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RISK ASSESSMENT TECHNIQUES

Addendum 1

Transmitted by the Governments of Belgium, Luxembourg, Portugal and Switzerland

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BELGIUM**(a) Railway accidents (based on definitions used in UIC statistics):**

The following table shows the trend in railway accidents over the past three years:

| | 1998 | 1999 | 2000 |
|----------------------|------------|------------|------------|
| Total number | 122 | 125 | 136 |
| (at level crossings) | 32 | 20 | 17 |
| Deaths | 30 | 27 | 29 |
| (passengers) | 3 | 3 | 3 |
| (employees) | - | 2 | 4 |
| (third parties) | 27 | 22 | 22 |
| (at level crossings) | 12 | 12 | 5 |
| Injured | 46 | 22 | 41 |
| (passengers) | 16 | 6 | 12 |
| (employees) | 9 | 4 | 15 |
| (third parties) | 21 | 12 | 14 |
| (at level crossings) | 13 | 6 | 8 |

(b) Methodologies used to establish investment priorities in the field of railway safety:

Each railway accident is the subject of an investigation in depth to ascertain the causes and responsibilities. On these bases, and if justified, proposals for improvement are prepared and addressed to the services in question. In addition, an overall accident report, by type of accident, is drawn up annually; it registers trends in numbers of accidents and thus the weak points of the safety system.

Investment priorities in railway safety also take account of the need to renew older equipment.

For more details in this regard, reference may be made to (b) concerning the question of railway safety discussed in the document on information on developments in various railway fields (TRANS/SC.2/2001/.../Add.1) explaining the measures and steps taken by the SNCB to improve safety of operation.

(c) Traffic of dangerous goods on the network of the European Agreement on Main International Railway Lines (AGC):

B-Cargo has no accurate statistics permitting the identification of the traffic flows via the main international railway lines to which AGC refers.

On a point of information, the table which follows gives the overall tonnage of dangerous goods carried by the SCNB in the last three years.

| | 1998 | 1999 | 2000 |
|--|-------|-------|-------|
| Tonnage carried (millions of tonnes) | 60.70 | 59.15 | 61.28 |
| Tonnage RID (millions of tonnes) | 4.92 | 2.24 | 3.15 |
| Percentage of dangerous goods carried | 8.11% | 3.79% | 5.14% |

When there are incidents or accidents involving the transport of dangerous goods by rail on the SNCB network, the company carries out inquiries and proposes, if necessary, amendments to the general rules of operation in order to improve safety and thus reduce the risks inherent in the transport of dangerous goods.

Dangerous goods traffic is accepted on all SNCB lines, provided that the requirements of RID and SNCB's general rules of operation are respected.

UIC (MD consolidation group) of which the SNCB is a member, and the European Chemical Industry Council (CEFIC) reached an agreement in 1998 to draw up a common system to manage the safety of chemicals carried by rail. The purpose of the initiative is to prevent accidents involving chemicals and to minimize their consequences. It consists of a standardized joint assessment procedure (appropriately detailed questionnaire completed by a competent independent inspector) followed by an in-depth analysis and the identification of a jointly agreed programme for improvement. The preparatory work for the implementation of this system was finalized during the year 2000.

(d) Marshalling yards used more by dangerous goods transport:

The four main marshalling yards of the SCNB network (Antwerpen-Noord, Gent Zeehaven, Kinkempois and Monceau) handle wagons carrying dangerous goods.

UIC (ad hoc "Barcelona" group of the "dangerous goods" consolidated group) was invited by the European Commission's Environment and Transport and Energy Directorates-General, in the context of the discussions on the Seveso II Directive, to prepare an international guide to emergency plans for marshalling yards used for the transit of wagons carrying dangerous goods.

This guide, which was developed in consultation with several networks, including the SNCB, will normally be approved during 2001. In the case of the SNCB, the new guide's recommendations will be incorporated into the general emergency plan.

LUXEMBOURG

(a) Railway accidents (based on definitions used in UIC statistics):

Since 1997, Luxembourg has experienced a decrease in railway accidents as a result of the introduction of a safety audit with the collaboration of a consultant external to the CFL. The table below gives the statistical details of railway accidents in 2000.

