

Incident contributing factors
industry guidance



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Introduction

A trend revealed through TSV Safety audits have revealed that bus operators generally do not effectively analyse causes of bus incidents with the aim of preventing recurrences. There may be a number of reasons for this, but the primary reason is probably that bus operators do not have access to practical tools or methods to conduct simple but effective incident cause analysis. TSV has developed the following guidance to assist bus operators to do so.

Incident definition

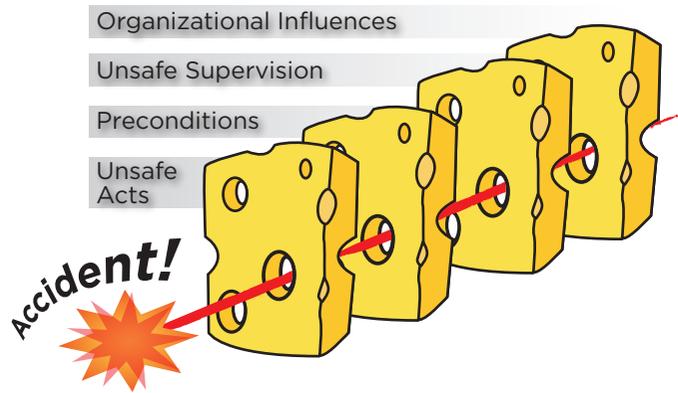
A bus incident, in relation to a bus operated by an accredited bus operator or a registered bus operator, means—

- (a) a circumstance, act or omission including—
 - (i) a collision with any person, vehicle, infrastructure, obstruction or object;
 - (ii) an implosion, explosion or fire;
 - (iii) any mechanical failure;
 - (iv) divergence from the highway;
 - (v) a failure to comply with applicable legislative requirements, vehicle specifications, bus standards or codes of practice—
 - where the circumstance, act or omission resulted in, or had the potential to result in the death of, or serious injury to, any person, a loss of control of the bus, or significant damage to property; or
- (b) an accident or incident that results in a person requiring immediate treatment as an in-patient in a hospital; or
- (c) a circumstance where the driver of the bus is in contravention of the bus operator’s alcohol and drug management policy.

It is important to note that the definition captures circumstances, acts or omissions that “had the potential” to result in the specified adverse outcomes.

Background

The Swiss-cheese model¹ (below) takes a systems approach to incident analysis. With this approach, human error is viewed as a symptom of a larger problem in an organisation and not simply the cause of incidents. Barriers are generally established in an organisation to prevent incidents and, to be most effective, multiple layers of barriers are established. Reason (1997)¹ argues that most organisations have established four separate levels of barriers. The four levels of barriers are sequential in nature, meaning that those levels at the top affect the levels below. Within each level, failures can cause holes in safety barriers. These failures can either be active, (occurring immediately prior to an accident and directly impacting events), or latent (removed both temporally and physically from the event and not exhibiting a direct impact).



This guidance recommends the “Five Whys” methodology, as a method for analysis of incidents and to generate appropriate risk treatments (remedial actions).

¹ Reason, J. (1997). *Managing the risks of organizational accidents*. Hampshire, UK: Ashgate.

Five Whys

The Five Whys Technique is used for incident cause analysis². By repeatedly asking the question “Why” (five is a good rule of thumb), it is possible to peel away the layers of symptoms which can lead to the root cause of a problem. Very often the reason for a problem will lead to another question. Although this technique is called “Five Whys,” you may find that you will need to ask the question more or less than five times before you find the issue related to a problem.

Benefits of the Five Whys

- Helps identify the root cause of a problem.
- Determines the relationship between different factors that contribute to a problem.
- It is a very simple tool that is easy to complete without statistical analysis.

When Is Five Whys Most Useful?

- When problems involve human factors or interactions.
- In day-to-day business life.

How to Perform the Five Whys analysis

1. Write down the specific problem or incident. Writing the issue down helps to formalise the problem and describe it completely. It also helps a team focus on the same problem.
2. Ask why the problem or incident happened.
3. If the answer you just provided doesn't identify the root cause of the problem that you wrote down in Step 1, ask why again, and write that answer down.
4. Continue asking why until the incident's root causes have been identified. Again, this may take more or less than “Five Whys”.

