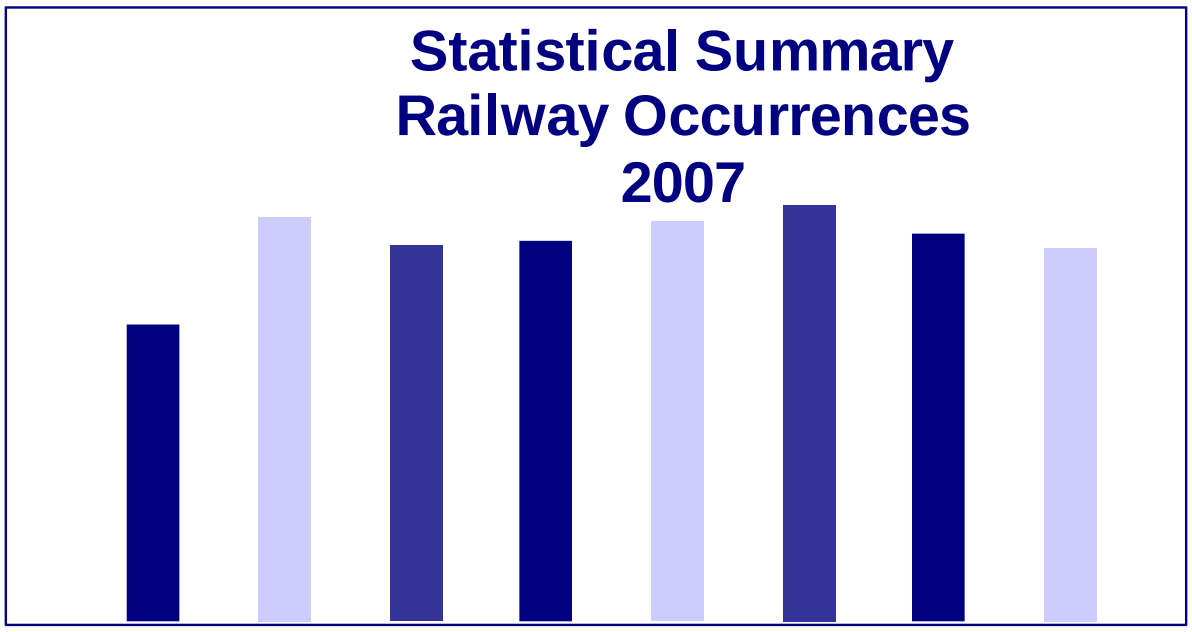
Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

Statistical Summary
Railway Occurrences
2007



Canada

Foreword

This document provides users of Canadian railway safety data with an annual summary of selected statistics on rail occurrences. It covers federally regulated railways only. Provincial data reported to the Transportation Safety Board of Canada (TSB) are not included in this report. Information in this summary is also posted on the TSB website at www.bst-tsb.gc.ca.

Users of these statistics are advised that, in a live database, the occurrence data are constantly being updated. Consequently, the statistics can change slightly over time. Further, as many occurrences are not formally investigated, information recorded on some occurrences may not have been verified. Therefore, caution should be used when utilizing these statistics. The 2007 statistics presented here reflect the TSB database updated as of 29 May 2008.

To enhance awareness and increase the safety value of the material presented in the TSB *Statistical Summary, Railway Occurrences 2007*, readers are encouraged to copy or reprint the data presented, in whole or in part, for further distribution (with acknowledgements of the source).

The TSB is an independent agency operating under its own Act of Parliament. Its sole aim is the advancement of transportation safety.

Comments on this document can be forwarded to the following address:

Transportation Safety Board of Canada
Communications Division
Place du Centre
200 Promenade du Portage
4th Floor
Gatineau, Quebec
K1A 1K8

Telephone: 819-994-3741
Facsimile: 819-997-2239
E-mail: communications@bst-tsb.gc.ca

Cat. No. TU1-2/2007
ISBN 978-0-662-05711-6

TABLE OF CONTENTS

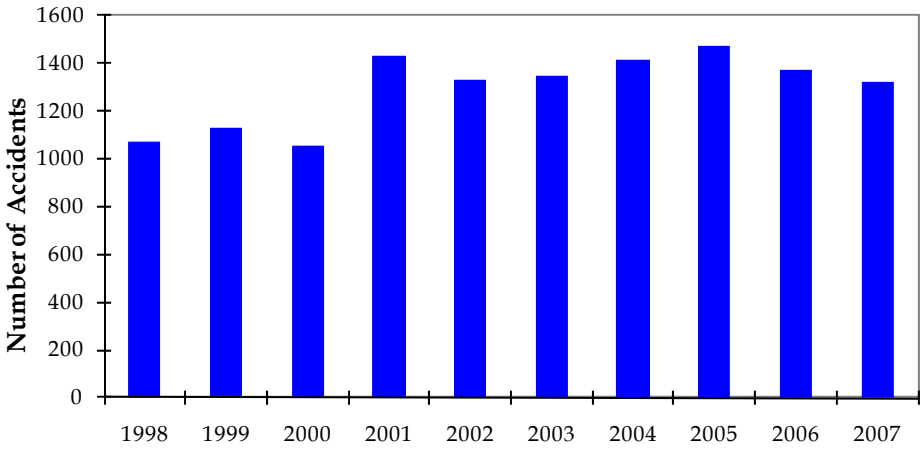
RAILWAY OCCURRENCES IN 2007

ACCIDENTS

Overview of Accidents and Casualties (Tables 1 to 3)

In 2007, 1323 rail accidents were reported to the TSB (Figure 1), a 4% decrease from the 2006 total of 1377 and a 5% decrease from the 2002–2006 average of 1391.

Figure 1 – Rail Accidents, 1998–2007

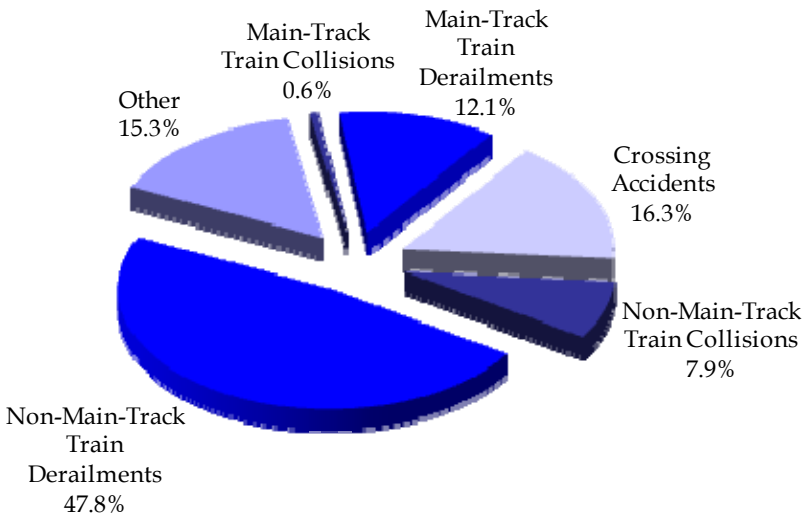


The largest proportion of reported rail accidents are non-main-track related. In 2007, these accounted for over half of the total (Figure 2). Typically, most non-main-track accidents are minor, occurring during switching operations at speeds of less than 10 mph.

Main-track derailments and collisions accounted for 13% of all accidents in 2007, up from 10% last year.

In 2007, 16% of rail accidents involved vehicles or pedestrians at highway-rail crossings, down from 18% over the previous five years.

