



Office of Transport Safety Investigations

BUS SAFETY INVESTIGATION REPORT

DRIVER INCAPACITATION ON BUS 2635 ST

CAMMERAY

1 JULY 2016



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Once OTSI has completed an investigation, its report is provided to the NSW Minister for Transport and Infrastructure for tabling in Parliament. The Minister is required to table the report in both Houses of the NSW Parliament within seven days of receiving it. Following tabling, the report is published on OTSI's website at www.otsi.nsw.gov.au.

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EXECUTIVE SUMMARY

At 0846¹ on Friday 1 July 2016, a northbound State Transit Authority of NSW (STA) bus veered off Miller Street, Cammeray in Sydney and mounted a footpath, subsequently colliding with three cars and striking three pedestrians before coming to a halt. At the time of the incident, the bus was operating on Route 207 between Sydney central business district (CBD) and East Lindfield with 12 passengers on board. The bus was a 2014 built Scania bus, registration 2635 ST.

One pedestrian who suffered extensive injuries was airlifted to hospital and two other pedestrians and the driver were taken to hospital by NSW Ambulance service.

The investigation determined that the driver became incapacitated after suffering a medical seizure while operating the bus. As a result, the bus travelled for approximately 127 metres along the footpath on Miller Street in an uncontrolled state before coming to a halt.

Previously, in 2010, the driver had been involved in a separate motor vehicle accident and afterwards experienced a seizure in hospital. Six months after the date of the accident, the driver was allowed to return to normal bus driving duties contrary to the National Transport Commission and Austroads '*Assessing Fitness to Drive*' (AFTD) guidelines.

OTSI recommends that Roads and Maritime Services (RMS) ensure that incapacitated drivers of heavy vehicles, public passenger vehicles and bulk dangerous goods vehicles are assessed in accordance with the AFTD guidelines before resuming normal driving duties.

OTSI also recommends that STA works in collaboration with RMS to ensure, that should a bus driver become incapacitated while driving a bus, their return to work program complies with AFTD guidelines.

Since the accident, RMS has implemented an extensive list of remedial actions.

Full details of the Findings and Recommendations of this bus safety investigation are contained in Parts 3 and 4 respectively.

¹ Times in this report are in 24-hour clock form in Australian Eastern Standard Time.

PART 1 FACTUAL INFORMATION

Introduction

- 1.1 At 0844 on Friday 1 July 2016, the driver of STA bus number 2635 ST had a medical seizure while operating the bus. As a result, four persons including the driver of the bus were taken to hospital and a number of motor vehicles, shop facades and roadside infrastructure were extensively damaged.

Location

- 1.2 The accident occurred on Miller Street, Cammeray (see *Figure 1*). The nearest cross street was Amherst Street. Cammeray is approximately four kilometres north of Sydney's CBD. Miller Street consists of adjacent two-way traffic lanes with parking either side of the road. The bus was travelling in the northbound lane at the time of the accident. The speed limit posted for the area was 50 km/h.

Environmental Information

- 1.3 The morning of 1 July 2016 was cool and dry. A recorded temperature of 10.1°C was observed by the Bureau of Meteorology at 0900 at Sydney Observatory Hill, 4.1 km to the south-west of Cammeray. The environmental conditions did not contribute to the accident.

Bus Driver 2635 ST

- 1.4 The driver had been employed as a STA bus driver for the past 14 years at their Willoughby depot. The driver had no issues recorded in relation to work performance. The driver was the holder of a current RMS 'Authorised Bus Driver' accreditation and a RMS 'Heavy Vehicle Driver Licence' (HR, R)^{2,3}. Both the driver accreditation and licence had been issued without conditions.

² Prior to 1 November 2011 the 'Authorised Bus Driver' accreditation was issued by the Ministry of Transport (MoT) and the 'Heavy Vehicle Driver Licence' was issued by the Roads and Traffic Authority (RTA).

³ (HR, R) 'HR' is the RMS licencing code for any ridged vehicle with three or more axles and 'R' is for motor cycle.