| No. of column | Description | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|----------------------------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| NUMBER OF ACCIDENTS | | | | | | | | | | | | | | | | | | |
| 4 | Collisions | 3 | 6 | 1 | 1 | 6 | 1 | 4 | 7 | 2 | 0 | 1 | 0 | 3 | 0 | 1 | 0 | |
| 5 | Deraillments | 3 | 5 | 3 | 3 | 4 | 3 | 3 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | |
| 6 | Others (not including accidents of cols. 7 and 8) | 0 | 1 | 2 | 3 | 0 | 1 | 3 | 1 | 0 | 7 | 1 | 0 | 0 | 0 | 0 | 2 | |
| 7 | At level crossings | 3 | 1 | 1 | 1 | 0 | 0 | 4 | 1 | 0 | 4 | 2 | 3 | 1 | 1 | 0 | 1 | |
| 8 | Persons in contact with moving rolling stock | 7 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 4 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | |
| NUMBER OF DEATHS | | | | | | | | | | | | | | | | | | |
| Passengers | | | | | | | | | | | | | | | | | | |
| 9 | Collisions and derailments | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10 | Other accidents (cols. 6, 7 and 8) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Employees | | | | | | | | | | | | | | | | | | |
| 11 | Collisions and derailments | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 12 | Other accidents (cols. 6, 7 and 8) | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | |
| Persons unconnected | | | | | | | | | | | | | | | | | | |
| 13 | Collisions and derailments | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14 | Other accidents (cols. 6, 7 and 8) | 2 | 0 | 2 | 0 | 1 | 2 | 3 | 1 | 2 | 4 | 3 | 0 | 1 | 1 | 0 | 0 | |
| Total deaths | | | | | | | | | | | | | | | | | | |
| 15 | Collisions and derailments (cols. 9+11+13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 16 | Others (not including deaths in cols. 17 and 18) | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | |
| 17 | At level crossings | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 3 | 1 | 1 | 0 | 0 | |
| 18 | Persons in contact with moving rolling stock | 3 | 1 | 2 | 0 | 2 | 1 | 1 | 1 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | |

| No. of column | Description | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|----------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| NUMBER OF INJURED | | | | | | | | | | | | | | | | | | |
| Passengers | | | | | | | | | | | | | | | | | | |
| | 19 Collisions and derailments | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | |
| | 20 Other accidents (cols. 6, 7 and 8) | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Employees | | | | | | | | | | | | | | | | | | |
| | 21 Collisions and derailments | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 1 | 0 | |
| | 22 Other accidents (cols. 6, 7 and 8) | 2 | 1 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | |
| Persons unconnected | | | | | | | | | | | | | | | | | | |
| | 23 Collisions and derailments | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 24 Other accidents (cols. 6, 7 and 8) | 5 | 2 | 2 | 1 | 0 | 2 | 2 | 0 | 4 | 2 | 4 | 0 | 1 | 1 | 0 | 1 | |
| Total injured | | | | | | | | | | | | | | | | | | |
| | 25 Collisions and derailments (cols. 19+21+23) | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 0 | 1 | 0 | |
| | 26 Others (not including injured in cols. 27 and 28) | 1 | 0 | 2 | 3 | 0 | 1 | 1 | 1 | 0 | 6 | 3 | 0 | 0 | 0 | 0 | 0 | |
| | 27 At level crossings | 5 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | |
| | Persons in contact with 28 rolling stock | 3 | 2 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | |

(b) Methodologies used to establish investment priorities in the field of railway safety:

In 1998, the CFL, in close collaboration with an external consultant, drew up a safety plan to cover areas of safety in railway operation. This plan is used to identify investment priorities in this field. Investments have been made at this time for the installation in the short term of an automatic train stopping device (MEMOR II) on the Luxembourg railway network. In order to improve safety in railway operation the CFL are planning in the long term to generalize the ETCS system on the Luxembourg network in preparation for the interoperability of the conventional trans-Europe railway system.

(c) Traffic of dangerous goods on the network of the European Agreement on Main International Railway Lines (AGC):

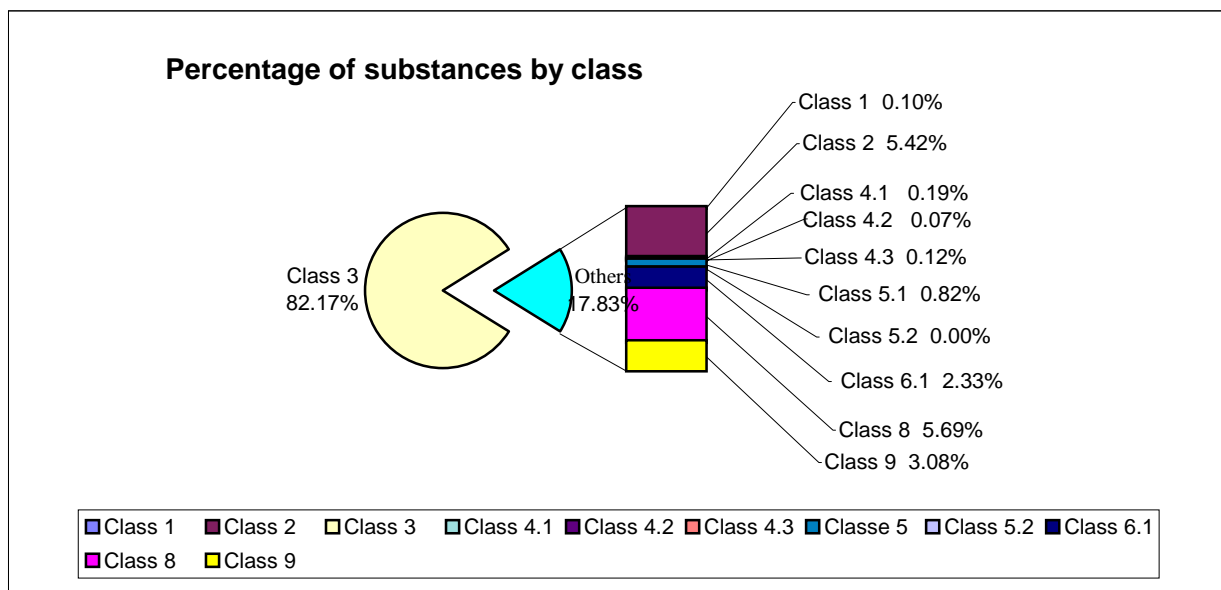
Practically a quarter of the goods carried on the Luxembourg network are RID substances. A table taken from the report of the CFL safety adviser, listing the total dangerous goods carried in the Grand Duchy of Luxembourg, is annexed.

