementation of

TARP delivered measurable improvements in ground control, operational discipline, and occupational safety, reinforcing the company's commitment to Zero Harm.

TARP consists of three escalation levels:

Level 1 - normal mining in accordance with standard procedures; **Level 2** - intervention by a Shiftboss or Mine Overseer, including barricading; and **Level 3** - intervention by a Strata Control Officer or Rock Engineer, Geologist, and Mine Overseer or Manager, including barricading. TARP levels are determined through MOSH inspections and routine shift examinations.



Sibanye Stillwater SA Gold Operation

FULL DESCRIPTION OF THE RISK ADDRESSED

The majority of the Carbon Leader Reef (CLR) had been extracted between dip pillars, with subsequent development undertaken towards the Venterspost Contact Reef (VCR) to open additional mineable ground. The presence of a previously left pillar introduced design constraints, particularly in relation to infrastructure placement and mining configuration, due to the differing strike orientation of the VCR.

Current mining activities at Masakhane D1 Shaft are focused on the Venterspost Contact Reef, including the VC38 25 raise line. From a geotechnical perspective, the VCR is characterised by weak hangingwall lava and competent footwall quartzite. Stope stability within this reef horizon is influenced by geological structures such as faults and joints, as well as variations in reef dip.

In response to deteriorating ground conditions and emerging geotechnical risks, the crew escalated the matter to the responsible Shiftboss who initiated a TARP Level 3 investigation in accordance with the approved TARP procedure.

A TARP Level 3 site inspection was subsequently conducted at the VC38 25 10W panel due to the presence of a steeply rolling reef and challenges associated with supporting the panel. Identified conditions included excessive stoping width, steep area exposure, a fractured hangingwall, and the development of brows. Geological assessment confirmed that the reef was rolling steeply on both dip and strike, with an inclination of approximately 45 degrees, necessitating higher level intervention and control measures.

Hazard	Level	Remedial action
Minor Fault, Dyke, Roll with no or little displacement (reef on other side exposed)	T 1	Make safe Install temporary support Support feature on both sides
New exposure on face. Flat dipping discontinuity (less than 35 degrees to normal strata / hanging wall)	T 2	Make safe Install temporary support Support discontinuity on both sides
Major Fault, Dyke, Roll which results in a change in stoping width. (reef not exposed on other side)	T 3	Barricade off the affected area. Log in miner's declaration book Notify the T3-team

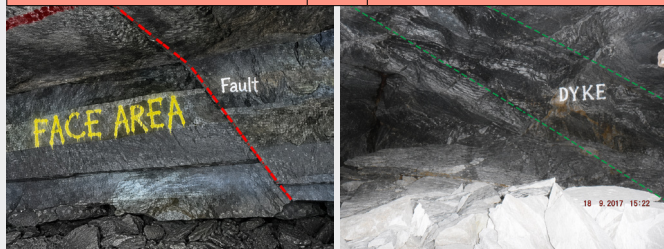


Figure 2: Geological Features.

Hazard	Level	Remedial action
Face shape not straight. Full line of support cannot be installed.	T 1	Make safe Drill shorter blast holes at leading portion of face
Overhanging face more than 30cm	T 2	Make safe Use longer top holes to correct overhanging face
Overhanging face combined with High stope width >2.0 m	T 3	Barricade off the affected area. Log in miner's declaration book Notify the M-team



Figure 3: Face shape.

During the TARP Level 3 assessment at the VC38 25 10W panel, several critical conditions were identified. These included steep area exposure associated with the rolling reef, an overhanging face profile, partial off reef mining that adversely affected panel grade—and consequently the overall shaft grade, given the panel's ranking among the top ten producing panels—as well as excessive footwall waste. The elevated stoping width resulted in the over extension of installed omni props beyond their design specification, compromising support effectiveness.

Following the implementation of TARP, in line with the seven prescribed steps—namely TARP training, planning classification, hazard identification, response team mobilisation, mitigation and response, treatment and control, and review—conditions at the VC38 25 10W panel showed marked improvement. Key interventions included the application of the approved support standard (MSI 1# 2025 01K – 10.6 m tight end heading, one dip strike gully), full exposure of the reef to improve panel grade and reduce dilution, and the enforcement of controlled stoping widths to ensure support units were installed strictly in accordance with specification.