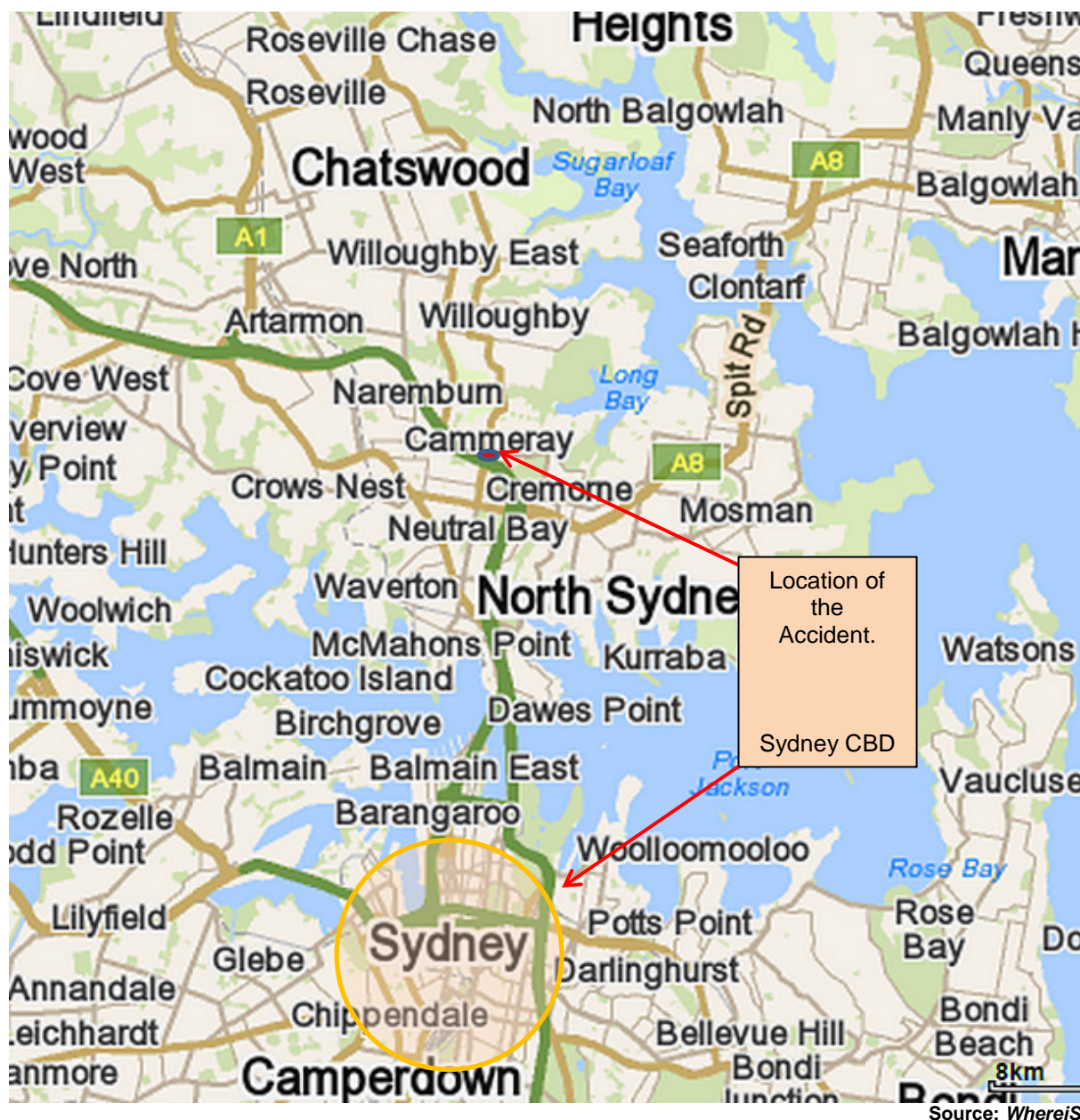


Figure 1: Locality map, arrow depicts Cammeray in reference to Sydney CBD

Bus Information

- 1.5 The bus was a 2014 K280UB Scania passenger bus. The bus chassis was purchased from Scania and the body was built and fitted by Bustech. The bus had two doorways with one located at the front near side ⁴ and the other near the middle of the bus (see *Photograph 1*). The bus tare weight was designated at 12600 kg and the Gross Vehicle Mass was 19100 kg. The bus was authorised to carry 68 passengers; 46 seated and 22 standing. The bus was carrying 12 passengers at the time of the incident.

⁴ The left side when looking forward within the bus is the near side. The right side (driver side) is the off side.



Photograph 1: Scania K280UB model 2014 bus

Development of the Accident

- 1.6 The bus driver started work at 0724 on STA roster number L464. Part of the shift required the driver to drive Route 207.
- 1.7 Bus 2635 ST departed on Route 207 at Gresham Street in the CBD at 0820 and was timetabled to depart Cammeray shops on Miller Street at 0843. STA bus MO 3729 departed on bus route 267 at Crows Nest and was due to depart the bus stop outside the Cammeray shops on Miller Street at 0844. On the day, bus 2635 ST was delayed and arrived behind MO 3729 at Cammeray shops.

The Accident

- 1.8 MO 3729 stopped at the Cammeray shops to drop off and pick up passengers at 0844. At 0844 bus 2635 ST briefly stopped at a bus stop on Miller Street near Falcon Street (one stop prior to the Cammeray shops bus stop).
- 1.9 At 0845, the bus driver of 2635 ST suffered a medical seizure as the bus approached the intersection of Miller and Amherst Streets, Cammeray. From this point onwards, the bus continued in an uncontrolled state. CCTV footage captured on board the bus revealed that the bus mounted the kerb outside the

'Pizza Olla' restaurant at Cammeray. The bus left the road travelling at approximately 16 km/h and its speed increased to 38 km/h before striking both road traffic control signals on the western side of the intersection of Miller and Amherst Streets. The bus returned to Miller Street by entering the left-turn lane to Abbott Street before re-mounting the kerb and travelling along the western footpath of Miller Street retail precinct (see Figure 2).

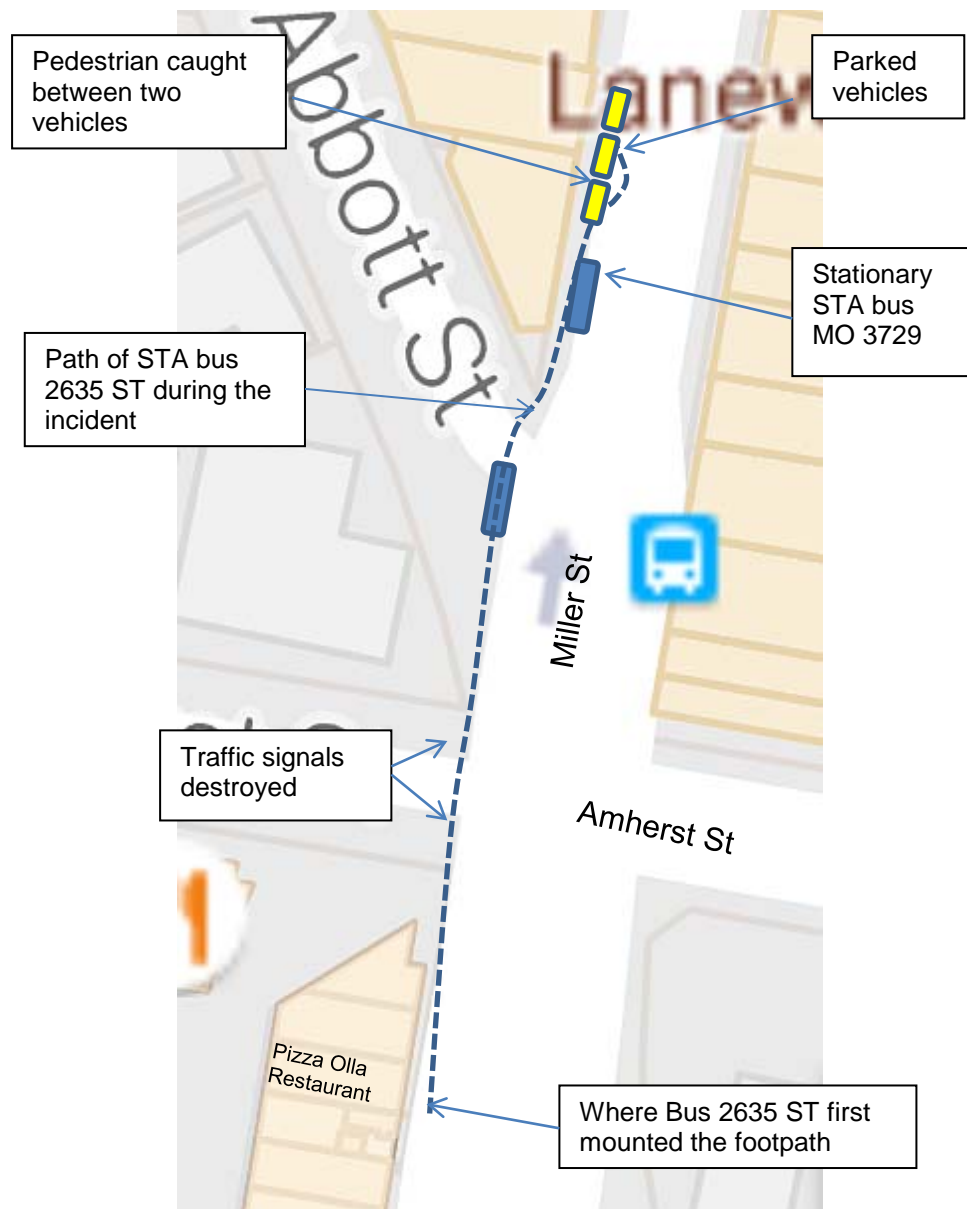


Figure 2: Dotted line depicts the pathway of the uncontrolled 2635 ST bus

At the time of the incident, MO 3729 was stationary at the Cammeray shops bus stop. Bus 2635 ST mounted the western-side footpath behind the stationary MO 3729 bus and travelled along the footpath between the shop

fronts and the near side of MO 3729. Two pedestrians seated at the bus stop adjacent to MO 3729 had to move from their position to avoid the approaching 2635 ST. Bus 2635 ST grazed the kerb side of MO 3729 and hit roadside infrastructure before veering back onto Miller Street directly in front of bus MO 3729 (see *Photograph 2*).



