The AA Motoring Trust

April 2006

MAKING EUROPE'S ROAD TUNNELS SAFER FOR USERS

EUROPEAN TUNNEL ASSESSMENT PROGRAMME (EUROTAP) INSPECTIONS 2006

THE MEDWAY TUNNEL

Foreword

Over the last ten years 93 car and lorry occupants have been killed in accidents in road tunnels, the worst being in the Mont Blanc tunnel on 24 March 1999 when 39 people were killed. Since 2000, firstly EuroTest and subsequently EuroTAP, have been engaged in a programme of tunnel inspections designed to highlight weaknesses in tunnel safety, encourage improving standards and promote driver awareness. And standards have been rising, out of the 52 tunnels inspected this year, 31 were rated either 'Very Good' or 'Good'.

This year the Medway Tunnel, in Rochester, Kent, was inspected for the first time and received a rating of 'Very Poor', putting it in the bottom nine of the 52 tunnels inspected. It is a busy tunnel with around 46,000 vehicles using the tunnel each day of which nearly nine per cent are HGVs.

The inspector identified several positive points:

- Adequate escape and rescue provision
- Video surveillance (however, see below)
- Provision of emergency phones and fire extinguishers
- A sufficiently powerful ventilation system
- Sufficient protection against smoke and heat in the escape routes
- Adequate radio communication for emergency services throughout the tunnel
- Rescue service vehicles able to cross at the portals
- Regular cross tunnel escape routes
- Small team of experienced staff at the tunnel

Shortcomings were also identified. In particular:

- Gaps in the video surveillance
- No regular training for tunnel personnel
- No permanently manned tunnel control centre where video images could be sent and monitored
- No automatic detection of traffic incidents
- No automatic fire alarm system
- No emergency response plan
- No regular emergency drills
- In the event of a fire, the ventilation system and tunnel closure can only be activated by rescue services on site.

The inspectors noted that the operators are planning:

- A new video surveillance system
- An emergency response plan
- Improve co-ordination between themselves and the fire brigade and police
- A video link to the control centre at Rochester

The Medway tunnel is relatively new, having been completed in 1996 and it is unusual for a tunnel this new to be rated 'Very Poor". British tunnels have a good safety record and good management has helped UK tunnels achieve reasonable scores for our generally older tunnels. Medway bucks this trend as it is the physical traffic control and management which needs to be improved.

Many of the other UK tunnels which have been inspected in recent years, such as the Mersey tunnels, the Blackwall tunnels, the Dartford and Rotherhithe tunnels and Tyne tunnel are now being improved and upgraded, often as a direct result of the findings of the previous EuroTest/EuroTAP inspections. Rising standards and increasing public awareness of how to react in a tunnel should help to ensure that the UK avoids a major tunnel disaster in the future.

1. Key points

- Tests where designed to examine the safety standards of a selection of European road tunnels on major routes
- Fifty-two tunnels where inspected between January and March 2006, across 13 European countries, including the Medway Tunnel in Kent
- The Medway Tunnel was rated "Very Poor" and awarded a 'medium' risk potential
- The top rated tunnel was the Spainish M-12 on the M12 Autopista on the approach to Madrid airport
- The lowest rated tunnel was the Italian Segesta tunnel on the A29 Autostrada (Palermo – Trapani) near Calatafimi
- The AA Trust is a leading partner in the European Tunnel Assessment Programme (EuroTAP), established in 2004 and funded by the European Commission and European motoring organisations. EuroTAP evolved from the EuroTest programme, which was set up in 2000 by motoring organisations to inspect and report on road-user facilities across Europe, such as motorway service areas and car ferries. The motoring clubs continue to fund EuroTest
- The project was managed by the ADAC (the German AA) and the inspections were carried out by experts from Deutsche Montan Technologie GmbH (DMT)
- Since 2000, the Mersey Kingsway and Queensway tunnels, Dartford, Rotherhithe, Tyne, and Blackwall North and South tunnels have been inspected, along with 200 others across Europe

