

Does the crash have any of the characteristics of a Tired Driver Crash?		
1.1. The crash has the primary characteristics of a TDC The majority of TDCs meet at least one of the following criteria.	Tick all that apply	Notes
a. The crash vehicle rear-ended another vehicle or stationary object that was clearly visible for several seconds beforehand.		
b. The crash vehicle drifted out of lane or off the carriageway.		
c. The driver made no attempt to avoid the crash (e.g. no evidence of emergency braking or steering). However, see 1.2 below.		
1.2. The possibility that the driver was unconscious for reasons other than sleep can be eliminated.		Notes
a. If the vehicle travelled over bumpy terrain, a rumble strip or a kerb (which would be sufficient to wake a sleeping driver) was there evidence of evasive action? If there was no evasive action it is possible that the driver was unconscious or incapacitated for reasons other than sleep (e.g. due to a seizure).		
b. There is no evidence to suggest that the crash was a deliberate act on the part of the driver.		
1.3. The crash has the secondary characteristics of a TDC The criteria listed here are secondary characteristics. If a crash meets any of these criteria there is an increased likelihood that it was a TDC.	Tick all that apply	Notes
a. The crash was a single vehicle accident – no other vehicles were involved.		
b. Emergency service personnel attending the crash suspected driver tiredness as a cause.		
c. Prior to the crash the vehicle was seen swerving or veering out of lane.		
d. Prior to the crash the vehicle had an erratic speed profile.		
e. The crash occurred on a motorway or major trunk road.		
f. The crash occurred in the early morning (approx. 02:00 to 06:00) or afternoon (approx. 14:00 to 16:00).		See Fact Sheet 6
g. The driver was using caffeine, other stimulants or alerting devices in an attempt to stay awake (for example energy drinks).		See Fact Sheet 8

INVESTIGATION PROCESS

The Investigation process is summarised in figure 1. This procedure has been developed to assist investigators to identify and investigate crashes where fatigue is suspected of being a contributory factor.

- Levels 1-2 estimate the **likelihood that the individual was suffering from fatigue** at the time of the incident, based on prior work and rest patterns. If sufficient information is available, the scoring system on page 4 can also be used to calculate the individual's **Fatigue Index Score** at the time of the incident. The **worksheet** (page 5) can be used to record the number of full rest days in the last month.
- Level 3 investigates whether the **individual exhibited fatigue-related behaviours** leading up to the incident.
- Level 4 explores whether this incident shows **evidence of fatigue-related errors**: the kind of mistakes people typically make when they are tired.
- Level 5 should be used when fatigue is suspected – this will help to pinpoint the **precise causes of the individual's fatigue**.

