

# European awareness day on level crossings 25 June 2009

*The risk to level crossing users in the European Union*



European Railway Agency

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## The European Railway Agency

The European Railway Agency (ERA) was set up to help create an integrated railway area by reinforcing safety and interoperability. Its main task is to develop economically viable common technical standards and approaches to safety, working closely with railway sector stakeholders, national authorities and other concerned parties, as well as with the European institutions.

## Recent statistics on accidents at level crossings

EU rail accident statistics including level crossings have been published by Eurostat since 2004 and ERA since 2006.

ERA statistics show that, in 2006 and 2007 30 % of deaths and 32 % of serious injuries as a result of accidents on railways occurring at level crossings. Level crossing accidents were 21 % of all significant<sup>1</sup> accidents on railways. 2592 significant accidents at level crossings occurred in the period 2006–2007 resulting in 860 deaths and 955 serious injuries.

Deaths and serious injuries classified by category of persons are reported in Figures 1 and 2, significant accidents classified by type are reported in Figure 3.

These statistics make level crossings an area of primary importance in the management of transport safety.

National Investigation Bodies of Member States have investigated serious<sup>2</sup> accidents since 2006, some of them occurred at level crossings; all information on accidents investigated can be found at:

<http://pdb.era.europa.eu/pdb>

## Management of the risk to level crossing users

ERA delivers recommendations to the European Commission (EC) relating to safety and interoperability; technical requirements on level crossings are competence of Member States and are not subject of these recommendations. A set of the ERA recommendations relates to Common Safety Targets (CSTs), that are addressed

to Member States. CSTs are expressed in terms of collective risk to level crossing users as well as to passengers, employees, unauthorised persons on railway premises and others.

ERA delivered a recommendation for the first set of CSTs in 2008 that has resulted in an EC Decision in 2009. This Decision requires Member States to maintain their current risk to level crossing users as long as the risk is lower than ten times the EU average, otherwise they will have to improve their performance. A second set of CSTs will be delivered in 2011 and shall reflect priority areas where safety needs to be further improved; level crossings may be one of these areas.

<sup>1</sup>'significant accident' means any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic. Accidents in workshops, warehouses and depots are excluded (Regulation (EC) N° 91/2003)

<sup>2</sup>'serious accident' means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety; 'extensive damage' means damage that can immediately be assessed by the investigating body to cost at least EUR 2 million in total (Directive 2004/49/EC)



### The weakest link: the human factor at level crossings

Research indicates that the human factor plays a key role when developing measures to improve safety at level crossings.

These measures should take into account the key topics of the research with reference to the human factor, some are reported below.

#### Familiarity

USA: "The results of the Safety Board study are consistent with previous findings on stop sign compliance at passive crossings. A study funded by the FHWA found that 60 percent of drivers stopped at crossing stop signs compared with 80 percent who stopped at highway intersection stop signs where there was no grade crossing. Another study reported that for familiar crossings, stopping compliance can be as low as 29 percent." (Safety study, Safety at Passive Grade Crossings, NTSB, 1998)

USA: "This study (Abraham, Datta and Datta, 1998) identified two-thirds of the respondents to be very familiar with the crossings they violated" ('Human Factor in Traffic Safety', Robert Dewar and Paul Olson, 2002)

Australia: Wigglesworth investigated 85 fatal accidents occurred at level crossings in Victoria between 1973 and 1977, 73/85 drivers (86%) were familiar with the crossing (Wigglesworth 1979).

USA: "Overall, each of the 18 drivers interviewed by the Safety Board underestimated the frequency of train crossings per day, typically by a factor of 2 to 3" (Safety study, Safety at Passive Grade Crossings, NTSB, 1998)

#### Knowledge of rules

Austria: most of 169 drivers interviewed felt badly informed about behaviour rules at level crossings (presentation published by the Austrian Road Safety Board<sup>3</sup>)

Germany: 33% of the road users wrongly believed that they had not to stop at a red flashing signal; 8% believed that they were allowed to cross through lowering gates, if this was possible without danger (presentation published by the Austrian Road Safety Board, see footnote 3)

#### Waiting time

USA: "the reasons given for violating warnings often involve statements that the train was not in sight, was stopped for an unreasonable amount of

time or was moving slowly" ('Human Factor in Traffic Safety', Robert Dewar and Paul Olson, 2002)

#### Germany:

- about 1/3 of road users are regularly annoyed by long waiting times,
- 2 minutes between signal activation and arrival of the train is acceptable,
- willingness for violations increases with long waiting times (15 min).