2. 2006 EuroTAP tunnel inspections

	Austria	Belgium	Switzerland	Germany	Spain	France	Croatia	Italy	Netherlands	Norway	Portugal	Slovakia	Slovenia	GB	Total
VG	**4**	**1**	**3**	**4**	**3**	**2**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**21**
G	**2**	**0**	**2**	**0**	**2**	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**1**	**0**	**10**
A	**1**	**0**	**0**	**3**	**0**	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**8**
P	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**5**
VP	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**1**	**8**
Total	**7**	**1**	**6**	**8**	**8**	**4**	**2**	**6**	**2**	**2**	**2**	**1**	**2**	**1**	**52**

VG = very good; G = good; A = acceptable; P = poor; VP = very poor

3. Strengths /weakness of the Medway Tunnel

Location:	Vanguard Way, Rochester, Kent
Start of operation:	1996
Length:	725m
Portal height level:	0m above sea level
Number of tubes:	2 with 2 lanes of one-way traffic in each
Speed limit:	50mph
Vehicles per day:	46,000
Share of HGVs:	8.6 per cent
Breakdowns in 2004:	No details available
Accidents in 2004:	0
Fires in 2004:	1
Risk:	Medium

Strengths and weaknesses:


Two tubes with cross-connections as additional escape and rescue routes every 75 metres


Video surveillance with cameras approximately every 340 metres


Emergency phones provided every 60 metres


Fire extinguishers provided every 50 metres


Ventilation is sufficiently powerful to move smoke away from a fire


Smoke and heat cannot penetrate the external escape routes


Radio communication possible throughout the tunnel for both fire brigade and police


Rescue service vehicles can cross at the portals


Risk of congestion spilling back from nearby junction


Gaps in video surveillance


Traffic information radio cannot be received throughout the tunnel


No automatic detection of traffic or traffic disruptions,


No automatic detection of emergency phone or fire extinguisher use

No system in place to quickly drain flammable and toxic liquids

No automatic fire alarm system

If a fire alarm is triggered, neither ventilation nor tunnel closure are automatically activated

Monitoring and control of ventilation in the event of a fire are not sufficiently effective

No evacuation lighting for tunnel escape route

No signs showing the escape direction and distance to the nearest exit

No tunnel control centre

No regular training for tunnel personnel

Radio communication is not provided throughout the entire tunnel for tunnel personnel

No emergency response plan

No regular emergency drills

Plans for the future:

- New video surveillance
- Emergency response plan
- Co-ordination between the tunnel operator, fire brigade, rescue service and police
- Link to the control centre in Rochester

General remarks:

- Tunnel designated as 'Medium risk' due to the high traffic volume (46,000 vehicles per day) and the unrestricted transport of hazardous goods
- Unidirectional traffic with sufficiently wide lanes and lighting are in part, the reasons for the good result for preventive measures.
- Gaps were found in the video surveillance.
- At present there is no permanently manned tunnel control centre where video images can be sent.
- An emergency call to the tunnel control centre is the only way staff (when on duty) can obtain detailed information concerning the situation in the tunnel.
- Traffic can be managed, if necessary, using traffic lights.
- In the event of a fire, the ventilation system and tunnel closure can only be activated by rescue services on site.
- Effective fire fighting is assisted by the short distances which the fire brigade have to cover to arrive at the tunnel and the adequate supply of fire-fighting water.
- No co-ordination of rescue service activities, neither in an emergency response plan nor by way of regular drills.
- Short distances between the clearly marked emergency exits assist self rescue.