Photograph 2: Bus 2635 ST trail of roadside infrastructure damage

- 1.10 Bus 2635 ST then struck three vehicles on Miller Street. A pedestrian received serious injuries during the collision between bus 2635 ST and the parked vehicles (see *Photographs 1, 2 and Figure 2*).
- 1.11 At 0846, the bus came to a halt against the other vehicles involved in the final collision. The bus had travelled approximately 127 metres from the point where the driver lost control of bus 2635 ST until coming to a halt.
- 1.12 The pathway of bus 2635 ST was on a slight downhill grade. It was likely the bus's speed increased from 16 km/h to 38 km/h by an input from the driver's foot staying in contact with the bus's accelerator pedal. When interviewed, the driver of bus 2635 ST said that at that particular location the vehicle's

retarder⁵ was set at position three. In this position, the bus will immediately begin to decelerate if the driver lifts their foot off the accelerator pedal.

Post Accident

- 1.13 At 0847, the emergency services received a call for assistance. Fire and Rescue NSW, NSW Ambulance and NSW Police responded to the accident.
- 1.14 One pedestrian was airlifted by Careflight helicopter to hospital. The driver and two other pedestrians were also taken to hospital by road ambulance.
- 1.15 Three other passengers from bus 2635 ST received minor injuries when evacuating the bus and were treated by NSW Ambulance at the scene.
- 1.16 At the hospital, the driver of 2635 ST received treatment and was also drug and alcohol tested. Both tests returned a negative result.

Passengers Evacuation

- 1.17 The passenger evacuation from 2635 ST was observed by reviewing the onboard CCTV footage. The footage revealed that some of the passengers made their way to the front of the bus to evacuate through the front door, while a number of passengers tried to evacuate through the rearward centre door. One of the motor vehicles involved in the final collision was resting against the near side of the bus. This obstructed passenger egress through the bus's rear door and partially obstructed egress through the front door (see *Photograph 3*). As a result of this obstruction, a passenger broke a side window next to the rear door with the onboard emergency break-glass hammer and evacuated to the footpath through the broken window. A number of other passengers also evacuated through the window. Several passengers received minor cuts on their hands and forearms from contact with the glass remnants remaining in the window frame. The evacuating passengers were treated at the scene by ambulance officers.

⁵ A retarder is a device used to augment or replace some of the functions of primary friction-based braking systems, usually on heavy vehicles. Retarders serve to slow vehicles, or maintain a steady speed while travelling down a hill.



Photograph 3: Bus 2635 ST in full lock position towards parked vehicles

Related Occurrences

- 1.18 In 2005, the driver of another STA bus became incapacitated while in control of a bus descending Spit Road, Mosman, Sydney (see OTSI investigation 14 November 2005). The bus crossed the median strip and collided with four vehicles. Ten people and the bus driver were injured and conveyed to hospital. At the time, the OTSI investigation made recommendations to the Ministry of Transport (MoT) (now TfNSW) to review its system of monitoring adherence to the health assessment regime and its system of monitoring compliance with any special conditions attached to a driver's authorisation.
- 1.19 Since 2012, STA has recorded five driver incapacitations while operating a bus, including the Cammeray event and two other serious matters that have taken place after Cammeray. One incident occurred at Manly and the other at Rosebery. There were no serious injuries as a result of the two additional incidents.

Fatigue

- 1.20 The driver's roster for the preceding two weeks of the accident was examined in detail. Fatigue was not deemed to be a contributing factor to this accident.

Drug and Alcohol

- 1.21 While in hospital, a drug and alcohol test was conducted. The driver returned a negative result for both tests. The influence of drugs and alcohol were not a contributing factor in the accident.

Heavy Vehicle Mechanical Inspection

- 1.22 Technical inspections conducted by RMS and STA's heavy vehicle inspectors did not detect a mechanical malfunction, component failure or a design feature of the bus that contributed to the accident.

Roads and Maritime Services

- 1.23 On 1 November 2011, the Roads and Traffic Authority and the NSW Maritime formed into the one entity, the Roads and Maritime Services, as the road authority and regulator. The *Passenger Transport Act 1990* requires the accreditation or authorisation, by RMS, of the operators and drivers involved in public bus passenger services.

State Transit Authority of NSW

- 1.24 The STA is the NSW Government-owned transport organisation. The STA has over 2100 buses and operates over 15,000 services a day carrying more than 600,000 bus passengers.

PART 2 ANALYSIS

Introduction

- 2.1 The investigation focused on the driver of bus 2635 ST's incapacitation and the processes that enabled the driver to return to operating a heavy passenger vehicle after a previous motor vehicle accident in 2010.

Medical Condition of Driver of bus 2635 ST

- 2.2 The driver of 2635 ST received serious injuries when involved in a motor vehicle accident as a motorcycle rider on 1 April 2010. The rider was conveyed to hospital and, while there, experienced a medical seizure. The rider (bus driver of 2635 ST) recovered from their injuries, however, continued to receive treatment to prevent further seizures. The bus driver's licence and bus driver's authority were suspended on medical grounds. Later in April 2010, the bus driver's medical condition was reviewed by a specialist neurologist and concluded the risk of further seizures was low, although the driver continued on prescribed preventative medication. On 1 October 2010, the driver's licence was reinstated and the driver returned to normal duties. On 9 October 2010, the neurologist carried out a further review of the driver's condition and concluded the driver had been seizure free since the original event and was fit for duty.

Fitness to Drive Guidelines

- 2.3 The Assessing Fitness to Drive (AFTD) guideline is a joint document between the National Transport Commission (NTC) and Austroads with the primary purpose to improve road safety in Australia. The guideline provides information for health professionals to assess the fitness of their patients, to promote responsible patient behaviour, conduct medical examinations for licencing drivers as required by licencing authorities and provide information to inform conditional licence decisions. The AFTD outlines the criteria against which Australian drivers are medically assessed (*see Appendix 2*).
- 2.4 In 1998 the NTC, in consultation with Austroads, published the AFTD. The document provided guidelines on 'Medical Standards for Licencing' and

'Clinical Management Guidelines'. The resource further provided advice for health professionals to determine the eligibility of a driver to continue to drive and to determine restrictions or conditions that may need to be applied to the driver's licence.

2.5 The guideline comprises three major sections.

- Part A - General Information
- Part B - Medical Information, and
- Part C - Appendices.

2.6 In Part 'B' of the publication (*see Appendix 3*), a table summarises the criteria health professionals are to apply to determine unconditional and conditional licences. In a table labelled as 'Medical Standards for Licencing – Epilepsy', there are two main parameters, Private Standards and Commercial Standards.

2.7 The guidelines for Commercial Standards apply to drivers of heavy vehicles, public passenger vehicles and bulk dangerous goods vehicles. The document recognises the difference between diagnosed epilepsy and an initial or isolated seizure. A medical professional could recommend for a driver under assessment to return to driving duties providing the guidelines have been met.