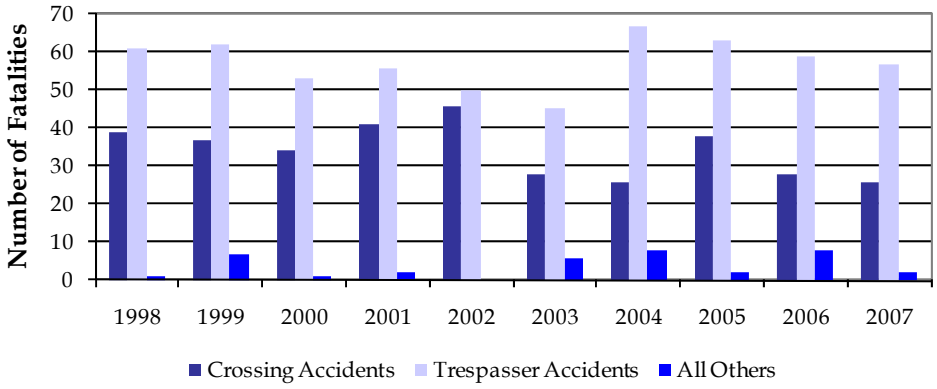
Figure 2 – Rail Accidents by Type, 2007



In 2007, 191 accidents involved dangerous goods (either rail cars or road vehicles carrying or having recently carried dangerous goods), up from the 2006 total of 183, but down from the five-year average of 210. Of these, 75% were non-main-track accidents. Four accidents resulted in a dangerous goods release, the same as the 2006 total, but down from the five-year average of 6.

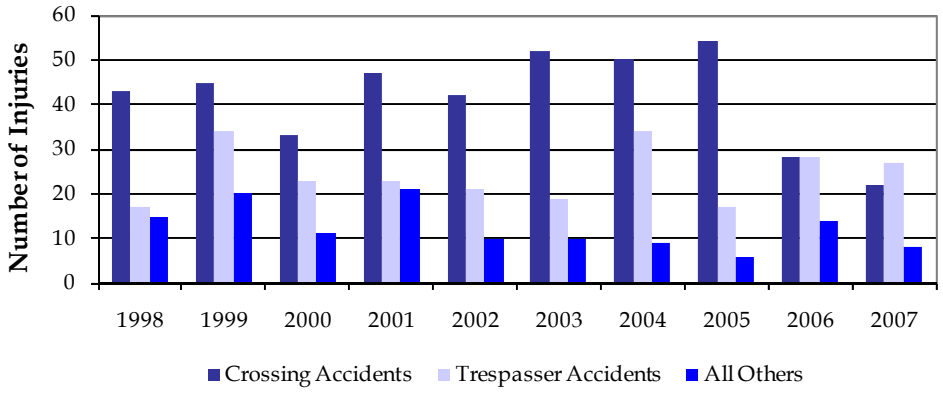
Rail fatalities totalled 85 in 2007, down from 95 in 2006 and the five-year average of 95. The largest fatality category was trespasser fatalities with 57 in 2007 (Figure 3), unchanged from the five-year average. Crossing fatalities totalled 26 in 2007, down from 28 in 2006 and from the five-year average of 33. In 2007, one employee was fatally injured, down from the five-year average of four.

Figure 3 – Fatalities by Type of Occurrence, 1998–2007



A total of 57 serious injuries resulted from rail occurrences in 2007 (Figure 4), down from 70 in 2006 and from the five-year average of 79. Trespasser injuries totalled 27 in 2007, down 1 from the 2006 total of 28 but a 13% increase from the five-year average of 24. Crossing accidents resulted in 22 injuries, down from 28 in 2006 and from the five-year average of 45.

Figure 4 – Serious Injuries by Type of Occurrence, 1998–2007

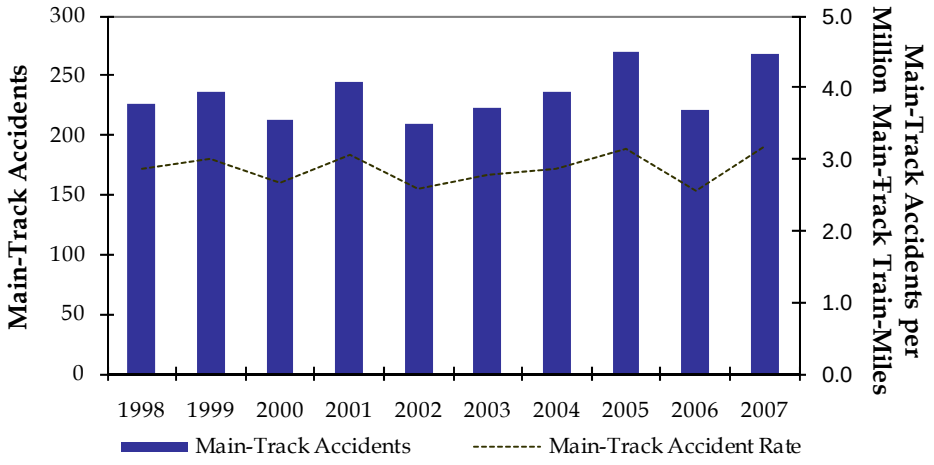


Freight trains accounted for 72% of all trains involved in rail accidents in 2007, followed by single cars/cuts of cars and passenger trains with proportions of 10% and 6% respectively.

Accidents by Type (Tables 4a to 9)

Main-Track Accidents: The number of main-track accidents (accidents other than crossing and trespasser accidents that occur on main tracks or spurs) totalled 268 in 2007 (Figure 5), up from 222 in 2006 and from the five-year average of 232. Rail activity on main tracks decreased by 3% from the previous year, and the main-track accident rate increased by 23%, from 2.6 main-track accidents per million main-track train-miles in 2006 to 3.2 in 2007.

Figure 5 – Main-Track Accidents and Accident Rate, 1998–2007

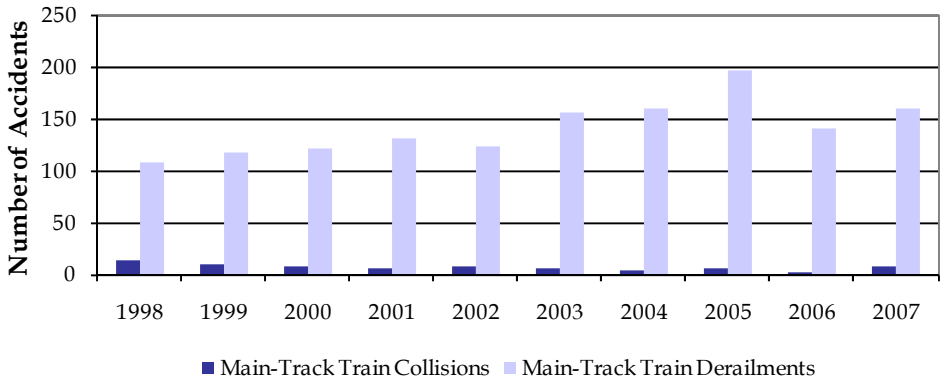


Main-track collisions and derailments are the most serious categories of rail accidents in terms of financial loss and potential risk to the public (for example, where passenger trains are involved or dangerous goods are released from trains that derail while travelling at high speeds in populated areas).

There were 8 main-track collisions in 2007, up 5 from the 2006 total (Figure 6) and from the five-year average. No fatalities or serious injuries resulted from main-track collisions in 2007, and none resulted in the release of dangerous goods.

A total of 160 main-track derailments were reported in 2007, a 13% increase from the 2006 total of 141 and a 3% increase from the five-year average of 156. The number of main-track derailments per million main-track train-miles increased to 1.89 in 2007, up from 1.62 in 2006 and the five-year average of 1.87.

Figure 6 – Main-Track Collisions and Derailments, 1998–2007



No fatalities or serious injuries resulted from main-track derailments in 2007.

In 2007, 35 main-track derailments involved dangerous goods, up from 18 in 2006 and from the five-year average of 30. Two of these resulted in a release of dangerous goods.