² [“Five Whys Technique”](#), adb.org. Asian Development Bank. February 2009. Retrieved 7 October 2016

Worked example of the Five Whys methodology:

1. Ask the “whys” and answer/identify cause:

Question	Answer/Cause
Why was there a fire in the engine compartment?	An oily rag was left in the engine bay after maintenance work had been completed.
Why was an oily rag left in the engine bay after maintenance work had been completed?	The mechanic was suffering from the effects of fatigue and did not notice he had left it there.
Why was the mechanic suffering from the effects of fatigue?	The mechanic had been working 12 hour shifts for the last seven days.
Why has the mechanic had been working 12 hour shifts for the last seven days?	The supervisor was covering sick leave by rostering staff for extra hours rather than temporarily bringing in additional staff to cover the short-term workload.
Why was the supervisor covering sick leave by rostering staff for extra hours.	Management does not look favourably on bringing in additional resources (and therefore spending extra money) to cover staff absences.

2. For each of the answers, consider and document treatment/s that may be implemented to eliminate or reduce the risk SFAIRP, as in the following example:

Question	Answer/Cause	Treatment
Why was there a fire in the engine compartment?	An oily rag was left in the engine bay after maintenance work had been completed.	Include a work area check on the job completion checklist.
Why was an oily rag left in the engine bay after maintenance work had been completed?	The mechanic was suffering from the effects of fatigue and did not notice he had left it there.	All bus safety workers (BSWs) must adhere to fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.
Why was the mechanic suffering from the effects of fatigue?	The mechanic had been working 12 hour shifts for the last seven days.	All BSWs must adhere to fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.
Why has the mechanic had been working 12 hour shifts for the last seven days?	The supervisor was covering sick leave by rostering staff for extra hours rather than temporarily bringing in additional staff to cover the short-term workload.	Specify that extra hours (overtime) must always be voluntary, and cannot be offered unless the worker is within fatigue hours limits, taking into account any secondary employment or personally fatiguing circumstances.
Why was the supervisor covering sick leave by rostering staff for extra hours.	Management does not look favourably on bringing in additional resources (and therefore spending extra money) to cover staff absences	Issue written policy that extra hours must always be voluntary, and cannot be offered unless the worker is within fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.

3. Enter risk, causes, and treatments into risk register

Ref. #	Risk	Cause	Likelihood	Consequence	Risk Rating	Treatment
	Fire caused by oily rag left in the engine bay	An oily rag was left in the engine bay after maintenance work had been completed.				Include a work area check on the job completion checklist.
		The mechanic was suffering from the effects of fatigue and did not notice he had left it there.				All BSWs must adhere to fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.
		The mechanic had been working 12 hour shifts for the last seven days.				All BSWs must adhere to fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.
		The supervisor was covering sick leave by rostering staff for extra hours rather than temporarily bringing in additional staff to cover the short-term workload.				Specify that extra hours (overtime) must always be voluntary, and cannot be offered unless the worker is within fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.
		Management does not look favourably on bringing in additional resources (and therefore spending extra money) to cover staff absences				Issue written policy that extra hours must always be voluntary, and cannot be offered unless the worker is within fatigue hours limits, also taking into account any secondary employment or personally fatiguing circumstances.

4. Determine risk rating using risk assessment matrix, and to determine remedial action prioritisation.

5. Provide the Five Whys table to TSV (not mandatory). This is the three column table you completed in Step 2 of the above process.

Identifying trends and proactive safety

TSV will analyse Five Whys documents to identify where interventions may be needed and, more importantly, where low level incidents are occurring that are indicators of more serious issues. While traditional approaches are generally successful at preventing the same or similar incidents from happening again, TSV's analysis aims to be able to provide operators with a broader range of information to help prevent a variety of incidents from actually occurring.

Publication of incidents and their contributing factors

It is vital that the data gathered during near miss or incident analysis is shared among the bus industry. To facilitate the sharing of data, TSV intends to publish on its website de-identified incidents and their accompanying contributing factors.

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