2.8 At the time of the 2010 accident a person who had experienced a seizure could not obtain an unconditional licence. A conditional licence could have been granted by RTA by taking into account an epilepsy specialist's opinion and the vehicle they intended to operate. Additionally, the issuing of a conditional licence would have needed to consider:

- if the person has had a single provoked seizure event; and
- provocative factors can be avoided reliably; and
- has been seizure free for one year; and
- takes no anti-epileptic medication; and
- the EEG shows no epileptic activity.

2.9 In reviewing the circumstances of the accident and the NTC and Austroads guidelines at the time of the 2010 accident (September 2003 AFTD and

reprinted in 2006 (see *Appendix 3*), the bus driver should not have resumed regular bus driving duties when he did.

- 2.10 Under the AFTD guidelines at the time of the 2010 accident, the driver should have been restricted from resuming normal bus driving duties for a period of five years. However, even taking into account 'provocative circumstances' the driver, at a minimum, should not have resumed bus driving duties until one year from the date of the seizure.
- 2.11 The NTC amended the AFTD publication in March 2012 and then again in October 2016. The October 2016 edition of the AFTD recommends that a professional driver should not return to duties within 10 years of a seizure and not within five years for 'provocative circumstances'. This change was a result of the NTC adopting research from Monash University in Victoria.
- 2.12 On 15 June 2010, a letter from the bus driver's neurologist requested the driver's General Practitioner (GP) to report on the driver's current medical status. The specialist neurologist advised the driver he was fit to resume his normal duties.
- 2.13 OTSI queried why the driver's accreditation and motor vehicle licence was reinstated after six months with no comments and/or conditions. After the incident at Cammeray in 2016, RMS advised OTSI that in 2010 the driver had been assessed by a neurologist who deemed the driver's medical seizure as a one-off event. After a period of six months had expired, the driver's car/bus licence and accreditation authority were reinstated. This enabled the driver to resume normal bus driving duties with an unconditional licence and without restrictions.
- 2.14 In 2010 the RTA did not have a specialist medical officer for the evaluation and appraisal of complicated issues such as medical seizures associated with the demands of bus driving duties. The RTA's evaluation process had initially involved an administrative officer then a subsequent evaluation by a registered nurse. In this case, the administrative officer and the registered nurse accepted the advice of the neurologist and the driver was returned to driving duties. This decision was contrary to the AFTD guidelines.

Other Modes of Transport Management of Medical Cases

- 2.15 On 31 January 2003, a rail accident occurred on the outskirts of Waterfall, Sydney. Seven people were killed as a result of the accident. In a Special Commission of Inquiry into the Waterfall train accident, it was identified that the driver had become incapacitated at the controls of the train. The inquiry addressed the issue of medical assessments for rail workers. The inquiry highlighted many deficiencies in the railway medical assessment system that prevailed at the time, which had implications for the medical assessment of other operational transport staff.
- 2.16 The Medical Journal of Australia (January 2006) examined this issue in an article entitled: *'The Inquiry into the Waterfall train crash: implications for medical examinations of safety-critical workers'*. It states that *"Medical examinations of safety-critical workers need to be particularly designed to take into account the company's duty of care to the public and other employees. The Inquiry further states "In situations where sudden incapacity, like a heart attack, could lead to serious consequences, a quantitative and predictive risk assessment should be considered."* It also stated that whatever the frequency set for medical examinations, a system should be established to monitor safety-critical workers for markers of ill-health. It further stated that any occupational health examination is best conducted by a doctor who has a good understanding of the particular occupation and the requirements of that organisation.
- 2.17 Currently, within Australia, there are 790 designated medical officers that are authorised to perform Category 1 type medicals for the railway industry. These individuals must follow a stringent assessment process when conducting medical assessments of rail safety workers. This was a direct result from the Special Commission of Inquiry into the Waterfall rail accident. The medical officers must hold a clear understanding of the rail safety workers' working environment and the type of work they perform.
- 2.18 The aviation sector requires flight crews to obtain and maintain an aviation licence. The level of medical scrutiny is relevant to the class of licence held. Within Australia, designated medical practitioners perform the necessary

medical examinations for the Aviation Medicine Section of the Civil Aviation Safety Authority (CASA). These are conducted under stringent regulations and guidelines. Currently in Australia, there are approximately 700 Designated Aviation Medical Examiners (DAME) who have an obligation to report relevant medical information to CASA.

- 2.19 CASA has a resident Chief Medical Officer and medical professionals to assess evaluations carried out by DAMEs as assessments for licencing in accordance with the aviation regulations.

Roads and Maritime Services Management of Medical Cases

- 2.20 As a result of a recommendation from the OTSI investigation into a bus collision at Spit Road, Mosman in 2005, MoT advertised for a Specialist Medical Officer with an aim to review and reinforce the Ministry's approach to industry through the medical assessment process it applies to public passenger vehicle drivers. The medical officer was contracted for a six month period.
- 2.21 In the 2005 OTSI report '*STA Bus Collision, Spit Road, Mosman*', the report documented the following: *"OTSI was advised that MoT has since redesigned its Medical Assessment certificate to accommodate the National Transport Commission's (NTC) policy "Assessing Fitness to Drive Commercial and Private Vehicle Drivers 2003". "This has resulted in the self-reporting section being expanded to include sleep disorder, sleep apnoea and narcolepsy, and an improved section on drugs and alcohol. There is also an improved clinical examination proforma reflecting a national medical standard for drivers."*

Remedial Actions

- 2.22 RMS is currently developing a new program that is being implemented in 2018. The new system will centralise drivers' authorities and licenses which will be linked with all medical reviews and conditions and recorded within the one database system. By linking the two currently separate systems, all future management and medical reviews will be centralised. This will provide consistency when assessing drivers against commercial medical standards.

- 2.23 TfNSW has adopted the 2016 AFTD Guidelines, as have all the Australian licencing authorities. TfNSW is a member of the Austroads AFTD Management Advisory Group. RMS also has a representative on the working group.
- 2.24 Upon release of each new edition of the AFTD, RMS reviews its procedures to ensure its medical review processes are compliant with any amended medical standards.
- 2.25 The RMS forms used in the assessment process specifically reference the 2016 AFTD Guidelines. These include the 2016 NSW Fitness to Drive Medical Assessment Form, the 2017 Public Passenger Vehicle Driver Medical Assessment Form and the 2017 Medical Specialist Assessment Form for Commercial/Public Passenger Vehicle Driver. These are available on the RMS website.
- 2.26 The RMS website links directly to the 2016 AFTD Guidelines on the Austroads Website.
- 2.27 RMS forms have been developed to capture medical information relevant to the AFTD standards so that Licence Review Unit staff are able to properly assess a licence holder's medical fitness to drive. The forms also advise health professionals that they must adhere to the medical standards when reviewing their patient. Submissions that contain information and recommendations which conflict with the standards may not be accepted by RMS.
- 2.28 An on-line medical form has been developed to mirror the requirements of the AFTD medical standards. "Triggers" have been incorporated into the form to ensure that the Licence Review Unit receives any medical reports that require further specialist review because of the licence class or medical condition.
- 2.29 Any licence holders who are identified as needing ongoing or further specialist review are sent a Medical Specialist Fitness Assessment Report. This form also specifically instructs the medical practitioner to examine the patient in accordance with the AFTD standards.