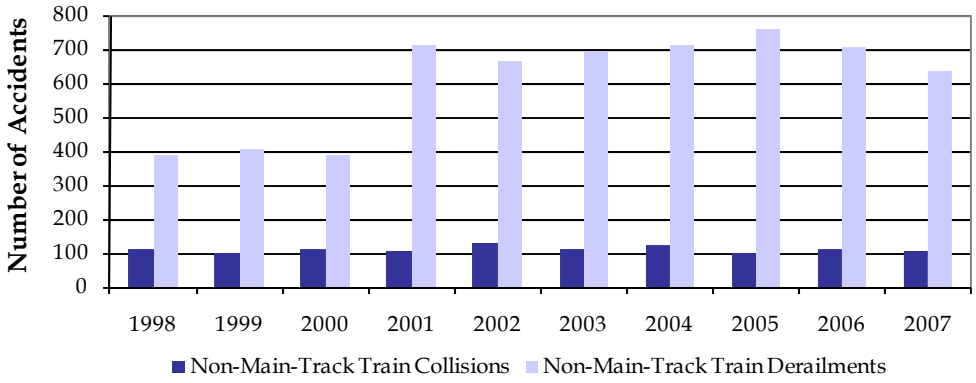
In 2007, there was a 12% decrease in factors assigned[1] to main-track derailments compared to the five-year average. However, factor types were proportionately unchanged, with 36% being equipment-related in 2007 compared to the five-year average of 39%, and 36% being track-related compared to the five-year average of 41%.

Factors assigned in an accident are considered to have acted in combination to contribute to the occurrence.

1 Factors assigned are conditions and/or acts that may have played a role in an occurrence.

Non-Main-Track Accidents: Non-main-track collisions totalled 104 in 2007, down from 109 in 2006 (Figure 7) and from the five-year average of 114. Derailments occurred in 58% of non-main-track collisions, and 63% of those involved the derailment of one or two cars.

Figure 7 – Non-Main-Track Collisions and Derailments, 1998–2007



No fatalities or serious injuries resulted from non-main-track collisions in 2007.

Dangerous goods were involved in 41% of non-main-track collisions, none of which resulted in a release of product.

Factors assigned to non-main-track collisions are primarily rules-related (94%) (for example, non-compliance with prescribed procedures). Failure to protect, such as improper positioning of movements and handling of switches, was assigned most often.

There were 633 non-main-track derailments in 2007 (Figure 7), down 10% from last year and 10% from the five-year average of 707; 72% of these accidents involved the derailment of one or two cars.

No fatalities or serious injuries resulted from non-main-track derailments in 2007.

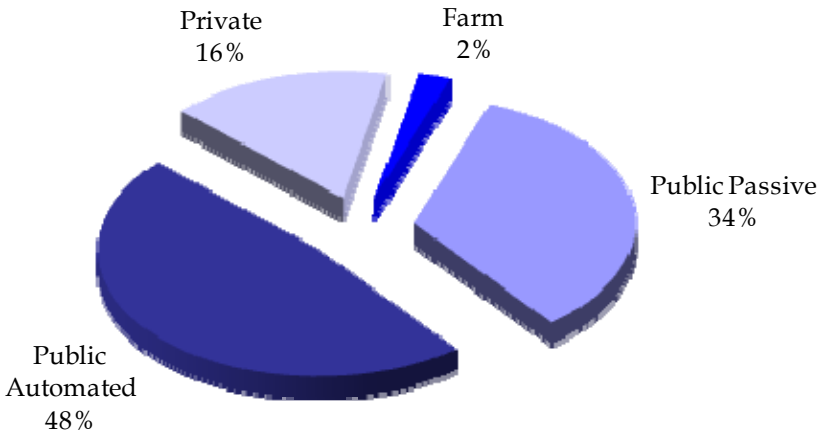
Dangerous goods cars were involved in 16% of non-main-track derailments, but none resulted in a release of dangerous goods.

In 2007, there was an 8% decrease in rules-related factors (for example, non-compliance with prescribed procedures) assigned to non-main-track derailments compared to the five-year average, as well as a 12% decrease in track-related factors assigned. Factors assigned in an accident are considered to have acted in combination to contribute to the occurrence.

Crossing Accidents: Crossing accidents represent one of the most serious types of rail accidents in terms of casualties; typically, 25% result in either serious or fatal injuries. Although crossing accidents do not usually result in substantial damage to railway property or equipment, the motor vehicles involved are usually heavily damaged or destroyed.

There were 216 crossing accidents in 2007, down from 248 in 2006 and from the five-year average of 254. This reduction consisted mainly of a decrease in accidents at public automated crossings. Accidents at public automated crossings (103) decreased 12% from the 2006 total of 117 and 21% from the five-year average of 131, and accidents at private crossings decreased 17% from the five-year average of 42. The proportion of accidents occurring at public automated crossings in 2007 remained constant from 2006 at 48% (Figure 8). Although there are nearly twice as many public passive crossings as public automated ones, the higher number of accidents occurring at automated crossings is due in part to higher vehicle and train traffic volumes at these crossings.

Figure 8 – Crossing Accidents by Type of Crossing, 2007

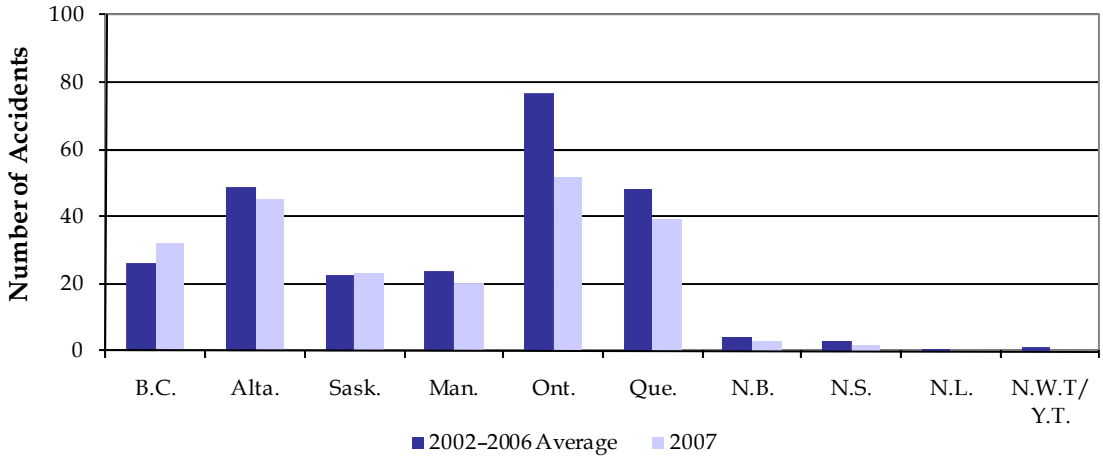


There were 23 fatal crossing accidents in 2007, down from 25 in 2006 and the five-year average of 29. Although crossing accidents involving pedestrians accounted for 7% of crossing accidents in 2007, they accounted for 35% of fatal crossing accidents. Crossing-related fatalities totalled 26 in 2007, down 7% from the 2006 total of 28 and 21% from the five-year average of 33.

In 2007, 6 crossing accidents resulted in a derailment, up from the 2006 total of 4, but down from the five-year average of 8. Although heavy vehicles (for example, dump trucks, tractor-trailers) were involved in 14% of crossing accidents in 2007, they were involved in half of those resulting in a derailment.

Crossing accidents in British Columbia and Saskatchewan were higher than their respective five-year averages (Figure 9), while accidents in Alberta, Manitoba, Ontario and Quebec showed a decrease.

Figure 9 – Crossing Accidents by Province

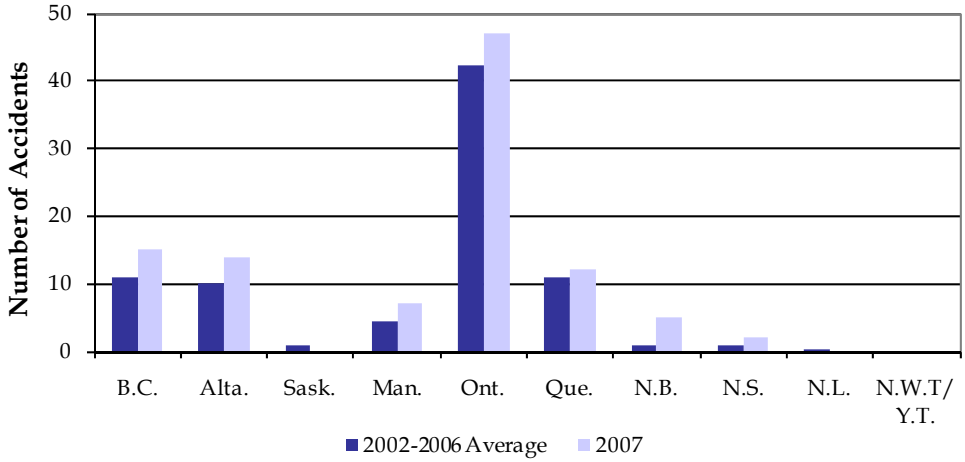


Trespasser Accidents: Trespasser accidents involve persons, primarily pedestrians, not authorized to be on railway rights-of-way and who are struck by rolling stock other than at railway crossings. They totalled 102 in 2007, up from the 2006 total of 91 and the five-year average of 82.