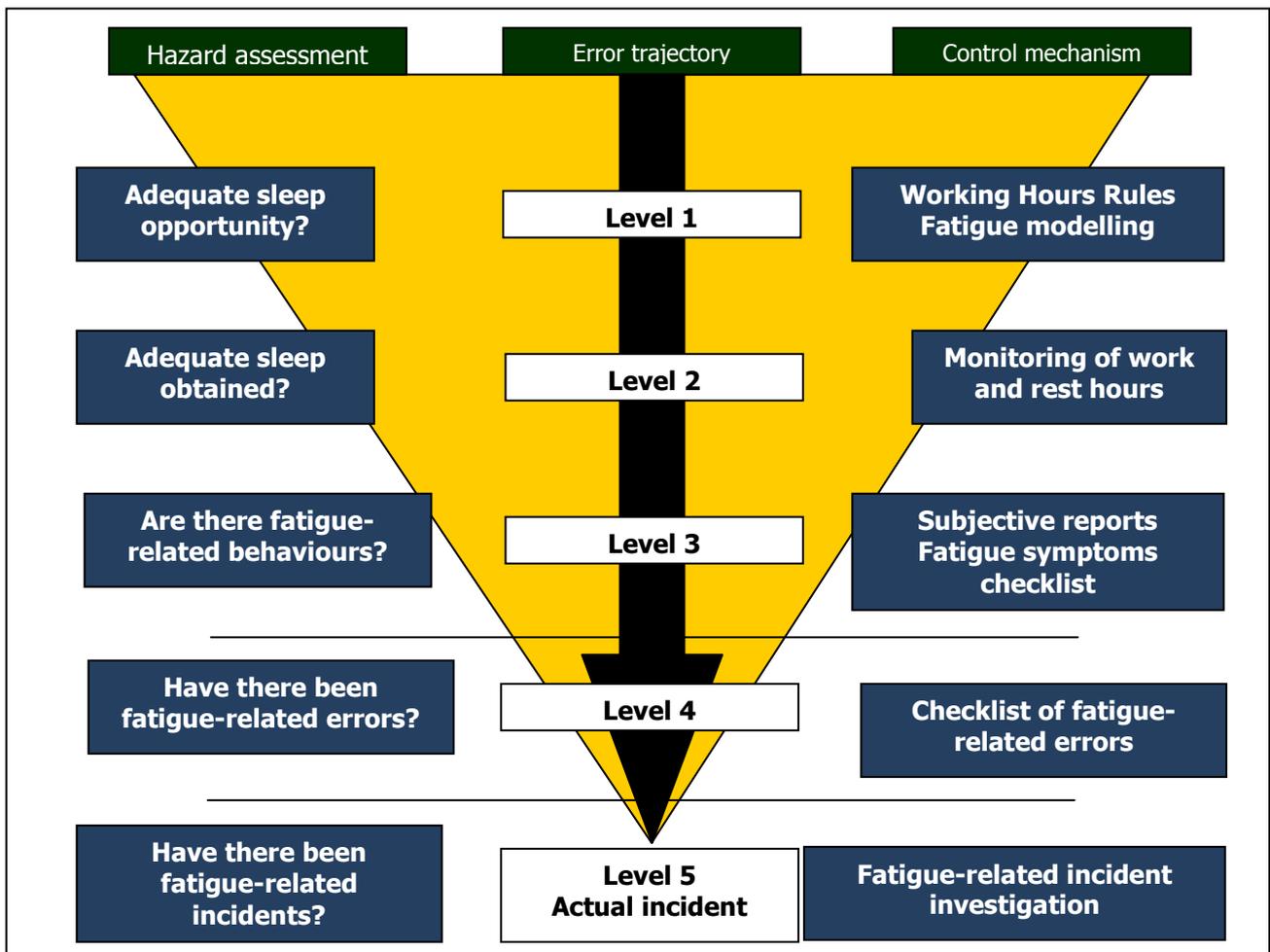


Figure 1: Fatigue risk trajectory. There are multiple layers that precede a fatigue-related incident, for which there are identifiable hazards and controls.

(Adapted from Dawson and McCulloch (2005): Managing Fatigue: it's about sleep, **Sleep Medicine Reviews** 9(5) pp.365-380)

Data Collection		
Level 1: Did the individual have sufficient time off to obtain adequate sleep?	Yes / No	Number of hours of rest
On the day of the incident did the individual commence work having had <u>less than 10 hours continuous rest</u> ?		
Level 2: Did the individual obtain adequate sleep?	Yes / No	Number of hours of sleep
Did individual <u>sleep for less than 6 hours</u> in the 24 hours prior to the incident?		
	Yes / No	Number of hours awake
Had the individual been <u>awake for more than 16 hours</u> in the 24 hours prior to the incident?		
Level 3: Is there evidence of fatigue-related behaviours?		
Did the individual experience any of the following behavioural signs of tiredness in the hours prior to the incident (Either self-reported, or reported by colleagues or family members)?	Yes / No	
a. Difficulty keeping eyes open or heavy eyelids		
b. Head nodding		
c. Repeated yawning		
d. Reported tiredness		
e. Reported (by others) to be looking tired		
If the answer to any of the questions in levels 1-3 is 'yes' it is likely that the individual was suffering from fatigue at the time of the incident. If there is sufficient data available use the fatigue index scoring system overleaf to calculate the individual's fatigue score.		

Calculate the Fatigue Index Score for this incident

Calculate the Fatigue Index Score for this incident	
1. Did the individual experience any of the following fatigue symptoms while on duty prior to the incident?	Tick if this symptom was present
a. Forgetfulness	
b. Distraction	
c. Sore muscles	
d. Decreased motivation	
e. A desire to sit or lie down	
f. Difficulty keeping eyes open	
g. Difficulty operating equipment	
Number of symptoms present	(S)
<i>The individual did not experience any symptoms of fatigue (tick if applicable)</i>	
<i>It was not possible to collect evidence of fatigue symptoms (tick if applicable)</i>	
2. How many hours had been worked?	Total
How many hours had individual worked in the 24 hours prior to the incident?	(WH)
3. How many hours had been slept?	Total
How many hours sleep had the individual obtained in the 24 hours prior to the incident?	(SH)
Fatigue Index Formula	Fatigue Index Score
<p>S (21.4) + WH (6.1) – SH(4.5)</p> <p><i>S = total number of fatigue symptoms</i></p> <p><i>WH = total number of hrs worked in the last 24 hrs (to the nearest tenth)</i></p> <p><i>SH = total number of hrs slept in the last 24 hours (to the nearest tenth)</i></p> <p><i>e.g. (3 Symptoms x 21.4) + (10 Work Hrs x 6.1) – (5 Sleep Hrs x 4.5) = <u>102.7</u></i></p>	
Interpreting the Fatigue Index Score	
Scores of 50 or above	There is a strong likelihood that the individual was suffering from fatigue at the time of the incident.
Scores less than 50	If the Fatigue Index Score is less than 50, and the answers to the questions in Levels 1 – 3 were all 'no', then it is unlikely that the incident is fatigue-related.
This Fatigue Index Scoring system and the weightings in the formula are the result of research undertaken by the US Coast Guard Research and Development Centre.	