- 2.30 RMS Licence Review Unit staff are trained to apply the AFTD medical standards when assessing and processing all medical reports received for licensing purposes.

PART 3 FINDINGS

From the evidence available, the following findings are made with respect to the bus collision involving a Scania K280UB, registration 2635 ST, that occurred on Miller St, Cammeray, NSW on 1 July 2016.

Contributory Factors

- 3.1 The bus driver became incapacitated after suffering a medical seizure while driving a bus. As a result, the driver did not have control of the bus. It is probable that the drivers' foot remained on the accelerator which enabled the bus to continue for approximately 127 metres.

Other Safety Factors

- 3.2 In 2010, the MoT systems did not encapsulate the intent of the AFTD guidelines.
- 3.3 The bus driver's accreditation and NSW driver's licence did not have any medical conditions and/or restrictions applied to the reinstated licence following the seizure related to the 2010 accident.
- 3.4 The bus driver had a medical history that included having a seizure in 2010. His driving licence and bus operator accreditation was suspended for six months by the RTA in 2010; however the driver's authorisation to drive a public passenger vehicle was restored contrary to the AFTD in October 2010.
- 3.5 RTA had consulted with a third party medical specialist before reinstating the driver's licence and driver's authority, however, the advice was contrary to the AFTD guidelines.
- 3.6 STA did not ensure that the driver's return to work program complied with AFTD guidelines.

PART 4 RECOMMENDATIONS

It is recommended that the following additional safety actions be undertaken by the specified responsible entities.

Roads and Maritime Services

- 4.1 Ensure that incapacitated drivers of heavy vehicles, public passenger vehicles and bulk dangerous goods vehicles are assessed in accordance with the AFTD guidelines before resuming normal driving duties.
- 4.2 Ensure the advising specialist medical practitioner is made aware of the requirements in the AFTD guideline and the working environment of the person being assessed.

State Transit Authority

- 4.3 Consult with RMS to ensure that a return to work program complies with the AFTD guidelines.

PART 5 APPENDICES

Appendix 1: Sources, Submissions and Acknowledgements

Sources of Information

- State Transit Authority
- Roads and Maritime Services
- Transport for NSW
- National Transport Commission
- NSW Ambulance

References

- National Transport Commission and Austroads *Assessing Fitness to Drive* guidelines

Submissions

The Chief Investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- State Transit Authority
- Roads and Maritime Services
- Transport for NSW
- NSW Ambulance
- NSW Police

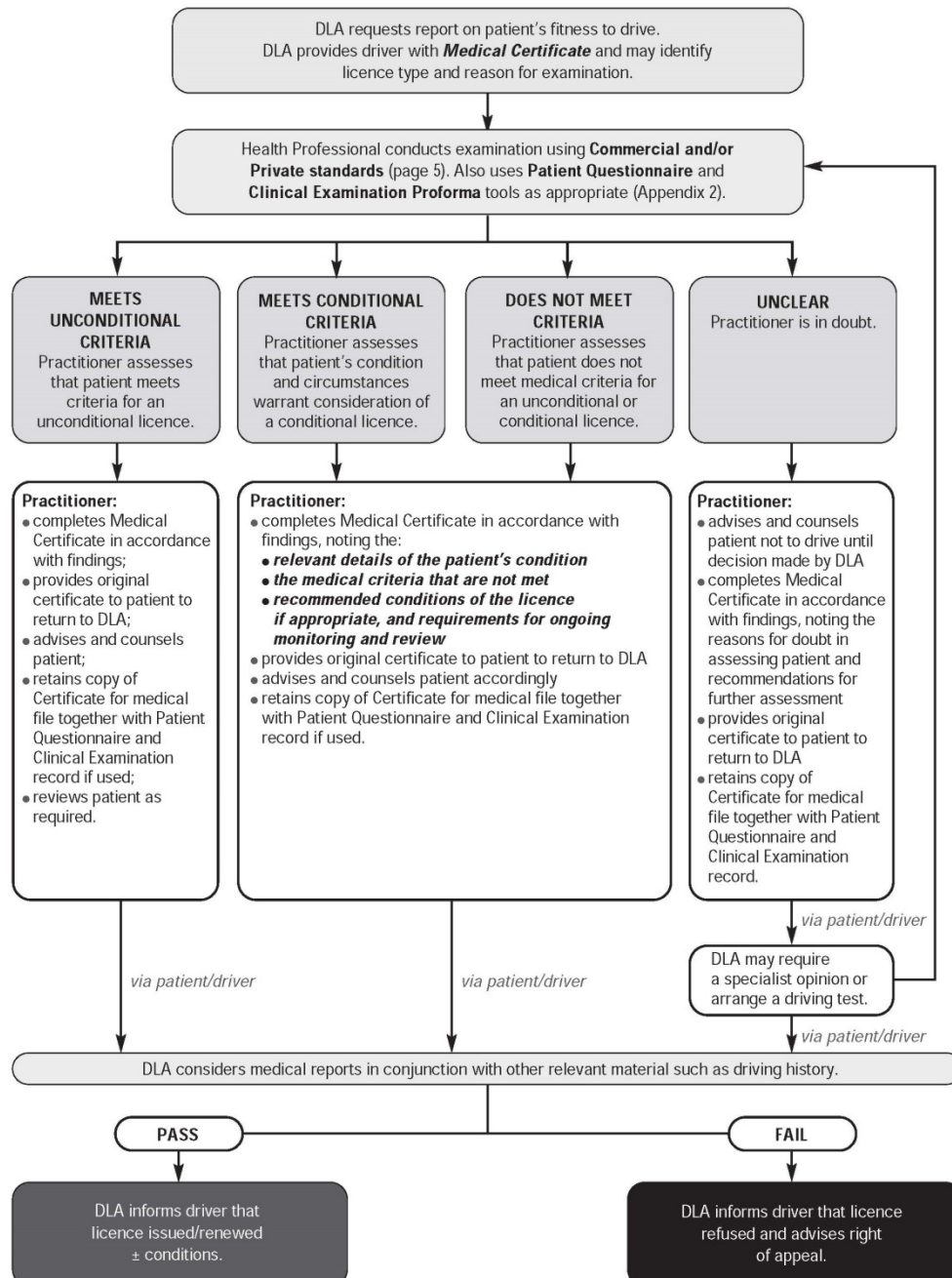
Appendix 2: The AFTD Medical Assessment Reporting Process

ASSESSING FITNESS TO DRIVE

THE MEDICAL ASSESSMENT AND REPORTING PROCESS

Diagram 4.1 – Conducting an examination at the request of a Driver Licensing Authority (DLA)

The following flow chart summarises the process involved when an examination and report is requested by a Driver Licensing Authority.