(presentation published by the Austrian Road Safety Board, see footnote 3).

#### Distraction

USA: "The Safety Board cited distraction as the primary probable cause or contributing factor in 12 of the 60 study accidents" (Safety study, Safety at Passive Grade Crossings, NTSB, 1998)

#### Recognition errors

USA: "Berg et al. (1982) found that 80 percent of accidents involved recognition errors (i.e. breakdown in the detection or perception of information necessary to recognize the presence of an approaching train and to identify the action necessary to avoid a collision)" ('Human Factor in Traffic Safety', Robert Dewar and Paul Olson, 2002)

### Railways cannot manage by themselves

The analysis of the rail sector demonstrates that railways cannot deal with safety at level crossings without cooperating with all concerned parties, such as road authorities, local authorities and land use planning entities.

**"Just over 8% of the total (level crossing) risk is related to sources within the direct control of the rail industry. The majority of this risk is associated with workforce errors,"**  
(UK Rail Safety and Standard Board, Annual Safety Performance Report 2008).

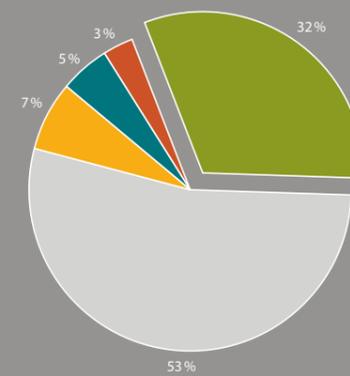


Figure 1: Fatalities by category of person 2006–2007 data

- Passengers (147)
- Employees (78)
- Level crossing users (892)
- Unauthorised persons (1512)
- Others (207)

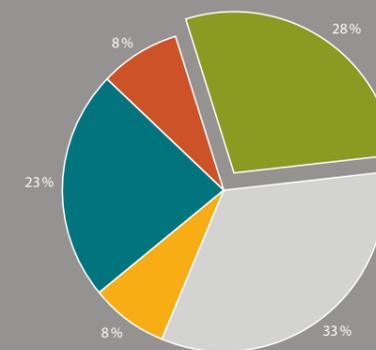
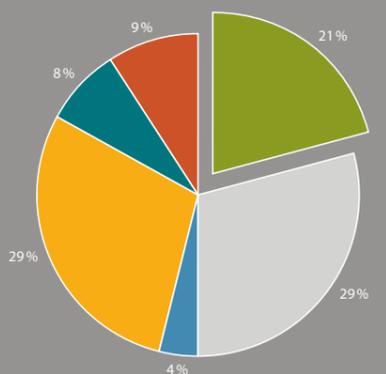


Figure 2: Serious injuries by category of person 2006–2007 data

- Passengers (711)
- Employees (234)
- Level crossing users (841)
- Unauthorised persons (994)
- Others (247)

Figure 3: N° of significant accidents by type 2006–2007 data

- Collisions of trains (1036)
- Derailments of trains (1142)
- Level crossing accidents (2592)
- Accidents to persons caused by rolling stock in motion (3702)
- Fires in rolling stock (469)
- Others (3644)



<sup>3</sup> [http://www.kfv.at/fileadmin/webcontent/Publikationen/Fachartikel/VM/Enquete\\_2008/5\\_Human\\_Factors\\_Pripfl.pdf](http://www.kfv.at/fileadmin/webcontent/Publikationen/Fachartikel/VM/Enquete_2008/5_Human_Factors_Pripfl.pdf)