In addition, steep area controls were reinforced through the installation of lifelines, and safety belts were issued to all crew members, with mandatory use enforced until steep area conditions were adequately stabilised.

FINDINGS AND LESSONS LEARNED FROM THE ADOPTION OF THE LEADING PRACTICE

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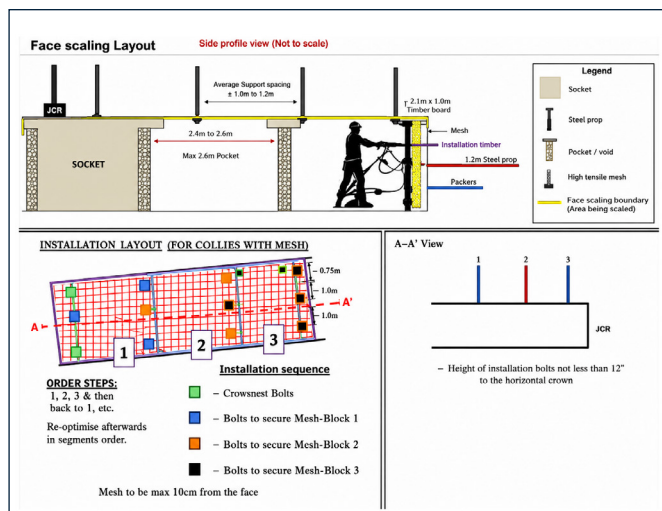


Figure 4: MSI 1# 2025 01K - 10.6m Tight-end heading (One dip-strike gully).

The implementation of TARP at the VC38 25 10W panel highlighted several key findings and lessons relevant to the adoption of leading and company-approved best practices.

1 GEOTECHNICAL DRILLING

The assessment confirmed the importance of conducting adequate geotechnical drilling ahead of mining activities to improve understanding of anticipated ground conditions and associated geotechnical challenges.

2 GROUND CONDITIONS

Variable reef dip contributed to widespread fracturing and deterioration of the hangingwall, resulting in blast damaged conditions. These conditions manifested as significant hangingwall fractures and adverse mining features, including the formation of brows, which elevated fall of ground risk.

3 STOPPING WIDTH CONTROL

The support design limit of 2.2 m was exceeded, resulting in elevated stoping widths. This led to the over extension of primary support elements (PSEs) during installation and pre stressing, negatively affecting support installation and performance. Excessive stoping widths were also associated with a reduction in omni prop load capacity, leading to instances of buckling.

4 WASTE MINING AND DILUTION

Mining across steeply rolling reef sections increased the extraction of footwall waste, resulting in higher ore dilution due to the reef dipping at approximately 45 degrees. This dilution adversely affected ore grade and had a direct economic impact on the operation.

Notably, the prompt response by the responsible workplace personnel and the TARP team in addressing the identified hazards at VC38 25 10W contributed significantly to restoring and maintaining a safe and healthy working environment, in line with the Zero Harm strategy. The experience reinforced the effectiveness of company-adopted systems, mine standards, and safety programmes when applied proactively.

Key enablers included early and ongoing training of underground crews (refer to Appendix 1), focused on hazard identification and reporting in accordance with TARP procedures, routine MOSH assessments, and the installation of appropriate support measures, including full face netting to contain loose hangingwall material. These interventions demonstrated tangible safety and operational benefits and reaffirmed the value of proactive engagement with established leading practices in mine safety and geotechnical risk management.



Figure 5: Conditions prior to TARP visit
(Reef Rolling Steeply, Off Reef, High SW).

The panel is currently mined with the reef fully exposed, resulting in improved ore grade and a reduction in dilution associated with excessive footwall waste extraction.

The enforcement of controlled stoping widths has improved the performance and condition of installed support units. Support props are now installed in accordance with design



Figure 6: Post TARP -
Reef fully exposed and face not overhanging.

specifications, with no over extension, thereby enhancing overall hangingwall stability within the panel.

Steep area controls have been fully implemented, including the installation of a lifeline. All crew members have been issued safety belts, with mandatory use enforced until steep area conditions are adequately improved and stabilised.

AWARDS



Figure 7: Best improved safety performance.



Figure 8: Best Adopter Mine - FOG Leading Practices.