Over 75% of trespasser accidents occurred in Ontario, Alberta and British Columbia (Figure 10), accounting for 46%, 14% and 15% of accidents respectively.

In 2007, the proportion of fatal trespasser accidents (56%) was lower than the five-year average proportion of 69%. In addition, the proportion of trespasser accidents resulting in serious injuries (26%) was lower than the five-year average proportion of 28%.

Figure 10 – Trespasser Accidents by Province



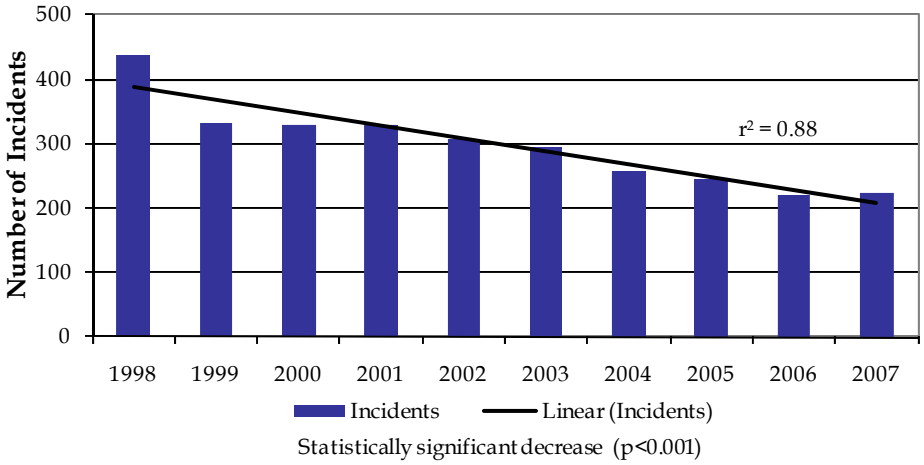
INCIDENTS

Overview of Incidents (Tables 10 and 11)

In 2007, there were 225 reported rail incidents, up from 221 in 2006 but down from the five-year average of 265.

Statistical analysis using linear regression indicates that there has been a significant downward trend ($p<0.001$)[2] of reported railway incidents over the past 10 years (Figure 11), due mainly to the considerable decrease in the number of reported dangerous goods (DG) leaker incidents.

Figure 11 – Rail Incidents, 1998–2007



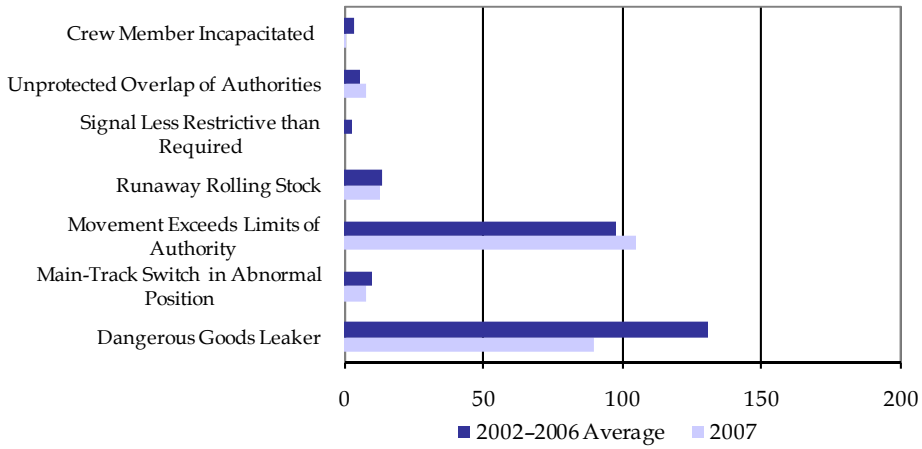
A DG leakage is the unintentional release of a hazardous material while in transportation and does not involve an accident. The vast majority of these incidents involve small quantities of products. DG leaker incidents, which accounted for 40% of reported rail incidents in 2007, showed an 8% increase and a 31% decrease respectively from the 2006 total of 83 and the five-year average of 131 (Figure 12).

Factors assigned in non-dangerous goods incidents were primarily operational or rules-related, most frequently involving an overlap of authorities or a failure to protect.

In 2007, there were 105 incidents where the movement exceeded the limit of authority, compared to 101 in 2006 and the five-year average of 98.

[2] It is agreed by convention that, for a result to be considered statistically significant, its probability must be lower than 1 in 20 (that is, $p<0.05$).

Figure 12 – Rail Incidents by Type



APPENDIX A – RAIL OCCURRENCE TABLES

Table 1
Railway Occurrences[1] and Casualties
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Accidents										
Main-Track Train Collisions	14	10	9	7	9	6	5	6	3	8
Main-Track Train Derailments - 1–2 cars[2]	63	64	54	70	66	83	96	102	84	77
Main-Track Train Derailments - 3 or more cars[2]	45	55	68	61	58	73	65	96	57	83
Crossing Accidents	273	283	265	280	264	251	237	270	248	216
Non-Main-Track Train Collisions	114	100	113	108	131	111	123	98	109	104
Non-Main-Track Train Derailments - 1–2 cars[2]	253	268	270	532	482	525	562	589	567	458
Non-Main-Track Train Derailments - 3 or more cars[2]	135	135	117	181	182	170	150	170	137	175
Collisions/Derailments Involving Track Units	13	27	16	19	11	23	26	19	17	31
Employee/Passenger Accidents	10	13	13	8	8	6	12	8	15	18
Trespasser Accidents	78	95	78	80	73	65	99	82	91	102
Fires/Explosions	51	53	32	36	25	23	15	17	25	25
Other	26	26	19	48	26	16	23	20	24	26
Total	**1075**	**1129**	**1054**	**1432**	**1335**	**1352**	**1413**	**1477**	**1377**	**1323**
Reportable Incidents										
Dangerous Goods Leaker	272	167	188	194	167	151	131	123	83	90
Main-Track Switch in Abnormal Position	14	15	17	9	9	11	12	10	7	8
Movement Exceeds Limits of Authority	107	115	102	101	99	102	95	91	101	105
Runaway Rolling Stock	20	15	9	10	18	13	11	16	12	13
Other	25	21	14	15	15	18	8	5	18	9
Total	**438**	**333**	**330**	**329**	**308**	**295**	**257**	**245**	**221**	**225**
Million Main-Track Train-Miles (MMTTM)[3]	79.0	78.8	80.1	79.9	81.3	80.6	82.6	85.8	86.9	84.5
Main-Track Accidents[4]/MMTTM	2.9	3.0	2.7	3.1	2.6	2.8	2.9	3.1	2.6	3.2
Accidents Involving Dangerous Goods										
Main-Track Train Derailments	25	19	30	17	25	38	37	32	18	35
Crossing Accidents	8	8	12	7	6	3	11	15	4	6
Non-Main-Track Train Collisions	56	48	50	40	48	37	44	44	41	43
Non-Main-Track Train Derailments	136	133	149	128	130	139	106	113	109	100
All Others	15	16	8	13	13	8	10	9	11	7
Total	**240**	**224**	**249**	**205**	**222**	**225**	**208**	**213**	**183**	**191**
Accidents with a Dangerous Goods Release	5	9	7	5	5	9	7	7	4	4
Fatalities										
Crossing Accidents	39	37	34	41	46	28	26	38	28	26
Trespasser Accidents	61	62	53	56	50	45	67	63	59	57
All Others	1	7	1	2	0	6	8	2	8	2
Total	**101**	**106**	**88**	**99**	**96**	**79**	**101**	**103**	**95**	**85**
Serious Injuries										
Crossing Accidents	43	45	33	47	42	52	50	54	28	22
Trespasser Accidents	17	34	23	23	21	19	34	17	28	27
All Others	15	20	11	21	10	10	9	6	14	8
Total	**75**	**99**	**67**	**91**	**73**	**81**	**93**	**77**	**70**	**57**

1 For federally regulated railways only

2 These statistics (derailments since 2002) have been adjusted in light of clarifications to industry of TSB's reporting requirements.