Annex**Overall tonnage by class**

The table contains the sum of the net masses carried, by class, for the year 2000. The last column gives the percentage of total tonnage of the class under consideration.

| Class | Net mass carried in tonnes | Percentage of overall tonnage |
|---------------|----------------------------|-------------------------------|
| Class 1 | 4 840.2 | 0.10 |
| Class 2 | 254 869.1 | 5.42 |
| Class 3 | 3 870 518.5 | 82.17 |
| Class 4.1 | 9 302.7 | 0.19 |
| Class 4.2 | 3 510.9 | 0.07 |
| Class 4.3 | 5 865.1 | 0.12 |
| Class 5.1 | 38 570.5 | 0.82 |
| Class 5.2 | 88.9 | 0.00 |
| Class 6.1 | 109 798 | 2.33 |
| Class 8 | 267 682.7 | 5.69 |
| Class 9 | 145 097.2 | 3.08 |
| Total: | 4 710 143.8 | |

Number of different substances carried in 2000: 584



(d) Marshalling yards used more by dangerous goods transport

For traffic in single wagons, the Bettembourg marshalling yard is the main hub for the Grand Duchy while the Luxembourg Station marshalling yard, which is the terminus for hydrocarbons-carrying trains from the Belgian refineries, makes up the goods trains which are sent to the sidings of the oil companies.

PORTUGAL**(a) Railway accidents (based on definitions used in UIC statistics)**Table 6: Trend of accidents in the railway sector

| TYPE/YEARS | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|------------|
| MATERIAL ACCIDENTS | 738 | 661 | 707 | 600 | 586 | 568 | 566 | 546 | 524 | 473 |
| Collisions | 270 | 238 | 288 | 244 | 252 | 226 | 250 | 262 | 256 | 223 |
| Trains | 8 | 11 | 14 | 9 | 8 | 13 | 9 | 11 | 10 | 8 |
| Shunting | 48 | 37 | 52 | 29 | 26 | 31 | 38 | 38 | 30 | 31 |
| Other collisions | 214 | 190 | 222 | 206 | 218 | 182 | 203 | 213 | 216 | 184 |
| Derailments | 250 | 217 | 209 | 186 | 155 | 169 | 147 | 144 | 127 | 91 |
| Trains | 54 | 58 | 57 | 52 | 41 | 47 | 43 | 37 | 45 | 21 |
| Shunting | 196 | 159 | 152 | 134 | 114 | 122 | 104 | 107 | 82 | 70 |
| Other material accidents | 28 | 12 | 39 | 16 | 14 | 17 | 17 | 12 | 11 | 13 |
| Collisions at level crossings | 190 | 194 | 171 | 154 | 165 | 156 | 152 | 128 | 130 | 146 |
| ACCIDENTS TO PERSONS | 614 | 673 | 625 | 652 | 556 | 525 | 536 | 560 | 550 | 518 |
| Run over by slow train | 123 | 116 | 151 | 116 | 114 | 138 | 114 | 127 | 129 | 108 |
| Run over in a station | 63 | 45 | 50 | 42 | 54 | 53 | 54 | 70 | 60 | 46 |
| Run over at a level crossing | 52 | 34 | 42 | 36 | 30 | 22 | 18 | 18 | 20 | 18 |
| Falling on the line | 147 | 177 | 133 | 196 | 161 | 138 | 130 | 145 | 152 | 138 |
| During shunting | 85 | 89 | 39 | 73 | 43 | 33 | 56 | 50 | 54 | 59 |
| Coupling | 35 | 29 | 23 | 18 | 19 | 15 | 19 | 30 | 28 | 25 |
| Buffers | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 |
| Various | 50 | 60 | 16 | 55 | 22 | 17 | 37 | 20 | 24 | 34 |
| Injured in train | 16 | 39 | 45 | 35 | 33 | 51 | 72 | 56 | 48 | 52 |
| Collisions with gauge | 12 | 11 | 24 | 9 | 15 | 8 | 9 | 8 | 5 | 8 |
| Flying stones | 96 | 146 | 130 | 131 | 97 | 74 | 73 | 82 | 64 | 86 |
| Various | 20 | 20 | 11 | 14 | 9 | 8 | 10 | 4 | 18 | 3 |
| TOTALS | 1 352 | 1 334 | 1 332 | 1 252 | 1 142 | 1 093 | 1 102 | 1106 | 1 074 | 991 |