Level 4: Is there evidence of fatigue-related errors?

Fatigue affects a range of cognitive skills.

Does this incident show evidence of any of these fatigue-related errors or failures?

4.0 Sleep	Notes:	Tick any that apply
Individual was asleep at time of incident	If there is evidence that the individual was asleep at the time that the incident occurred proceed to Level 5.	
4.1 General Alertness	Notes	
Failure to attend to relevant information	e.g. failure to respond to warning signs that should have been evident to a fully alert person.	
Failure to filter irrelevant information	The individual was focusing on non-relevant information at the expense of more important information.	
Inability to maintain concentration	The individual suffered lapses in concentration, e.g. during tasks requiring prolonged vigilance.	
4.2 Memory	Notes	
Short-term memory problems	The individual was forgetful or failed to correctly recall recent information or instructions.	
Long-term memory problems	The individual failed to follow established or learned procedures.	
4.3 Mental simulation ability	Notes	
Impaired decision making	The individual displayed poor judgement in the decisions taken.	
Impaired problem solving	The individual selected inappropriate strategies for dealing with a problem that led to or contributed to an error.	
Impaired risk assessment	The individual's ability to assess the risks associated with a particular situation or course of action were impaired.	
Inability to anticipate likely outcomes	The individual failed to anticipate the likely sequence of events that would result from his/her behaviour.	
4.4 Performance insight	Notes	
Inability to recognise own errors	The individual did not notice errors or failed to change behaviour when these errors should have been evident.	
Failure to recognise impairment	The individual failed to recognise that his/her performance was impaired.	
4.5 Other	Notes	
Errors	The individual accidentally did the wrong thing. The individual accidentally failed to do the right thing.	
Increased risk-taking	The individual took unnecessary risks that placed self, others or the business in jeopardy.	
Poor communication skills	Poor communication skills could result in incidents (e.g. one shift not giving full or accurate information to the next team at a shift handover).	
A failure on one of these dimensions alone would not necessarily indicate that fatigue caused the incident. However, failures on more than one dimension increase the likelihood of the incident being fatigue-related.		Total

Fatigue can also affect other aspects of behaviour that, while unlikely to lead to incidents, may provide further evidence of fatigue.

Mood	The individual is irritable / intolerant of others or loses temper over trivial matters. Fatigued individuals may also be listless or withdrawn and make little effort to interact with their colleagues	
Inappropriate behaviour	The individual behaved in a manner that would be considered inappropriate for the circumstances and was unaware, unable or unwilling to control their behaviour. E.g. being verbally or physically aggressive during a meeting, being rude or losing temper with a client etc.	

Level 5. What are the possible causes of the individual’s fatigue?

Where an individual is considered to have been suffering from fatigue and the incident was caused by a fatigue-related error, the investigation process should seek to identify possible reasons for the fatigue or tiredness that caused the incident, so that appropriate countermeasures can be implemented to help prevent future, similar incidents occurring.

5.0 Circadian effects	Questions to ask (see also fact sheet 1)	Tick any that apply
a. Time of Day effects	Did the incident occur at a time of the day when we are at our least alert, i.e. between 2-6am or between 3-5pm?	
b. Jet lag effects.	Had the individual taken an international flight crossing more than one time zone in the week preceding the incident?	
5.1 Medical	Questions to ask (see also fact sheet 2)	Tick any that apply
a. The individual had been diagnosed with a sleep disorder.	If yes, was the disorder effectively treated? Has the individual been using his/her treatment? When was the effectiveness of the treatment last reviewed i.e. when did the individual last see their doctor about the treatment?	
b. The individual is suspected of having a sleep disorder	Is there evidence that the driver had excessive daytime drowsiness (e.g. regularly taking naps or falling asleep at work?)	
c. The individual is suspected of having sleep apnoea.	<i>Does the individual exhibit the symptoms or risk factors for sleep apnoea:</i>	
	Stopping breathing or choking during sleep	
	Frequent loud snoring	
	Prone to excessive daytime drowsiness	
	Severely overweight (BMI >30)	
d. The individual had a medical condition that can cause sleep difficulties.	Collar size >17inches	
	Male, aged > 50 years	
	For example, was the individual suffering from depression or chronic pain prior to the incident?	