3 2007 main-track train-miles are estimated (Source: railways annual reports submitted to Transport Canada)

4 Accidents that occurred on main tracks or spurs, excluding crossing and trespasser accidents

Table 2

Fatalities and Serious Injuries by Type of Occurrence and Person Type
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Main-Track Train Collisions										
Fatalities	0	0	0	0	0	0	1	0	0	0
Serious Injuries	2	0	0	0	2	0	0	0	0	0
Main-Track Train Derailments										
Fatalities	0	4	0	0	0	2	2	0	3	0
Serious Injuries	0	6	1	9	0	2	0	0	2	0
Crossing Accidents										
Fatalities	39	37	34	41	46	28	26	38	28	26
Serious Injuries	43	45	33	47	42	52	50	54	28	22
Non-Main-Track Train Collisions										
Fatalities	0	0	0	1	0	0	0	0	0	0
Serious Injuries	0	2	0	0	0	0	0	0	0	0
Non-Main-Track Train Derailments										
Fatalities	0	0	0	1	0	1	0	0	0	0
Serious Injuries	0	0	0	0	0	0	0	1	0	0
Collisions/Derailments Involving Track Units										
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	3	0	1	0	0	0	0	1	0	0
Employee/Passenger Accidents										
Fatalities	1	3	1	0	0	1	5	2	4	1
Serious Injuries	10	10	8	8	6	3	7	4	9	8
Trespasser Accidents										
Fatalities	61	62	53	56	50	45	67	63	59	57
Serious Injuries	17	34	23	23	21	19	34	17	28	27
Fires/Other										
Fatalities	0	0	0	0	0	0	0	0	0	1
Serious Injuries	0	0	0	1	0	1	0	0	0	0
Dangerous Goods Leaker										
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	0	0	0	0	0	1	0	0	1	0
Other Incidents										
Fatalities	0	0	0	0	0	2	0	0	1	0
Serious Injuries	0	2	1	3	2	3	2	0	2	0
Fatalities by Person Type										
Employees	0	3	1	2	0	6	6	2	6	1
Passengers	0	0	0	0	0	0	0	0	3	0
Pedestrians	8	7	8	6	10	6	4	11	9	11
Vehicle Occupants	31	30	28	34	38	23	23	28	16	18
Trespassers	61	61	51	56	48	44	68	62	59	55
Other Persons	1	1	0	1	0	0	0	0	2	0
Total	**101**	**102**	**88**	**99**	**96**	**79**	**101**	**103**	**95**	**85**
Serious Injuries by Person Type										
Employees	11	14	9	16	8	9	9	6	14	9
Passengers	3	4	1	7	0	0	0	1	1	0
Pedestrians	4	5	7	5	6	6	2	2	5	6
Vehicle Occupants	39	38	27	42	36	44	48	51	24	18
Trespassers	16	32	21	20	21	20	32	17	25	24
Other Persons	1	0	1	1	0	0	2	0	1	0
Total	**74**	**93**	**66**	**91**	**71**	**79**	**93**	**77**	**70**	**57**

Table 3
Rail Accidents by Train Type[1]
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Freight Train										
Main-Track Train Collisions	19	15	13	9	20	10	7	7	3	14
Main-Track Train Derailments	106	111	114	125	123	155	151	189	134	155
Non-Main-Track Train Collisions	141	132	125	105	133	108	119	88	116	97
Non-Main-Track Train Derailments	351	367	327	348	319	339	411	486	448	478
Crossing	239	241	229	245	236	221	194	220	201	175
Trespasser	52	70	49	56	44	47	73	58	70	69
Other	70	82	55	55	45	41	36	32	49	58
Total	**978**	**1018**	**912**	**943**	**920**	**921**	**991**	**1080**	**1021**	**1046**
Passenger Train										
Main-Track Train Collisions	3	2	1	1	0	1	1	0	0	0
Main-Track Train Derailments	1	9	3	5	0	2	3	5	3	0
Non-Main-Track Train Collisions	4	0	0	0	0	8	5	4	1	5
Non-Main-Track Train Derailments	4	3	4	8	7	11	10	10	10	8
Crossing	29	32	19	26	23	18	33	38	35	28
Trespasser	25	23	28	23	29	18	25	23	18	33
Other	9	8	9	13	8	1	3	4	6	11
Total	**75**	**77**	**64**	**76**	**67**	**59**	**80**	**84**	**73**	**85**
Track Unit										
Main-Track Train Collisions	1	0	0	0	0	0	0	0	0	0
Main-Track Train Derailments	0	0	0	0	0	0	0	0	0	0
Non-Main-Track Train Collisions	0	0	0	0	0	1	0	0	0	0
Non-Main-Track Train Derailments	0	1	0	1	0	0	0	0	0	0
Crossing	2	7	5	5	1	5	8	8	7	3
Trespasser	0	1	0	1	0	0	1	0	1	0
Other	24	40	28	28	17	37	48	32	34	55
Total	**27**	**49**	**33**	**35**	**18**	**43**	**57**	**40**	**42**	**58**
Single Car/Cut of Cars										
Main-Track Train Collisions	6	0	0	0	0	0	0	0	0	0
Main-Track Train Derailments	0	3	2	1	2	1	0	2	1	3
Non-Main-Track Train Collisions	39	42	56	35	51	49	61	49	63	61
Non-Main-Track Train Derailments	21	20	17	23	22	32	20	35	73	75
Crossing	0	0	1	0	1	0	0	0	1	1
Trespasser	0	1	0	0	0	0	0	0	0	0
Other	9	8	5	10	5	10	12	8	6	3
Total	**75**	**74**	**81**	**69**	**81**	**92**	**93**	**94**	**144**	**143**
Other										
Main-Track Train Collisions	2	0	1	0	0	0	0	2	1	2
Main-Track Train Derailments	1	3	4	1	2	3	8	4	3	4
Non-Main-Track Train Collisions	12	3	21	26	26	14	18	12	12	12
Non-Main-Track Train Derailments	21	17	42	341	324	322	283	244	181	85
Crossing	3	6	11	4	4	7	2	4	6	10
Trespasser	1	0	1	0	0	0	0	1	2	0
Other	1	5	5	19	5	3	3	6	6	12
Total	**41**	**34**	**85**	**391**	**361**	**349**	**314**	**273**	**211**	**125**

1 Because some accidents may involve more than one train, the number of trains involved may differ from the total number of accidents.