Source: REFER E.P. safety report, 1998

Table 7: Railway accidents in 1998 by type

| TYPE | NUMBER | PERCENTAGES | |
|--------------------------------------|------------|-------------|------------|
| | | PARTIAL | TOTAL |
| MATERIAL | 473 | 100 | 48 |
| Collisions | 223 | 47 | 23 |
| Trains | 8 | 2 | 1 |
| Shunting | 31 | 7 | 3 |
| Other collisions | 184 | 39 | 19 |
| Derailments | 91 | 19 | 9 |
| Trains | 21 | 4 | 2 |
| Shunting | 70 | 15 | 7 |
| Collisions at level crossings | 146 | 31 | 15 |
| Other material accidents | 13 | 3 | 1 |
| INVOLVING PERSONS | 518 | 100 | 52 |
| Run over on the line | 108 | 21 | 11 |
| Run over in the station | 46 | 9 | 5 |
| Run over on a level crossing | 18 | 3 | 2 |
| Falling on the line | 138 | 27 | 14 |
| During shunting | 59 | 11 | 6 |
| Coupling | 25 | 5 | 3 |
| Between buffers | 0 | 0 | 0 |
| Various | 34 | 7 | 3 |
| Injured in train | 52 | 10 | 5 |
| Collisions with gauge | 8 | 2 | 1 |
| Projectiles | 86 | 17 | 9 |
| Various | 3 | 1 | 0 |
| TOTALS | 991 | | 100 |

Source: REFER E.P. Report on safety, 1998

(b) Methodologies used to establish investment priorities in the field of railway safety:

For some years, railway safety has been a matter of concern to railway administrations; with this in mind, new systems for signalling, automatic control and centralized traffic control have been established.

In addition, improvements to track superstructure have been introduced, in particular the use of continuous welded rails and single-block concrete sleepers and the adoption of new traction systems.

Another important aspect of railway safety is constituted by REFER's efforts to replace level crossings by crossings at different levels, when justified.

SWITZERLAND

(a) Railway accidents (based on definitions used in UIC statistics):

Switzerland issues half-yearly statistics of railway accidents. These statistics are established on the basis of definitions drawn up by the International Union of Railways (UIC). They cover the following headings:

- derailments, collisions (involving trains) and their causes;
- accidents on level-crossings and their causes;
- all incidents involving injuries or death;
- incidents involving a dangerous substance;
- suicides and attempted suicides;
- derailments and collisions (concerning shunting).

(b) Methodologies used to establish investment priorities in the field of railway safety:

Safety is a top priority task of the Federal Office of Transport (OFT). As the supervisory authority for public transport, the Office must adapt safety to constantly changing conditions of operation. It also performs this task by improving safety in trains. However, the modifications resulting from the reform of the railways must be taken into account. In the context of the reform, the Office has prepared a new approach to safety. The reform of the railways has clearly demarcated responsibilities and competences between the supervisory authority and the transport companies. While the latter are responsible for the safety of buildings, installations and vehicles, the Office establishes standards and requirements, ensures the approval of new systems, products and components and checks the safety of buildings, installations and vehicles certified by the transport companies and manufacturers.

Where safety is concerned, Switzerland has pursued previously established objectives in the following areas:

- Tunnels: Switzerland has continued with its research into safety in railway tunnels. Some aspects of this research were mentioned in the replies to last year's questionnaire. The full report contained in annex 3 will give a more complete version.
- Automatic train stopping: A risk analysis was carried out on the automatic train-stopping device. The results were circulated in 1998 and a strategy was drawn up. The upgrading of the technology has meant that the Federal Office of Transport has had to adapt and improve procedures. These can be seen in detail in the reply to question F(b).

(d) Marshalling yards used more by dangerous goods transport:

The marshalling yards mainly used in the transport of dangerous goods are: Basel, Zurich, Lausanne, Chiasso, Bienne, Rotkreuz, Buchs and Geneva.