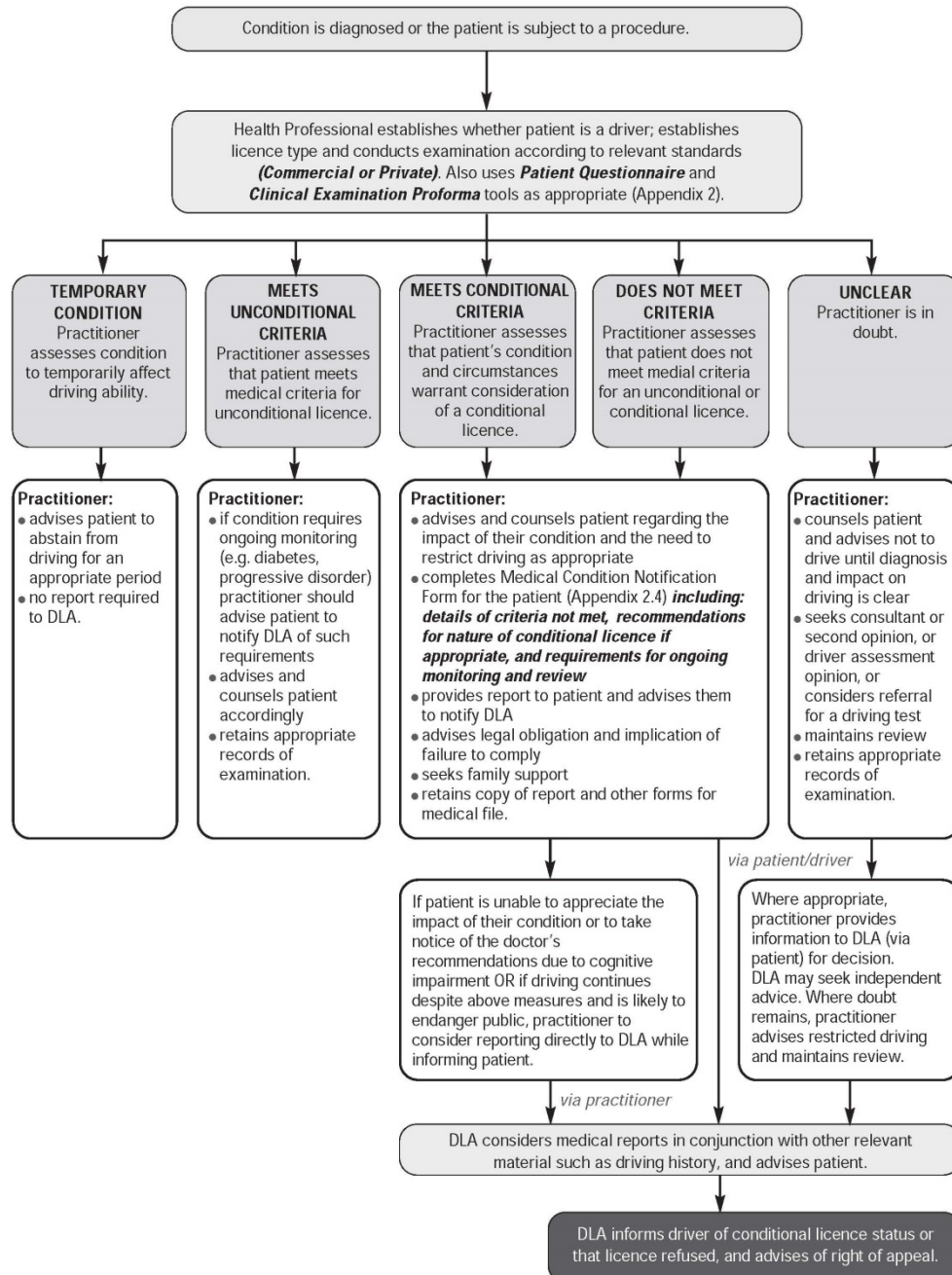


ASSESSING FITNESS TO DRIVE

THE MEDICAL ASSESSMENT AND REPORTING PROCESS

Diagram 4.2 – Assessing and reporting on fitness to drive in the course of patient treatment

The following flow chart summarises the process involved when a health professional assesses fitness to drive in the course of treating a patient.



Appendix 3: The 2003 AFTD Guidelines on Epilepsy

EPILEPSY

8 EPILEPSY

8.1 RELEVANCE TO DRIVING TASK

- 8.1.1** Epilepsy is a common disorder with a cumulative incidence of 2% of the population, with 0.5% affected and taking medication at any one time⁵. Fortunately, the majority of cases respond well to treatment with a terminal remission rate of 80% or more⁵⁻¹¹. The majority suffer few seizures in a lifetime and about half will have no further seizures in the first one or two years after starting treatment^{8,10}. Some cases may eventually cease medication and in other selected cases surgery has proven beneficial.

Seizures vary considerably, some being purely subjective experiences, e.g. some simple partial seizures, but the majority involve some impairment of consciousness (e.g. absence and complex partial seizures) or loss of control (e.g. focal motor, simple or complex partial or myoclonic seizures). Convulsive (tonic-clonic) seizures may be generalised from onset or secondarily generalised with partial onset. Seizures associated with loss of awareness, even if brief or subtle, or loss of motor control have the potential to impair the ability to control a motor vehicle^{12,13}.

- 8.1.2** Estimates of the relative casualty crash risk of drivers with epilepsy compared with other drivers has varied from 1.0 to 1.95¹⁴⁻¹⁶ (and in one exceptional study 7.0¹⁷). Around 11% of crashes of drivers with epilepsy are felt to be seizure-related¹⁴. Reported estimates of the prevalence of epilepsy-related crashes vary between 0.01% and 0.3% of all crashes^{2, 18-22}.

- 8.1.3** Complex partial seizures without aura, secondarily generalised seizures and generalised tonic-clonic seizures are the types most implicated in crashes. Simple partial seizures, complex partial seizures with aura and absence seizures are less frequently, and myoclonic seizures are rarely implicated²³. Some patients may have seizures that are 'safe' from the point of view of driving. Examples include seizures that have occurred only during sleep, some, but not all, simple partial seizures ('auras'), and seizures that are consistently preceded by a prolonged warning or premonition (provided that full control is retained during the period of such premonitory symptoms)¹³. There are also examples where seizures only occur at a particular time of day, especially in the first hour after awakening. A restricted licence may be acceptable in such instances (see 8.3.4).

- 8.1.4** While driving is a privilege rather than a right, the lack of a driving licence can be socially disabling. Ease of transport is diminished and there are restrictions of opportunity for employment, recreation and independent living: the lack of a licence may also impair the capacity to engage in financial and commercial transactions. The criteria applied to private vehicle licences are based upon the concept of what is an acceptable risk, i.e. that which may be directly attributed to the potential for a seizure, a risk that is additional to the background risk for motor vehicle crashes that all drivers will have. Such background risk varies greatly, being dependent upon age, gender and driving experience^{1,24}, and this variation colours the approach for an acceptable seizure-related crash-risk. In Australian conditions and with criteria applied over many years the contribution of seizures to accident statistics is only 0.025–0.053%, which is clearly acceptable²².