Table 4a
Main-Track Train Derailments
1998–2007

By Province

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Newfoundland and Labrador	1	0	2	3	1	0	0	2	1	1
Nova Scotia	1	3	2	3	1	0	2	0	1	2
New Brunswick	0	0	2	3	0	2	3	3	0	6
Quebec	21	22	15	19	24	27	23	26	21	12
Ontario	37	30	28	36	39	59	50	60	42	39
Manitoba	12	11	17	14	12	6	12	11	9	13
Saskatchewan	7	10	14	12	10	14	15	24	12	18
Alberta	15	16	15	17	16	19	24	29	21	30
British Columbia	14	26	27	24	19	29	32	43	34	39
Northwest Territories/Yukon	0	1	0	0	0	0	0	0	0	0
Canada	**108**	**119**	**122**	**131**	**124**	**156**	**156**	**198**	**141**	**160**
Derailments per MMTTM[1]	1.37	1.51	1.52	1.64	1.53	1.93	1.95	2.31	1.62	1.89
Derailments per BGTM[2]	0.32	0.33	0.32	0.34	0.33	0.40	0.38	0.45	0.32	0.34

1 MMTTM – Million main-track train-miles (Source: Transport Canada)

2 BGTM – Billion gross ton-miles (Source: Railway Association of Canada)

By Total Number of Derailed Cars per Accident

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Derailed Cars										
1	43	50	43	55	53	75	81	86	67	63
2	20	14	11	15	13	8	15	16	17	14
3	3	8	11	8	4	8	6	9	3	9
4	8	5	6	9	6	5	8	9	0	9
5–10	18	24	24	22	26	35	22	40	24	26
10+	16	18	27	22	22	25	29	38	30	39
Total	**108**	**119**	**122**	**131**	**124**	**156**	**161**	**198**	**141**	**160**

Table 4b
Main-Track Train Derailments by Assigned Factors[1]
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Environmental	**4**	**10**	**0**	**5**	**2**	**4**	**7**	**9**	**6**	**12**
Equipment – Total	**43**	**40**	**50**	**46**	**54**	**53**	**53**	**67**	**37**	**36**
Axle	9	15	20	16	15	20	12	16	4	10
Brakes	6	2	7	5	10	5	6	13	7	5
Draft System	4	7	8	6	4	3	11	5	2	6
Superstrucure	5	2	7	6	7	5	3	6	3	5
Truck	12	8	1	3	10	12	8	7	4	1
Wheel	7	6	7	10	8	8	13	20	17	9
Track – Total	**49**	**55**	**46**	**40**	**39**	**56**	**60**	**70**	**51**	**36**
Geometry	31	31	20	15	20	26	20	30	21	14
Object on Track	1	1	2	3	1	1	0	2	2	1
Other Track Material (OTM)	4	5	3	5	2	1	7	2	4	2
Rail	9	10	19	7	10	18	24	30	19	13
Roadbed	3	6	0	5	1	4	5	1	3	1
Switch	0	0	2	3	1	0	1	1	2	0
Turnouts	1	2	0	2	4	6	3	4	0	5
Actions – Total	**45**	**23**	**21**	**27**	**18**	**25**	**20**	**21**	**19**	**15**
Failure to Protect	4	6	6	4	3	5	4	4	2	2
Failure to Secure	0	0	0	1	0	1	1	0	0	0
Failure to Use Equipment Properly	10	7	5	9	11	10	6	7	3	4
Improper Loading/Lifting	1	1	1	1	1	0	1	0	2	2
Improper Placement/Position for Task	4	2	6	2	1	2	3	5	1	2
Inadequate/Inappropriate Maintenance of Equipment	20	3	1	4	1	2	3	4	4	1
Operating at Improper Speed	5	1	1	5	1	4	1	0	5	1
Vandalism	0	2	0	1	0	0	0	0	0	2
Other	1	1	1	0	0	1	1	1	2	1
Total	**141**	**128**	**117**	**118**	**113**	**138**	**140**	**167**	**113**	**99**

1 The TSB does not investigate all occurrences; therefore, assigned factors may not represent TSB findings. More than one factor may be assigned to each occurrence.

Table 5a
Non-Main-Track Train Collisions
1998–2007

By Province

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Newfoundland and Labrador	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	0	1	0	0	3	0	0	0	0
New Brunswick	0	1	1	2	1	2	1	1	5	1
Quebec	20	19	14	17	17	15	20	17	19	11
Ontario	36	31	42	42	54	47	28	28	24	31
Manitoba	10	13	11	12	14	7	14	11	7	13
Saskatchewan	7	6	4	5	6	10	4	5	7	10
Alberta	31	19	26	17	19	20	33	20	25	23
British Columbia	10	11	14	13	20	7	23	16	21	14
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	1	1
Canada	**114**	**100**	**113**	**108**	**131**	**111**	**123**	**98**	**109**	**104**

By Total Number of Derailed Cars per Accident

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Derailed Cars										
0[1]	54	49	55	65	79	68	69	63	55	44
1	35	23	25	22	21	20	26	14	28	23
2	11	13	19	10	16	13	14	12	10	15
3	5	7	7	5	8	1	9	5	7	8
4	2	1	2	3	3	4	2	1	4	8
5–10	7	6	4	3	2	4	3	3	5	4
10+	0	1	1	0	2	1	0	0	0	2
Total	**114**	**100**	**113**	**108**	**131**	**111**	**123**	**98**	**109**	**104**

1 Number of collisions with no derailment

Table 5b
Non-Main-Track Train Collisions by Assigned Factors[1]
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Environmental	**1**	**2**	**1**	**1**	**3**	**1**	**3**	**3**	**0**	**2**
Equipment – Total	**0**	**4**	**1**	**2**	**2**	**3**	**1**	**0**	**1**	**2**
Brakes	0	2	0	1	0	0	1	0	0	0
Draft System	0	2	1	1	1	1	0	0	1	2
Superstructure	0	0	0	0	1	2	0	0	0	0
Wheel	0	0	0	0	0	0	0	0	0	0
Track – Total	**1**	**4**	**3**	**1**	**0**	**5**	**2**	**3**	**1**	**0**
Appurtenances	1	2	1	1	0	3	1	3	0	0
Geometry	0	1	0	0	0	0	0	0	0	0
Others	0	1	2	0	0	2	1	0	1	0
Actions – Total	**117**	**63**	**85**	**72**	**87**	**71**	**87**	**68**	**86**	**66**
Failure to Protect	67	35	43	47	63	55	52	45	50	44
Failure to Secure	29	11	24	19	15	11	27	14	24	11
Failure to Use Equipment Properly	12	5	7	3	6	2	3	1	2	5
Improper Placement/Position for Task	4	2	1	0	0	0	1	1	1	0
Inadequate/Inappropriate Communications	2	4	2	1	0	0	1	2	2	2
Inadequate/Inappropriate Maintenance of Equipment	3	1	0	0	0	0	0	0	1	0
Operating at Improper Speed	0	4	5	1	1	2	3	4	6	4
Vandalism	0	0	0	0	2	1	0	0	0	0
Other	0	1	3	1	0	0	0	1	0	0
Total	**119**	**73**	**90**	**76**	**92**	**80**	**93**	**74**	**88**	**70**

1 The TSB does not investigate all occurrences; therefore, assigned factors may not represent TSB findings. More than one factor may be assigned to each occurrence.

Table 6a
Non-Main-Track Train Derailments
1998–2007

By Province

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Newfoundland and Labrador	1	0	1	0	0	0	0	1	1	0
Nova Scotia	2	3	2	11	21	39	23	13	15	6
New Brunswick	11	15	7	24	26	26	19	17	26	14
Quebec	78	74	69	124	116	140	150	133	117	67
Ontario	118	117	108	238	246	227	227	233	200	164
Manitoba	42	37	38	53	53	63	58	56	52	47
Saskatchewan	34	32	26	56	34	45	57	70	48	68
Alberta	64	64	88	89	81	75	93	125	142	146
British Columbia	38	61	48	118	86	80	85	110	103	120
Northwest Territories/Yukon	0	0	0	0	1	0	0	1	0	1
Canada	**388**	**403**	**387**	**713**	**664**	**695**	**712**	**759**	**704**	**633**

By Total Number of Derailed Cars per Accident

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Derailed Cars										
1	152	175	177	376	340	372	406	421	397	328
2	101	93	93	156	142	153	156	168	170	130
3	52	44	37	80	70	76	61	60	46	79
4	27	34	22	44	35	34	37	34	40	40
5–10	47	54	53	53	71	57	46	69	43	53
10+	9	3	5	4	6	3	6	7	8	3
Total	**388**	**403**	**387**	**713**	**664**	**695**	**712**	**759**	**704**	**633**