5.2 Drugs or alcohol	Questions to ask <i>(see also fact sheets 3 and 4)</i>	Tick any that apply
a. The individual was taking prescribed medication that promotes drowsiness or alertness.	<p>Was the individual taking any prescribed medication? If yes, does this medication promote drowsiness? How much was the individual taking per day? When was it last taken?</p>	
b. The individual was taking over-the-counter (OTC) medicines that promote drowsiness.	<p>Many OTC medications for travel sickness, allergy, cold and flu and sleep problems can promote drowsiness. Had the individual used any OTC medicines in the week prior to the incident? If so what had the individual taken? How much was the individual taking per day? When was it last taken?</p>	
c. The individual was using caffeine or OTC medications to promote wakefulness.	<p>What was taken? How much, how often and when was it last taken? Could these products have impacted on the individual's sleep? Did the effects of the products wear off just prior to the incident, possibly leading to a rebound in tiredness?</p>	
d. The individual was using illicit stimulants.	<p>What was taken? How much, how often and when was it last taken? Could these products have impacted on the individual's ability to get to sleep? Did the effects of the products wear off just prior to the incident, possibly leading to a rebound in tiredness?</p>	
e. Alcohol could have disturbed the individual's sleep and/or multiplied the degree of tiredness the individual was experiencing.	<p>What is the individual's history of use? How much, how often and when was it last taken? Alcohol consumption prior to sleep can disrupt and curtail sleep, thereby increasing tiredness. In addition, if the individual was already tired a small amount of alcohol at lunchtime could have increased the effects of tiredness mid-afternoon.</p>	
5.3 Sleep quantity and quality	Questions to ask <i>(see also fact sheets 5,6,7 and 9)</i>	Tick any that apply
a. The individual reported tiredness.	<p>Was the individual tired at the time of the incident?</p>	

	Do family, friends or colleagues recall the individual complaining about tiredness prior to the incident?	
b. Others thought the individual was tired.	Was the individual known for falling asleep or napping during work hours? Does anyone recall the individual looking tired on the day of the incident?	
c. The individual was suffering from sleep loss.	Use the tables on page 4 to record the individual's sleep / wake pattern in the days leading up to the incident. Where possible record bed time and wake time.	
d. The individual's sleep could have been disrupted by environmental factors.	Was the individual sleeping at home or elsewhere (e.g. hotel)? Was the sleep environment conducive to sleep (quiet, dark, cool)? Was the individual trying to sleep in a noisy environment (e.g. newborn baby in the house, sleeping during the day, noisy neighbours, roadworks)?	
e. The individual's sleep could have been disrupted due to stress or grief.	Was the individual experiencing a high degree of stress which could have adversely impacted on his/her sleep? Possible causes of stress could include divorce or relationship problems, bereavement, financial problems, a house move, family illness.	
f. The individual could have been suffering from sleep inertia.	How long was it since the individual last slept? Was the last sleep period within the last hour before the incident? For how long did the individual sleep?	
5.4 Work factors	Questions to ask (see also fact sheets 7, 8, 9 & 10)	Tick any that apply
a. Individual's hours of work promoted sleep loss.	Is the individual a shiftworker? Use the table on page 5 to record the individual's work and rest pattern for the weeks leading up to the incident. Use <u>actual</u> hours of work, not scheduled hours. Remember to consider second jobs and commute time.	
b. The individual was having difficulties coping with his/her hours of work.	Check company personnel records. Did the individual have a poor record of sickness and/or absenteeism? Do days off coincide with particular shifts or parts of the shift cycle?	
c. The individual was not using rest days to get adequate sleep.	How frequently did the individual work overtime on days designated as rest days? Had the individual worked on rest days in the weeks prior to the incident? Check pay records. Did the individual have a second job, or do other work on days off (paid or unpaid)?	

<p>d. Site culture promotes fatigue and tiredness.</p>	<p>Does the individual's employer have incentive schemes that inadvertently reward people for working excessive hours (e.g. excessive overtime rates)?</p> <p>Are individuals discouraged (inadvertently or formally) from being open about fatigue and tiredness?</p> <p>Is the culture 'work hard, play hard'?</p> <p>Would a person complaining of fatigue or tiredness be seen as 'letting the side down'?</p>	
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Notes:

If you have any questions or would like more information about investigating fatigue-related incidents please contact us:

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