

Fact sheet

Human and organisational factors data review

January 2024

Introduction

An independent review has found that 74% of human behaviours associated with safety incidents and accidents over the past 5 years were due to unintentional error by individual workers.

Twenty-three percent of behaviours were assessed as intentional or routine non-compliances. There were no instances of intentional harm or sabotage.

Background

The NSW Resources Regulator engaged the Keil Centre to undertake a comprehensive, independent data review of all human and organisational factors analyses undertaken by the Regulator between August 2018 and May 2023.

The data comprised human and organisational factors analyses related to 267 notifiable incidents with 180 incidents at surface mines and 87 at underground mines.

The Regulator's human and organisational factors analysis tool (S-HOF) was designed in 2017 to analyse the human behaviours associated with safety incidents and accidents. It considers both unintentional behaviours (errors) as well as intentional non-compliances with rules or established processes. It also accounts for the performance shaping factors (from individual through to organisational level factors), which influenced the behaviour.

The purpose of the S-HOF analysis was to identify and implement systemic changes that would help reduce unsafe human behaviours that lead to adverse safety incidents. For more information on human and organisational factor definitions and terms please refer to the additional information section at the end of this document.

Findings

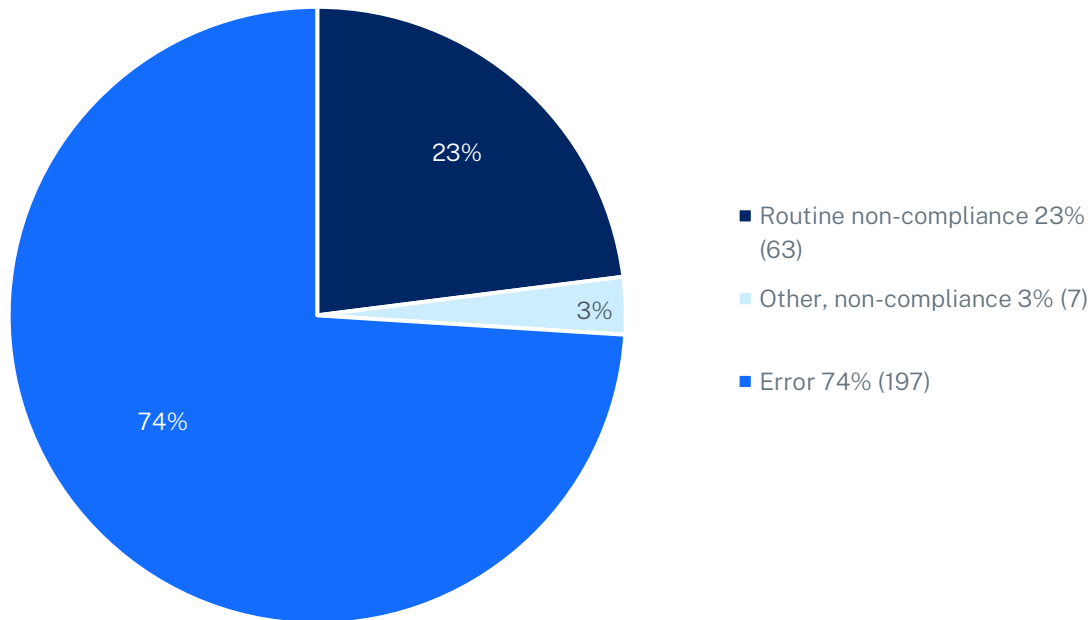
Behaviour types

- 74% of all analysed behaviours were assessed as unintentional errors by individual workers.
- 23% were assessed as intentional or routine non-compliances. That is, where the deviation from the rule or procedure was the accepted, normal way of getting the job done.
- The remaining 3% were attributed to a wide range of other factors.

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- There were zero instances of behaviours assessed as sabotage, where the adverse outcome was intended.
- This pattern was consistent across all operation types: surface, underground, large mines, small mines and quarries; and all mining sectors: coal, large mines (metalliferous and quarries), and small mines (metalliferous, quarries and other gemstones).

Figure 1. Total analysed behaviours from the S-HOF data 2018-2023



Performance-shaping factors

Of all the performance-shaping factors (PSF) identified in the assessed behaviours, the most prominent subcategory was safety management (organisational factors category)¹, followed by environmental conditions (work environment category), individual non-technical factors (personal factors category), and task demands (job factors category). See Figure 2 for the full breakdown.

¹ The S-HOF tool's Safety management category includes: risk management arrangements, worker participation and involvement, implementation of risk management arrangements, arrangements covering high risk work, change management, checking inspection and monitoring, investigation and audit findings, safety trend analysis and review practices, fatigue risk management, fitness for work management, contractor management, and emergency preparedness/management.