APPENDIX 1:

TRAINING SESSIONS (MEETINGS & TESTS)



ATTENDANCE REGISTER				
REMARKS				
Source Employee is committed to collecting, assessing, and secure and control of identified or identified personal information/employee details in accordance with the requirements of the Protection of Personal Information Act, 2013 (POPIA).				
We will use your personal information only for the purposes for which it was collected.				
For more information on the protection of your personal information, please visit our Privacy Statement on https://www.sibanye-tilwaater.com/privacy-policy				
If you provide your information for any other purpose besides the reasons stated, or that your information is being used for a purpose other than the one for which it was originally intended, you may contact us on info@sibanye-tilwaater.com				
Date of Meeting	18 March 2025	Title of Meeting	Safe Production Meeting and TARP Session (Shiftbosses)	
Time of Meeting	0400	Location	Masakhane Shaft Boardroom	
Name and Surname	Designation	Industry	Contact	Signature
✓ [Redacted]	S/Boss 5	[Redacted]	1542	[Redacted]
✓ [Redacted]	S/Boss 3	[Redacted]	1509	[Redacted]
✓ [Redacted]	S/Boss 3	[Redacted]	1507	[Redacted]
✓ [Redacted]	S/Boss	[Redacted]	1824	[Redacted]
✓ [Redacted]	S/Boss 10	[Redacted]	1326	[Redacted]
✓ [Redacted]	S/Boss 3	[Redacted]	1585	[Redacted]
✓ [Redacted]	S/Boss +S 11	[Redacted]	1472	[Redacted]
✓ [Redacted]	S/Boss 7	[Redacted]	1090	[Redacted]
✓ [Redacted]	S/Boss 11	[Redacted]	1432	[Redacted]
✓ [Redacted]	S/Boss & N/S	[Redacted]	1324	[Redacted]
✓ [Redacted]	S/Boss 9	[Redacted]	1824	[Redacted]

Figure 9: Training per shift done by HODs.

Figure 10: Example of attendance registers.

T.A.R.P training																
Maskahane Shaft																
Section	Designation	No. to be trained		Date: 13-03-2025		Date: 18-03-2025 (NS&D's) & 19-03-2025 (ME)		Date: 20-03-2025		Total complete		Still to be trained		Percentage Complied		
		NS	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS	DS	
MOD's	Manager's	0	2					2			0	2	0	0	#DIV/0!	100%
	Mine Overseer	0	0								0	0	0	0	#DIV/0!	#DIV/0!
Aerocrete	Shift Bosses	0	1			1					0	1	0	0	#DIV/0!	100%
	Miners	0	1			0		1			0	1	0	0	#DIV/0!	100%
Section 91	Mine Overseer	0	1					1			0	1	0	0	#DIV/0!	100%
	Shift Bosses	2	3	2	3			3			2	3	0	0	100%	100%
	Miners	4	8	2	3	2	5				2	8	2	0	50%	100%
	EU 53	0	1	0	0			1			0	1	0	0	#DIV/0!	100%
Section 5 Sweets & Yampa	Mine Overseer	0	1			1					0	1	0	0	#DIV/0!	100%
	Shift Bosses	0	2						1		0	2	0	0	#DIV/0!	100%
	Miners	0	2			2					0	2	0	0	#DIV/0!	100%

Figure 11: TARP training tracker to ensure all employees trained.

Figure 12-14: Notice Boards, Mina Izwiles, Standards.

TARP TRACKERS

Section ID / Working	Planning Remark	Planning Remark	1st TARP Trigger	2nd TARP Trigger	3rd TARP Trigger	4th TARP Trigger	5th TARP Trigger	6th TARP Trigger	7th TARP Trigger	8th TARP Trigger	9th TARP Trigger	10th TARP Trigger	11th TARP Trigger	12th TARP Trigger	13th TARP Trigger	14th TARP Trigger	15th TARP Trigger	16th TARP Trigger	17th TARP Trigger	18th TARP Trigger	19th TARP Trigger	20th TARP Trigger	21st TARP Trigger	22nd TARP Trigger	23rd TARP Trigger	24th TARP Trigger	25th TARP Trigger	
Section 201 / Working																												
10-25-08																												
10-25-09																												
10-25-10																												
10-25-11																												
10-25-12																												
10-25-13																												
10-25-14																												
10-25-15																												
10-25-16																												
10-25-17 & 18																												
Section 201 / Working																												
10-25-19			✓	End Shift of 1st cell	24/02/24	Step 2	As-built Area 4 checked again	Step 2																				
10-25-20			✓	End Shift of South Area	24/02/24	Step 3	As-built Area 4 checked again	Step 3																				
10-25-21																												
10-25-22																												
10-25-23																												
10-25-24																												
10-25-25																												
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10-25-33																												
10-25-34																												
10-25-35																												
10-25-36																												
10-25-37																												
10-25-38 & 39																												