4. 2006 inspection of 52 tunnels across Europe

Results

Tunnel	Country	Grade awarded	Risk potential
Aubing	Germany	Very good	Medium
Balito	Spain	Very good	Low
Bindermichl	Austria	Very good	Medium
Branisko	Slovakia	Very good	Medium
Confignon	Switzerland	Very good	Medium
Coschütz	Germany	Very good	
Gallaztegi	Spain	Very good	Medium
Gardunha 1	Portugal	Very good	Low
Glion	Switzerland	Very good	Medium
Grič	Croatia	Very good	Low
Hiefler	Austria	Very good	Medium
Hochwald	Germany	Very good	Low
Kappelberg	Germany	Very good	High
Liefkenshoek	Belgium	Very good	Medium
M-12	Spain	Very good	Low
Oferauer	Austria	Very good	Medium
Rosenberg	Switzerland	Very good	Medium
St Germain en Laye	France	Very good	Low
Thomassen	Netherland	Very good	Medium
Trojane	Slovenia	Very good	Medium
Vauche	France	Very good	Medium
Wald	Austria	Very Good	Medium
Ehrentalerberg	Austria	Good	Medium
Fäsenstaub	Switzerland	Good	High

Loibl[1]	Slovenia	Good	Low
Oswaldiberg	Austria	Good	Medium
Mala Kapela	Croatia	Good	High
Nievares	Spain	Good	Medium
Perdón	Spain	Good	Low
Sijtwende-Vliettunnel	Netherlands	Good	Medium
Sonnenberg	Switzerland	Good	High
Appia Antica	Italy	Acceptable	High
Bruck	Austria	Acceptable	Medium
Dortmund-Wambel	Germany	Acceptable	Medium
Kirchberg	Germany	Acceptable	Medium
Las Planas	France	Acceptable	Medium
Oslofiord	Norway	Acceptable	High
Rastatt	Germany	Acceptable	High
Ribeira Brava	Portugal	Acceptable	Medium
Calzadas Superpuestas	Spain	Poor	Medium
Cholfirst	Switzerland	Poor	High
Colle di Tenda[2]	Italy	Poor	Low
L'Arme	France	Poor	Low
Universität Dűsseldorf	Germany	Poor	Medium
Fossina	Italy	Very Poor	Very Poor
Lorca	Italy	Very Poor	Medium
Medway	GB	Very Poor	Medium
Monte Pergola	Italy	Very Poor	High
Montecrevola	Italy	Very Poor	Low
Nes	Norway	Very Poor	Medium
Rovira	Italy	Very Poor	Low
Segesta	Italy	Very Poor	Medium

[1] Border tunnel between Slovenia Austria

[2] Border tunnel between Italy and France; only Italian section tested

The risk potential is assessed on the following factors:

- Traffic volumes
- Proportion of heavy goods vehicles
- Tunnel gradients
- One-or two-way traffic and traffic density
- Hazardous material on lorries

5. The safety of UK tunnels

The AA Motoring Trust has been a leading supporter of both the EuroTest and EuroTAP tunnel inspections. Under the two programmes, all the major tunnels in the UK have been inspected. The results are shown in the table:

Name of Tunnel	Year tested	EuroTAP rating	Risk potential
Blackwall N	2002	Very poor	Medium
Blackwall N	2003	Very poor	Medium
Blackwall S	2002	Very poor	Medium
Blackwall S	2003	Poor	Medium
Dartford	2002	Acceptable	Medium
Dartford	2004	Acceptable	Medium
Medway	2006	Very poor	Medium
Mersey Kingsway	2000	Good	Not calculated
Mersey Kingsway	2002	Good	Medium
Mersey Kingsway	2005	Good	Medium
Mersey Queensway	2000	Acceptable	Not calculated
Mersey Queensway	2002	Acceptable	Medium
Rotherhithe	2003	Poor	Low
Tyne	2000	Poor	Not calculated
Tyne	2002	Poor	Medium
Tyne	2003	Poor	Medium

Since 2000, around 200 road tunnels have been inspected and rated across Europe. UK tunnel operators have responded positively and are investing to improve safety.