Table 6b
Non-Main-Track Train Derailments by Assigned Factors[1]
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Environmental	**12**	**15**	**5**	**19**	**10**	**15**	**24**	**16**	**9**	**20**
Equipment – Total	**27**	**39**	**25**	**26**	**28**	**30**	**38**	**40**	**30**	**24**
Axle	0	0	2	1	0	0	0	1	1	3
Brakes	5	5	7	6	6	3	6	10	9	6
Draft System	2	10	5	2	8	8	9	10	6	9
Superstructure	5	1	2	5	6	6	4	5	4	3
Truck	3	12	1	4	3	5	9	9	7	1
Wheel	12	11	8	8	5	8	10	5	3	2
Track – Total	**192**	**161**	**154**	**145**	**118**	**121**	**134**	**175**	**164**	**127**
Appurtenances	0	1	1	0	3	1	1	1	1	0
Geometry	73	60	62	48	29	43	44	56	56	47
Rail	22	21	17	14	14	16	12	17	18	21
Roadbed	4	5	4	5	2	2	7	5	2	4
Other Track Material	37	14	24	29	21	16	19	17	21	12
Turnouts	53	55	26	31	45	33	33	50	38	28
Object on Track	3	5	5	10	1	6	5	8	13	1
Switch	0	0	15	8	2	4	13	21	15	14
Other	0	0	0	0	1	0	0	0	0	0
Actions – Total	**238**	**159**	**181**	**138**	**135**	**146**	**155**	**204**	**194**	**153**
Failure to Protect	107	96	111	83	68	88	97	122	128	119
Failure to Secure	12	4	10	11	11	17	11	20	7	8
Failure to Use Equipment Properly	35	18	17	15	34	12	20	38	36	12
Improper Loading/Lifting	1	1	13	2	1	2	0	4	3	0
Improper Placement/Position for Task	8	2	9	5	0	3	4	10	7	2
Inadequate/Inappropriate Communications	1	1	2	1	1	1	3	2	2	1
Inadequate/Inappropriate Maintenance of Equipment	56	17	6	10	10	4	9	2	5	7
Operating at Improper Speed	2	5	7	4	2	9	4	2	2	1
Vandalism	15	12	6	6	7	10	6	4	2	2
Others	1	3	0	1	1	0	1	0	2	1
Total	**469**	**374**	**365**	**328**	**291**	**312**	**351**	**435**	**397**	**324**

1 The TSB does not investigate all occurrences; therefore, assigned factors may not represent TSB findings. More than one factor may be assigned to each occurrence.

Table 7
Crossing Accidents and Casualties by Type of Crossing and Protection 1998–2007

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Accidents											
Public Crossings[1]											
Total Passive Warnings	(11 439)	95	97	84	77	95	72	63	71	81	73
Flashing Lights and Bells	(3827)	96	91	95	101	89	85	75	103	73	62
Gates	(2150)	34	36	42	43	39	50	42	53	36	35
Other Automated Warnings	(34)	2	0	2	1	0	1	0	3	8	6
Total Automated Warnings	(6011)	132	127	139	145	128	136	117	159	117	103
Sub-total	(17 450)	227	224	223	222	223	208	180	230	198	176
Private Crossings		41	49	39	50	36	37	53	35	48	35
Farm Crossings		5	10	3	8	5	6	4	5	2	5
Total		**273**	**283**	**265**	**280**	**264**	**251**	**237**	**270**	**248**	**216**
Fatal Accidents		**38**	**32**	**31**	**35**	**41**	**24**	**22**	**35**	**25**	**23**
Fatalities											
Public Crossings											
Total Passive Warnings		14	19	10	14	16	8	6	7	8	5
Flashing Lights and Bells		11	5	13	11	14	9	11	14	10	8
Gates		9	10	10	10	13	7	9	12	7	9
Other Automated Warnings		0	0	0	0	0	0	0	0	0	1
Total Automated Warnings		20	15	23	21	27	16	20	26	17	17
Sub-total		34	34	33	35	43	24	26	33	25	23
Private Crossings		5	3	1	5	3	2	0	4	3	3
Farm Crossings		0	0	0	1	0	2	0	1	0	0
Total		**39**	**37**	**34**	**41**	**46**	**28**	**26**	**38**	**28**	**26**
Serious Injuries											
Public Crossings											
Total Passive Warnings		16	13	6	12	18	15	15	9	9	14
Flashing Lights and Bells		16	21	16	20	13	23	21	23	11	4
Gates		5	6	7	6	6	8	11	14	6	3
Other Automated Warnings		0	0	0	0	0	0	0	1	0	0
Total Automated Warnings		21	27	23	26	19	31	32	38	17	7
Sub-total		37	40	29	38	37	46	47	47	26	21
Private Crossings		5	5	3	7	5	6	3	6	2	1
Farm Crossings		1	0	1	2	0	0	0	1	0	0
Total		**43**	**45**	**33**	**47**	**42**	**52**	**50**	**54**	**28**	**22**

1 Figures in brackets denote the number of public grade crossings for federally regulated railways in Canada by warning type as of May 2008. (There are approximately 28 500 private and farm crossings in Canada.) (Source: Transport Canada)

Table 8

Crossing Accidents and Related Casualties by Province 1998–2007

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Accidents[1]											
Newfoundland and Labrador	(5)	0	0	0	0	0	0	0	1	1	0
Nova Scotia	(119)	3	7	3	10	1	2	2	5	4	2
New Brunswick	(148)	2	5	2	8	2	9	2	3	3	3
Quebec	(1662)	48	51	45	43	44	36	63	57	39	39
Ontario	(4083)	65	94	88	80	78	80	69	92	67	52
Manitoba	(2309)	34	19	22	25	36	28	19	18	20	20
Saskatchewan	(4986)	38	30	32	29	24	24	16	19	27	23
Alberta	(2854)	54	52	45	54	55	38	38	56	56	45
British Columbia	(1265)	29	24	28	30	24	33	26	18	31	32
Northwest Territories/Yukon	(19)	0	1	0	1	0	1	2	1	0	0
Canada	(17 450)	**273**	**283**	**265**	**280**	**264**	**251**	**237**	**270**	**248**	**216**
Crossing Accidents per MMTTM[2]		3.25	3.17	2.92	3.08	2.90	2.90	2.68	2.80	2.54	2.24
Crossing Accidents with Derailment		5	8	9	12	9	4	9	12	4	6
Fatalities											
Newfoundland and Labrador		0	0	0	0	0	0	0	0	0	0
Nova Scotia		0	0	1	2	0	0	0	0	0	0
New Brunswick		0	0	0	0	0	0	0	1	0	0
Quebec		7	6	9	4	9	4	10	8	7	1
Ontario		14	20	12	17	15	15	12	16	12	12
Manitoba		7	2	2	3	5	2	1	2	2	1
Saskatchewan		5	1	5	8	3	4	1	2	2	2
Alberta		4	5	3	5	10	3	2	6	4	5
British Columbia		2	3	2	2	4	0	0	3	1	5
Northwest Territories/Yukon		0	0	0	0	0	0	0	0	0	0
Canada		**39**	**37**	**34**	**41**	**46**	**28**	**26**	**38**	**28**	**26**
Serious Injuries											
Newfoundland and Labrador		0	0	0	0	0	0	0	1	1	0
Nova Scotia		0	0	0	0	0	0	0	2	0	0
New Brunswick		1	0	0	2	1	1	2	0	0	1
Quebec		7	4	6	4	6	5	14	11	4	2
Ontario		7	19	7	15	14	19	11	20	8	7
Manitoba		6	3	4	3	3	4	6	1	4	2
Saskatchewan		6	7	3	5	4	4	3	4	2	4
Alberta		13	11	8	13	12	11	9	12	8	4
British Columbia		3	1	5	4	2	8	5	3	1	2
Northwest Territories/Yukon		0	0	0	1	0	0	0	0	0	0
Canada		**43**	**45**	**33**	**47**	**42**	**52**	**50**	**54**	**28**	**22**

1 Figures in brackets denote the estimated number of public crossings for federally regulated railways in each province as of May 2008. The Canada total is the actual figure. (Source: Transport Canada)