VC38-25 BW	N/A	N/A																										
VC38-25 10W Up-dip	N/A	N/A	2	Reed cell	20/2/2021	3	Change of Liquor above sreebe.																					
Other - Sections	Planning TARP	Planning remark	UG TARP Trigger	UG TARP Reason	Date TARP Pick Up	TARP 1/2/3 Team Investigated	Instruction to mitigate IPC	16-Feb	17-Feb	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb														

Figure 15-17: TARP 1, 2 and 3 Trackers.

TARP REQUESTS

Request for High Level Visit at VC 38/25 10W

Summarize

Reply Reply All Forward ...

To: [Redacted]

2 - Company confidential – internal use only

You replied to this message on 2026/01/29 05:41.

Good Morning

May we please have a high-level visit for VC 38/25 10W due to the rolling reef and the challenges of supporting the panel. After the visit done by the geology department it was picked up that the reef is still rolling high at a dip of 45 degrees, and there is a portion where we still have reef in hanging wall and the stoping width is already exceeding 3m.

Thank You

Figure 18: TARP 3 Visit Request.

TARP INSTRUCTIONS & FOLLOW UPS

Sibanye Stillwater **Instruction Notice** 39802

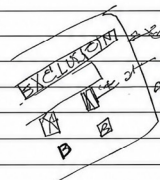

Date	02-02-2026	Shift	1st	Section	11
Working Place	VC38-25 10w	Level	38-25 10w		
Shape of Fissure (name)	[Redacted]	Miner (name)	[Redacted]		
Exact Location of Working Area/ Machinery (PEG ID's / Post) Heading 10w					

The described working area / machinery are hereby stopped with immediate effect due to:

Health & Safety	<input checked="" type="checkbox"/> Standards	Survey	<input checked="" type="checkbox"/> Geology	<input checked="" type="checkbox"/> TARP	<input checked="" type="checkbox"/> Rock Eng
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Previous Classification: T1 T2 T3
 Observed Classification: T1 T2 T3

Description / Source

	<ul style="list-style-type: none"> ① written on the fire nest water. ② install stop after cutrolis. ③ Apply 2 cross props are provided ④ intel metn 13m bolts & abertment ables on 30p face. ⑤ install stop head appor ables as in ce ⑥ bridge & nice to cross legs? for heading below strike ⑦ establish a yully systems with mesh & bolts ⑧ Blast a few of line with 100cc holes to "say line" & not requiring
	

Instruction Issued by:

Name	[Redacted]	Signature	[Redacted]
Occupation	VMRE	Time	10:00

Acknowledge by:

Name (Print) / Cert. Employee#	[Redacted]	Signature	[Redacted]
Occupation	2/Boss	Time	10:00

Mining Volume 2000

Figure 19: TARP Visit Instructions.

Sibanye Stillwater **Instruction Notice** 38652

Date	20/02/24	Shift	02.	Section	11
Working Place	38, 25 10w	Level	28'		
Shape of Fissure (name)	[Redacted]	Miner (name)	[Redacted]		
Exact Location of Working Area/ Machinery (PEG ID's / Post) 13825 10w / end.					


The described working area / machinery are hereby stopped with immediate effect due to:

Health & Safety	Ventilation	Survey	Geology	TARP	Rock Eng
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Previous Classification: T1 T2 T3
 Observed Classification: T1 T2 T3

Description / Sketch

count of 11. find fire state that changed. Steeps clipped side not exposed 15v. 2. high wall.



Instruction Issued by:

Name	[Redacted]	Signature	[Redacted]
Occupation	Plant Ops. Sum.	Time	08H54.

Acknowledged by:

Name (Print) / Cert. Employee#	[Redacted]	Signature	[Redacted]
Occupation	Miner.	Time	10#50

Mining Volume 2000

Figure 20: Follow-up TARP Instructions.