- **Mersey Queensway** A major investment, including the construction of emergency escape routes has been completed. A new PA system will be commissioned shortly and other ongoing work includes the provision of new variable message signs. The Chairman of Merseytravel said in 2002: *"Safety is always our top priority. Merseytravel volunteered to take part in this (EuroTest) survey – we need to deal with the legacy of the way in which the tunnels were built in comparison with modern practices"*.
- **Mersey Kingsway** A new PA system will be commissioned shortly. Future plans include new variable message signs and other work to ensure safety operations confirm with European Union Tunnel Directive.
- **Blackwall Tunnel (southbound)** Work is in hand to commission the major improvement work which is about to be completed.
- **Blackwall Tunnel (northbound)** Consultants have reviewed its safety with a view to a major refurbishment; building work is expected to start in 2006 and be completed by 2008.
- **Rotherhithe** In addition to the installation of state-of-the-art emergency communication system, major refurbishment work will start in May 2007
- **Tyne** The public inquiry for a second tunnel has been completed, but it is reported that legal and procedural issues will delay the opening of the second tunnel until 2011.
- **Dartford** Automatic fire detection systems have been installed, and more work is planned to improve safety operations, and to conform to the proposed European Directive on tunnel safety

6. How to act in a tunnel emergency

The UK has an excellent record for tunnel safety. Very few users have been killed or injured in an accident in a UK tunnel: in the rest of Europe, tunnel fires have killed around 90 people in the last 10 years.

A fire in a tunnel can be lethal. The heat builds up very quickly. That is why automatic fire detection and ventilation systems, and emergency exits, must be provided, why the emergency services must be summoned immediately, and why tunnel operators must be able to put emergency plans into operation seamlessly. If there is a fire, the occupants of the vehicles in a tunnel are not spectators to an accident, they are participants in a potential disaster.

Tunnel users also need to know how to behave in road tunnels, and what to do in an emergency. This includes:

- Driving safely at the appropriate speed for the conditions, leaving plenty of space between their car and the vehicle in front;
- Not waiting to be told what to do if there is a fire ahead, and knowing that they should pull over to the left, switching off the engine, leaving the keys in the ignition and moving swiftly away from the fire to the nearest emergency exit, or to the tunnel entrance.

MerseyTunnels has produced a leaflet giving clear and simple advice on how to drive safely through both their tunnels and what to do in an emergency. This is shown at the end of the report and copies are also available from MerseyTunnels. The leaflet will shortly be available by going to www.merseytunnel.co.uk.

A graphic, entertaining interactive quiz on tunnel safety can be found via the AA Trust website at www.aatrust,com (click on tunnel safety 2005 - your PC will need Active X and Shockwave). The lessons contained within the quiz may help to save lives in the event of a tunnel incident.

The AA Motoring Trust is a leading member of the EuroTAP consortium, established in 2004. The programme is funded jointly by the European Commission and European motoring organisations and has evolved from the EuroTest programme, established in 2000 by Europe's motoring organisations, with an annual programme of inspections of services used by tourists across Europe. Since 2000 EuroTest has carried out inspections of more than 200 motorway service areas, 107 road tunnels and 60 car ferries. The inspections have identified shortcomings and dangerous practices, and have led to improvements that benefit road-users across the European Union.

The EuroTAP consortium acknowledges the support of the European Commission in helping to make it possible to continue to conduct tunnel inspections; the content of this report is not the responsibility of the European Commission, however.

Reports of tunnel inspections undertaken under the EuroTest banner, as well as other consumer tests, may be found at

http://www.AAtrust.com/aamotoringtrust/consumer_policyarchive.cfm

Categories inspected **APPENDIX**

Tunnel system
- Number of tubes
- Brightness of tunnel walls
- Width and layout of traffic lanes
- Layout of emergency lanes and breakdown bays
- Additional items such as portal design, road surface, tunnel route

Lighting and power supply
- Lighting throughout and transition zones
- Power and emergency power supply

Traffic and traffic surveillance
- Type of traffic: unidirectional / bi-directional traffic
- Congestion in the tunnel
- Restrictions on and/or registration of vehicles carrying hazardous goods
- Measures to close the tunnel: traffic lights, barriers, information displays
- Traffic signs
- Traffic management and control: traffic lights, variable message traffic signs, signs
- Visual guidance equipment
- Automatic detection of traffic and congestion
- Video surveillance
- Tunnel control centre
- Additional measures: for instance for heavy goods vehicles, speed limits, monitoring the distance between vehicles and speed, automatic identification of hazardous goods transports, height control