Commercial vehicle driving exposes the driver and the public to a relatively greater risk because of the increased time spent at the wheel as well as the generally greater potential for injury from motor vehicle crashes involving commercial vehicles. For this reason, the acceptable risk of an illness-related accident for commercial driving is much less, and because it is reasonable to anticipate a degree of flexibility in employment opportunity the criteria applied are much stricter. As a rough guide, for private licences they correspond to a seizure-risk of about 20–50% p.a., compared with about 1–2% p.a. for commercial licences and 2–4% pa for restricted commercial licences. Some lenience in the last group is envisaged for those who need a commercial licence but whose driving of large and potentially damaging vehicles is restricted or unnecessary²⁵.

8.2 GENERAL MANAGEMENT GUIDELINES

- 8.2.1** In general, responsible individuals with well-managed epilepsy (as demonstrated by an appropriate seizure-free period) may be considered fit to drive by the Driver Licensing Authority. Individual responsibility on the patient's behalf means personal accountability for management of their condition in conjunction with the support of a medical practitioner. The authorities will rely heavily on the treating practitioner's and/or consultant's reports.

- 8.2.2** It is extremely important that the patient's specific epilepsy syndrome and seizure types are identified so that an adequate evaluation of the person's driving safety can be undertaken (including the risk of further seizures) and the appropriate therapy instituted. **Thus any licence-holder experiencing a seizure or recurrent seizures should be referred to an appropriate consultant for detailed evaluation.**

It is crucial that the following aspects of disease management be taken into account in the assessment of driver fitness:

- The patient must have been free of seizures for the specified period (see medical standards below).
- The patient must continue to take anti-epileptic medication regularly when and as prescribed.

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- The patient should ensure adequate sleep is had and not drive if sleep deprived.
- The patient should avoid other circumstances or the use of substances that are known to increase the risk of seizures.

8.2.3 All licence holders who need active management of epilepsy should be under periodic review, including, where necessary, at least annual specialist appraisal.

8.3 MEDICAL STANDARDS FOR LICENSING

8.3.1 Medical standards for licensing and the requirements for conditional licences are outlined in the table (page 57). A confirmed diagnosis of epilepsy will mean that the criteria for an unconditional licence are not met either for a private or a commercial driver. The table outlines recommended seizure-free periods after which resumption of driving under a conditional licence may be permitted by the Driver Licensing Authority on the advice of a suitably qualified consultant. In considering the recommended seizure-free period, the Driver Licensing Authority will generally accept the longer period, but may consider a shorter period on the recommendation of a consultant experienced in the management of epilepsy. Relevant considerations will include response to treatment, previous seizure frequency, the nature of seizures, the syndromal diagnosis and the patient's reliability and compliance with treatment. Further considerations, particularly in the case of commercial drivers, may be the size and condition of the vehicle, duties to be performed and the hours to be worked (for example, the requirements of an occasional driver in a farming situation versus those of a multiple combination vehicle driver).

8.3.2 The initial or isolated seizure. The occurrence of a seizure in the holder of any licence warrants consultant assessment. The assessment may reveal that the seizure was likely to have been an isolated event, or alternatively a diagnosis of epilepsy may be made.

Whether due to epilepsy or any other cause, an isolated seizure in a commercial vehicle driver presents a considerable risk and will require immediate notification of the Driver Licensing Authority by the driver, and suspension of driving (see table).

In the case of a private vehicle driver, the consultant should advise the patient not to drive until the diagnosis is determined and a decision can be made regarding their future licence status. Should the seizure be judged to be an isolated event the recommended non-driving period is 6 months (see table). It is important for Driver Licensing Authorities to acknowledge that an isolated seizure is not necessarily synonymous with epilepsy, and administrative and reporting systems should reflect this in order to avoid the stigma often associated with a diagnosis of epilepsy.

Should a diagnosis of epilepsy be made the patient should be managed accordingly. The table overleaf specifies non-driving periods for drivers diagnosed with epilepsy.

8.3.3 Recurrent seizure. In the event of a recurrent seizure in a person previously seizure-free and on a conditional licence, a consultant review should be obtained; in remote areas the GP should initially consult the neurologist by phone. In the case of a private vehicle driver, where a clear and reversible or non-recurring provocation is identified and overcome and/or corrected (e.g. illness, drug-interaction, sleep deprivation or antiepileptic medication-withdrawal) driving should be suspended for 1 month. If no clear cause is determined driving should be suspended for 3 months. A recurring seizure in a commercial vehicle driver will require immediate notification to the Driver Licensing Authority by the driver and suspension of driving.

8.3.4 'Safe seizures'. Where seizures occur only at a particular time of day (e.g. in the first hour after awakening) a restricted licence, limiting driving to certain hours or circumstances, may be acceptable. It is essential that patients experiencing such 'safe' or possibly 'safe' seizures be the subject of consultant review and that their assessment includes appropriate documentation of the factors that are important to their driving safety, and the corroboration of eye witnesses whenever possible.

8.3.5 Medication non-compliance. Where non-compliance with medication is suspected by the treating doctor, the doctor may recommend to the Driver Licensing Authority a driver licence conditional upon periodic medical review, including drug-level-monitoring where appropriate.

8.3.6 Withdrawal of anti-epileptic medication. In patients stabilised on anti-epileptic medication over a suitable period, the consultant may attempt a withdrawal of that medication. The patient should not drive for the full period of withdrawal of anti-epileptic medication and for 3 months thereafter unless withdrawal is advised by an experienced consultant on the basis that the risk of seizure-recurrence is low. The patient will already be on a conditional licence, thus notification of the Driver Licensing Authority is not required. Should the medication withdrawal be successful, as demonstrated by an extensive seizure-free period, the treating consultant may support an application to the Driver Licensing Authority to grant an unconditional licence. For commercial vehicle drivers, withdrawal of anti-epileptic medication is not compatible with continued driving (refer to the table).

8.3.7 Concurrent conditions. Where epilepsy is associated with other impairments or conditions, the relevant sections covering those disorders should also be consulted.