2 Includes crossing accidents on main tracks or on spurs per MMTTM – million main-track train-miles (Source: Transport Canada)

Table 9

Trespasser Accidents and Related Casualties by Province
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Accidents										
Newfoundland and Labrador	0	0	0	0	0	0	1	0	0	0
Nova Scotia	0	0	0	1	0	0	2	2	0	2
New Brunswick	0	0	1	0	2	0	0	2	1	5
Quebec	12	26	13	10	13	6	15	13	9	12
Ontario	36	46	41	42	43	38	45	43	43	47
Manitoba	4	1	1	7	3	3	3	6	5	7
Saskatchewan	2	3	2	3	0	2	3	0	2	0
Alberta	10	10	6	9	3	7	16	6	17	14
British Columbia	14	9	14	8	9	9	14	10	14	15
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**78**	**95**	**78**	**80**	**73**	**65**	**99**	**82**	**91**	**102**
Fatal Accidents	**59**	**61**	**53**	**56**	**50**	**45**	**66**	**63**	**58**	**57**
Fatalities										
Newfoundland and Labrador	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	1	0	0	1	1	0	1
New Brunswick	0	0	1	0	2	0	0	1	0	4
Quebec	11	19	9	9	9	4	9	11	6	7
Ontario	30	31	30	29	33	30	32	33	31	32
Manitoba	3	0	0	2	1	2	3	4	1	2
Saskatchewan	1	1	1	3	0	0	4	0	1	0
Alberta	8	7	4	7	1	5	11	5	11	7
British Columbia	8	4	8	5	4	4	7	8	9	4
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**61**	**62**	**53**	**56**	**50**	**45**	**67**	**63**	**59**	**57**
Serious Injuries										
Newfoundland and Labrador	0	0	0	0	0	0	1	0	0	0
Nova Scotia	0	0	0	0	0	0	1	1	0	0
New Brunswick	0	0	0	0	0	0	0	1	1	1
Quebec	1	7	3	1	3	2	6	2	3	3
Ontario	8	16	9	12	9	7	13	9	13	7
Manitoba	0	1	1	5	2	1	0	1	3	4
Saskatchewan	1	2	1	0	0	2	0	0	1	0
Alberta	2	3	5	2	2	2	5	1	3	4
British Columbia	5	5	4	3	5	5	8	2	4	8
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**17**	**34**	**23**	**23**	**21**	**19**	**34**	**17**	**28**	**27**

Table 10
Reportable Incidents by Type and Assigned Factor
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Incidents										
Dangerous Goods Leaker	272	167	188	194	167	151	131	123	83	90
Main-Track Switch in Abnormal Position	14	15	17	9	9	11	12	10	7	8
Movement Exceeds Limits of Authority	107	115	102	101	99	102	95	91	101	105
Runaway Rolling Stock	20	15	9	10	18	13	11	16	12	13
Signal Less Restrictive than Required	9	8	2	7	3	2	1	1	6	0
Unprotected Overlap of Authorities	16	11	11	4	6	10	5	3	7	8
Crew Member Incapacitated	0	2	1	4	6	6	2	1	5	1
Total	**438**	**333**	**330**	**329**	**308**	**295**	**257**	**245**	**221**	**225**
Assigned Factors[1]										
Equipment	5	4	1	4	3	7	1	1	1	0
Individual/Personal	108	109	57	35	29	40	20	17	13	4
Track	6	3	3	5	3	3	0	2	3	0
Actions	**174**	**110**	**134**	**112**	**104**	**118**	**109**	**111**	**114**	**87**
Failure to Protect	14	34	44	42	39	40	38	34	31	37
Failure to Secure	11	16	11	6	9	8	5	11	8	1
Failure to Use Equipment Properly	8	2	7	1	3	5	6	2	5	1
Inadequate/Inappropriate Communications	16	4	8	6	3	5	5	7	9	4
Overlap of Authorities	113	40	56	49	45	58	48	50	55	40
Vandalism	6	1	2	5	2	1	4	4	0	3
Other	6	13	6	3	3	1	3	3	6	1
Total	**293**	**226**	**195**	**156**	**139**	**168**	**130**	**131**	**131**	**91**

1 The TSB does not investigate all occurrences; therefore, assigned factors may not represent TSB findings.
More than one factor may be assigned to each occurrence.
For non-dangerous goods incidents only.

Table 11

Dangerous Goods Leaker Incidents by Province and Leak Location/Component
1998–2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Incidents										
Newfoundland and Labrador	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	1	0	0	0	1	0	0
New Brunswick	10	8	3	5	6	10	7	1	1	0
Quebec	25	14	12	8	8	9	7	8	8	6
Ontario	89	65	59	74	65	46	34	29	30	32
Manitoba	9	11	24	8	9	9	17	3	5	2
Saskatchewan	10	4	2	8	4	2	4	4	4	5
Alberta	74	37	54	43	43	45	31	29	13	20
British Columbia	55	28	34	47	32	30	31	48	22	25
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**272**	**167**	**188**	**194**	**167**	**151**	**131**	**123**	**83**	**90**
Leak by Location/Component[1]										
Structural	1	3	2	0	4	3	0	1	2	0
Safety Appurtenances	66	19	37	25	34	27	28	20	8	14
Operating Appurtenances	148	107	105	110	86	65	74	83	55	33
Auxiliary Appurtenances	46	32	28	34	25	25	15	12	3	6
Others	19	11	14	19	7	14	8	6	7	5
Total	**280**	**172**	**186**	**188**	**156**	**134**	**125**	**122**	**75**	**58**

1 More than one leak location/component may be assigned to each occurrence.

APPENDIX B – DEFINITIONS AND EXPLANATORY NOTES

DEFINITIONS

The following definitions apply to railway occurrences that are required to be reported pursuant to the *Canadian Transportation Accident Investigation and Safety Board Act* and the associated regulations.

Railway Occurrence

a) Any accident or incident associated with the operation of rolling stock on a railway; and
b) Any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident described in paragraph a) above.

Reportable Railway Accident

An accident resulting directly from the operation of rolling stock, where

a) a person sustains a serious injury or is killed as a result of
   i) being on board or getting off the rolling stock; or
   ii) coming into contact with any part of the rolling stock or its contents;
b) the rolling stock
   i) is involved in a grade-crossing collision;
   ii) is involved in a collision or derailment and is carrying passengers;
   iii) is involved in a collision or derailment and is carrying dangerous goods, or is known to have last contained dangerous goods, the residue of which has not been purged from the rolling stock;
   iv) sustains damage that affects its safe operation; or
   v) causes or sustains a fire or explosion, or causes damage to the railway that poses a threat to the safety of any person, property or the environment.

Reportable Railway Incident

An incident resulting directly from the operation of rolling stock, where

a) a risk of collision occurs;
b) an unprotected main-track switch is left in an abnormal position;
c) a railway signal displays a less restrictive indication than that required for the intended movement of rolling stock;
d) an unprotected overlap of operating authorities occurs;
e) a movement of rolling stock exceeds the limits of its authority;
f) there is runaway rolling stock;
g) any crew member whose duties are directly related to the safe operation of the rolling stock is unable to perform the crew member's duties as a result of a physical incapacitation that poses a threat to the safety of any person, property or the environment; or
h) any dangerous goods are released on board or from the rolling stock.

Serious Injury

An injury that is likely to require admission to a hospital.

Dangerous Goods Involvement

An accident is considered to have dangerous goods involvement if any car in the consist carrying (or having last contained) a dangerous good derails, strikes or is struck by any other rolling stock or object. It does not mean that there was any release of any product. Also included are crossing accidents in which the motor vehicle involved (for example, tanker truck) is carrying a dangerous good.

EXPLANATORY NOTES

Accidents by Railway

Accident totals are not presented by railway. The track, train and personnel in an occurrence may all belong to different companies; also an occurrence may have several contributing factors. Presenting data based purely on one of these criteria or factors would be misleading, and misinterpretation of data by readers could unfairly affect a company's competitive position.