Communication
- Traffic radio
- Loudspeakers

- Emergency telephones: distance signs, functions, insulation against traffic noise
- Tunnel radio

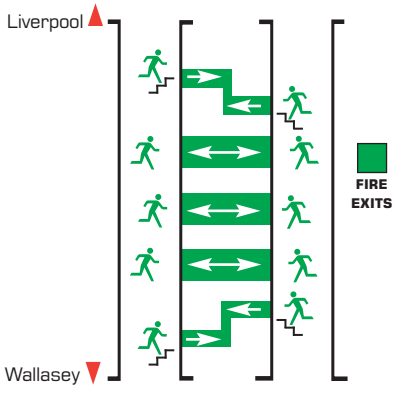
Escape and rescue routes
- Evacuation lighting and escape route signs in the tunnel
- Preventing smoke from penetrating escape routes, fire resistant doors
- Distance between emergency exits and marking
- External access and access for rescue services
- Additional measures: special lighting for emergency exits, signs showing what to do, barrier-free emergency exits

Fire protection
- Fire protection on the tunnel structure
- Fire resistance of cables
- System for draining flammable and toxic liquids
- Fire alarm systems: automatic/manual
- Extinguishing systems: arrangement, signs, function
- Time to reach the tunnel, fire brigade training and equipment

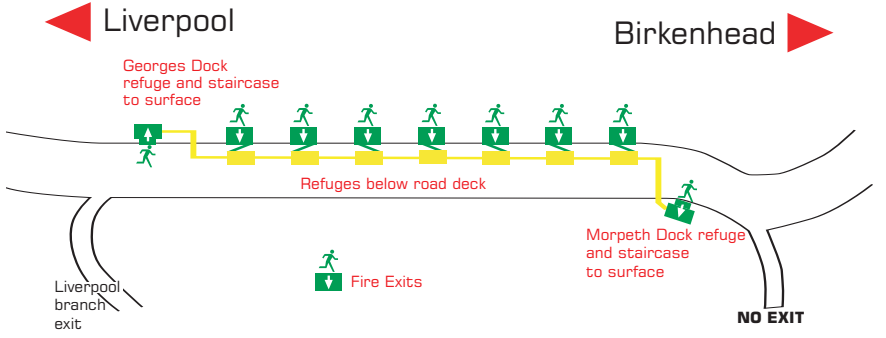
Ventilation
- Normal mode to thin out vehicle emissions
- Control of the longitudinal flow in the tunnel and consideration of this in ventilation control
- Temperature stability of facilities and equipment
- Special fire programmes
- Proof of correct functioning in fire trials and by flow measurements
- Longitudinal ventilation: airflow speed, length of the ventilation section, airflow in the direction of traffic, reversible fans.
- Transverse / semi-transverse ventilation: extraction volume flow, longitudinal flow control, opening / closing the exhaust air outlets can be controlled

Emergency management

- Regular training for tunnel control centre staff
- Maintenance plan
- Emergency response plans
- Automatic linking of emergency systems
- Measures in the case of accident or fire
- Regular emergency drills



KINGSWAY (Wallasey)



QUEENSWAY (Birkenhead)

EMERGENCY NUMBER

Tunnels Police: 0151 236 8602 ext 452

LOCAL TRAFFIC & TRAVEL INFORMATION

Radio Merseyside 95.8 FM
Radio City 96.7 FM

OTHER INFORMATION

Fast Tag:	0151 236 8602
Website:	www.merseytunnels.co.uk

As you pass through the Tunnel note the location of Fire Exits marked by a Green Running Man sign.

Listen to Local radio, Tunnel Police can interrupt broadcast with safety information and instruction.

In the event of a breakdown stay in your vehicle - you will be monitored via CCTV.

In the event of an emergency follow instructions of Tunnels Police and other Emergency Services personnel. In the event of a fire proceed to Fire Exits (nearest point of evacuation).

Drive Safely, obey all speed limits, signs and signals. Keep your distance.
KEEP IN LANE

Mersey Tunnels

Head Office: George's Dock Building, Pier Head, Liverpool L3 1DD