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MEDICAL STANDARDS FOR LICENSING – EPILEPSY		
CONDITION	PRIVATE STANDARDS <i>(Drivers of cars, light rigid vehicles or motorcycles unless carrying public passengers or bulk dangerous goods – refer to definition, page 6).</i>	COMMERCIAL STANDARDS <i>(Drivers of heavy vehicles, public passenger vehicles or bulk dangerous goods vehicles – refer to definition, page 6).</i>
Initial or Isolated Seizures (an isolated seizure is not necessarily synonymous with Epilepsy)	<p>A person who has had an initial or isolated seizure should be advised not to drive pending confirmation of diagnosis.</p> <p>Should the seizure be diagnosed as an isolated event, a non-driving period of 6 months should be recommended (shorter periods may be recommended by consultants experienced in the management of epilepsy).</p> <p>If epilepsy is confirmed or seizures recur the patient should be managed as for recently diagnosed epilepsy (see below) and should notify the Driver Licensing Authority.</p>	<p>The criteria for an unconditional licence are NOT met:</p> <ul style="list-style-type: none"> ● If the person has had a seizure due to any cause. <p>A conditional licence may be granted by the Driver Licensing Authority taking into account the opinion of a specialist in epilepsy and the size and condition of the vehicle, the duties to be performed and the hours to be worked (with conditions that may include limited and/or restricted use):</p> <ul style="list-style-type: none"> ● If the person has had a single provoked seizure event; and ● Provocative factors can be avoided reliably; and ● Has been seizure free for one year; and ● Takes no anti-epileptic medication; and ● The EEG shows no epileptiform activity.
Epilepsy – general requirements	<p>The criteria for an unconditional licence are NOT met:</p> <ul style="list-style-type: none"> ● If the person has epilepsy. <p>A conditional licence may be granted by the Driver Licensing Authority after seizure-free periods as shown below and subject to at least annual review (shorter periods may be recommended by consultants experienced in the management of epilepsy). The Driver Licensing Authority will take into account the opinion of the treating doctor/GP regarding the response to treatment and the driving requirements.</p> <p>Seizure free periods:</p> <p>Recently diagnosed epilepsy. Seizure-free period of 6 months from start of therapy (or 3 months on the recommendation of an experienced consultant).</p> <p>Chronic epilepsy (history of previously uncontrolled seizures). Generally a seizure-free period of 2 years. A shorter period only on recommendation of an experienced consultant where there is clear evidence of seizure control (e.g. following adjustment and stabilisation of anti-epileptic drug treatment).</p>	<p>The criteria for an unconditional licence are NOT met:</p> <ul style="list-style-type: none"> ● If the person has epilepsy. <p>A conditional licence may be granted by the Driver Licensing Authority taking into account the opinion of a specialist in epilepsy (who may recommend variation of the seizure-free periods in exceptional circumstances), and the nature of the driving task, and subject to periodic review:</p> <ul style="list-style-type: none"> ● If the person has a past history of febrile seizures or of benign childhood epilepsy; and ● Does not take anti-epileptic medication; and ● The EEG shows no epileptiform activity. <p>OR</p> <ul style="list-style-type: none"> ● If the person has a past history of a single seizure event; or of seizures occurring only under provocative circumstances that can be avoided reliably; and ● Has been seizure free for five years; and ● Takes no anti-epileptic medication; and ● The EEG shows no epileptiform activity.

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MEDICAL STANDARDS FOR LICENSING – EPILEPSY (continued)		
CONDITION	PRIVATE STANDARDS	COMMERCIAL STANDARDS
Epilepsy – general requirements (continued)	<p>Seizures only in sleep. Seizure-free period of 12 months since the last seizure whilst awake.</p> <p>Epilepsy treated by surgery. A period of 12 months following surgery.</p>	<p>OR</p> <ul style="list-style-type: none"> ● If the person has epilepsy and is taking anti-epileptic medication; and ● Maintains at least annual review and compliance; and ● Has been seizure free for five years; and ● Has had no more than three seizures in the preceding ten years; and ● The EEG shows no epileptiform activity. <p>OR</p> <ul style="list-style-type: none"> ● If the person has epilepsy and has had surgical treatment; and ● Maintains at least annual review; and ● Has been seizure free for five years; and ● The EEG shows no epileptiform activity. <p>OR</p> <p>Taking into account the size and condition of the vehicle, the duties to be performed and the hours to be worked (with conditions including limited and/or restricted use):</p> <ul style="list-style-type: none"> ● If the person has epilepsy and is taking anti-epileptic medication; and ● Maintains periodic review and compliance; and ● Has been seizure free for five years; and ● The EEG shows no epileptiform activity. <p>OR</p> <p>Taking into account the size and condition of the vehicle, the duties to be performed and the hours to be worked (with conditions including limited and/or restricted use):</p> <ul style="list-style-type: none"> ● If the person has had a single provoked seizure event; and ● Provocative factors can be avoided reliably; and ● Has been seizure free for one year; and ● Takes no anti-epileptic medication; and ● The EEG shows no epileptiform activity.
Epilepsy – special situations	<p>Recurrent Seizure.</p> <p>If a person on a conditional licence, who has previously been well controlled, has a recurrence of a seizure due to an identifiable and non-recurring provocation such as illness,</p>	<p>Recurrent Seizure.</p> <p>Recurrence of seizure in a commercial vehicle driver requires immediate suspension of driving and reporting to the Driver Licensing Authority by the driver.</p>

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MEDICAL STANDARDS FOR LICENSING – ELIPEPSY (continued)		
CONDITION	PRIVATE STANDARDS	COMMERCIAL STANDARDS
Epilepsy – special situations (continued)	<p>drug interaction or sleep deprivation, they should not drive for 1 month. If the cause is not identified the patient should not drive for 3 months.</p> <p>If a person on a conditional licence has a seizure causing a motor vehicle crash, they should not drive for at least 1 year and a consultant opinion is essential. The Driver Licensing Authority should be notified.</p> <p>Withdrawal of Anti-epileptic Medication</p> <p>The person should not drive for the full period of withdrawal and for 3 months thereafter. Where withdrawal is on the recommendation of a consultant experienced in the management of epilepsy on the basis that the risk of seizure-recurrence is low, driving need not be curtailed.</p> <p>Should there be a recurrence of seizures, the person should not drive for 1 month after resuming previously effective medication.</p> <p>If the patient refuses to resume medication they should not drive for 2 years (shorter periods may be recommended by consultants experienced in the management of epilepsy).</p> <p>Generally a person who is being considered for withdrawal of medication will be on a conditional licence and the Driver Licensing Authority need not be notified of a program of withdrawal of medication.</p>	<p>Withdrawal of Anti-epileptic Medication</p> <p>Withdrawal of medication is not compatible with continued driving of commercial vehicles.</p>

IMPORTANT – The medical standards and management guidelines contained in this chapter should be read in conjunction with the general information contained in Part A of this publication. Practitioners should give consideration to the following:

Licensing responsibility

The responsibility for issuing, renewing, suspending or cancelling a person's driver licence (including a conditional licence) lies ultimately with the Driver Licensing Authority. Licensing decisions are based on a full consideration of relevant factors relating to health and driving performance.

Conditional licences

Where a conditional licence is recommended practitioners must provide to the Driver Licensing Authority details of the criteria not met as well as the proposed conditions and monitoring requirements.

The nature of the driving task

The Driver Licensing Authority will take into consideration the nature of the driving task as well as the medical condition, particularly when granting a conditional licence. For example, the licence status of a farmer requiring a commercial licence for the occasional use of a heavy

vehicle may be quite different from that of an interstate multiple combination vehicle driver. The examining health professional should bear this in mind when examining a patient and when providing advice to the Driver Licensing Authority.

The presence of other medical conditions

While a patient may meet individual disease criteria, concurrent medical conditions may combine to affect on fitness to drive, e.g. hearing and visual impairment (refer to Multiple Disabilities, page 22, Older Drivers, page 76).

Reporting responsibilities

Patients should be made aware of the effects of their condition on driving and should be advised of their legal obligation to notify the Driver Licensing Authority where driving is likely to be affected. The practitioner may themselves advise the Driver Licensing Authority as the situation requires (refer to pages 10, 17).