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Figure 1. Frequency of performance-shaping factors identified during investigations 2018–2023



When considering performance-shaping factors and error types, the following key links were identified:

Safety management

- Risk management arrangements influenced the incidence of all error types.
- Checking, inspection and monitoring influenced the incidence of all error types.
- Fatigue risk management influenced both sensory errors and action errors.
- Contractor management influenced thinking errors (decisions, judgements).

Environmental conditions

- Temperature, humidity and light influence all error types, but particularly sensory errors.
- This pattern is repeated with both time of day and roadway conditions.

Individual non-technical skills

- Situation assessment has the biggest impact across all behaviour types and is the most identified PSF.
- Situation assessment was noted to be a co-occurring PSF. That is, situation assessment was consistently linked with other PSF and was rarely the sole identified PSF. This is consistent with the understanding that situation assessment can be seen as an outcome of other PSF.
- The PSF most commonly co-occurring with situation assessment was temperature/humidity and light.

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- The majority of PSF co-occurring with situation assessment were not individual factors, but rather environmental, organisational, and task-related factors, which negatively affected individual performance.

Task demands

- Task demands impacted all error types as well as routine non-compliances.
- Mental demands of the task influenced all behaviour types.
- Time pressure influenced thinking errors, actions errors and routine non-compliances.
- Workload (high or low) influenced sensory errors and actions errors.

Individual technical competence

- Thinking errors (decisions, judgements) were most vulnerable to the influence of individual technical competence.

Note: the level of experience influenced all error types, as well as routine non-compliance, though not to the same degree as individual technical competence.

Key considerations

Section 15 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 requires that mine operators undertake a review of control measures following a notifiable incident, identification of a deficiency in their safety management system, or following adverse health monitoring results. This review should include reviewing systems of work and consider human and organisational factors. As such mine operators should consider the following:

- Given that most incidents involving human factors are the outcome of unintentional actions (errors), then the default assumption from organisations during an investigation should be that the behaviours involved were probably unintentional. A claim of intentional non-compliance must be supported by strong evidence.
- Instead of focussing on disciplinary responses to individual non-compliance, attention should be turned to error prevention, detection, and recovery controls as more impactful measures to influence safe behaviour.
- Many behaviours found to have contributed to safety occurrences (both errors and intentional non-compliances) were created by the ways that work was managed and organised, opposed to individual failings. Therefore, the responsibility for improvement lies mainly with organisations.
- There are notable performance-shaping factors that were shown to heavily influence performance across many incidents. These represented an opportunity to proactively apply controls within organisations and across industry. Methods such as safety critical task analysis, which incorporates the assessment of human performance risks, and attention to the design of tasks to support workers can positively influence the reliability of human performance in safety critical work.

Definitions and terms

The following definitions relating to error and intentional non-compliance types, as well as performance-shaping factors will assist in interpreting the findings of the analysis.

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Error types

	Definition	Examples
Sensory error	Where information input via senses is degraded	Mishearing an instruction from a colleague/supervisor Not seeing an oncoming vehicle
Thinking error	Action is carried out as planned, but the wrong course of action is taken. This includes decision-making errors, errors of diagnosis or judgement involving conscious mental processes.	Misjudging vehicle capability due to experience in a different vehicle Applying outdated procedure which doesn't apply to the current conditions
Action error	Where a simple, frequently performed physical action goes wrong	Opening the wrong valve Moving a switch in the wrong direction

Intentional non-compliance types

	Definition	Examples
Routine	Deviation from rules and procedures as the normal way of operating	Driving above the speed limit because everybody does it
Situational	Non-compliance with rules or procedures, due to situation-specific factors, so that non-compliance is perceived as the best way to get the job done	Changing sequence on a procedure to save time Adjusting a safety related device outside manufacturer specifications
Exceptional	Non-compliance is intended to solve a novel problem in highly unusual circumstances, so that non-compliance is perceived as the only way to get the job done	Skipping communication steps in a procedure during an emergency to return plant to safe operations and avoid catastrophic failure
Sabotage	An egregious act, where the non-compliance is intended to cause harm or damage	Deliberately putting plant into an unsafe state

Performance-shaping factors

Performance-shaping factors either optimise or degrade human performance on any given day/shift. They can include personal factors such as individual technical competence, fatigue or distraction; job factors such as workload, communication or ergonomics, work environment factors such as weather or time of day, team factors such as team dynamics, work practices or planning or organisational factors such as resourcing, training and competence, or organisational culture.

For further information on [human and organisational factors](#) visit our website.

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