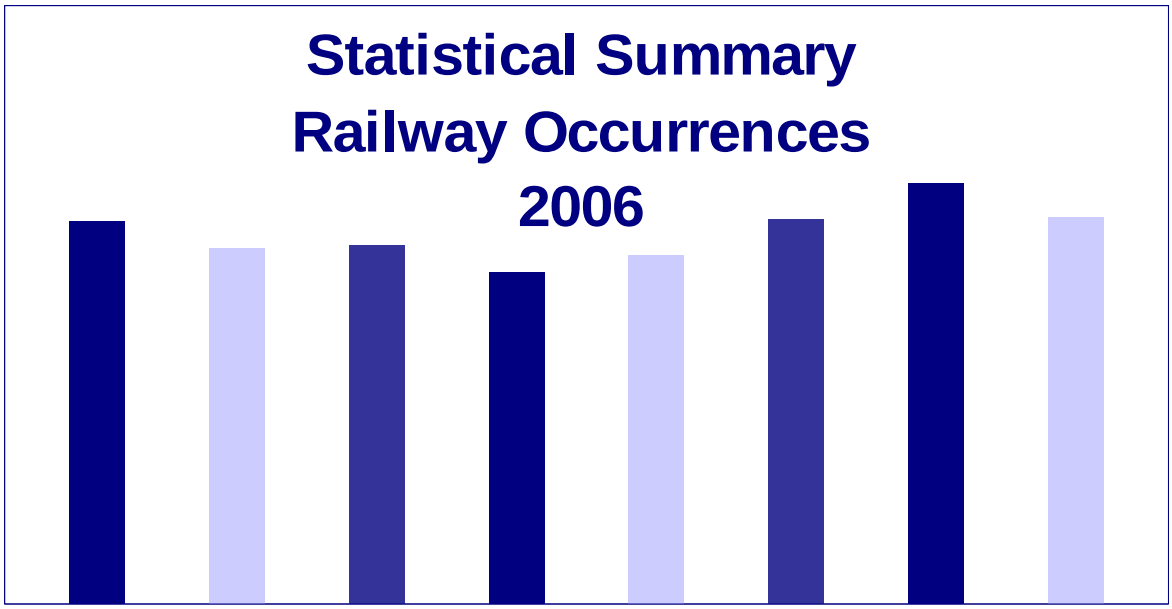
Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

Statistical Summary
Railway Occurrences
2006



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 web site at www.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 2006 statistics presented here reflect the TSB database updated as of 31 May 2007.

To enhance awareness and increase the safety value of the material presented in the TSB *Statistical Summary, Railway Occurrences 2006*, 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.

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TABLE OF CONTENTS

RAILWAY OCCURRENCES IN 2006 2

ACCIDENTS 2
Overview of Accidents and Casualties 2
Accidents by Type 4

INCIDENTS 9
Overview of Incidents 9

APPENDICES
Appendix A – Rail Occurrence Tables 11
Appendix B – Definitions and Explanatory Notes 25

TABLES
Table 1 Railway Occurrences and Casualties, 1997–2006 11
Table 2 Fatalities and Serious Injuries by Type of Occurrence and Person Type, 1997–2006 12
Table 3 Rail Accidents by Train Type, 1997–2006 13
Table 4a Main-Track Train Derailments, 1997–2006 14
Table 4b Main-Track Train Derailments by Assigned Factors, 1997–2006 15
Table 5a Non-Main-Track Train Collisions, 1997–2006 16
Table 5b Non-Main-Track Train Collisions by Assigned Factors, 1997–2006 17
Table 6a Non-Main-Track Train Derailments, 1997–2006 18
Table 6b Non-Main-Track Train Derailments by Assigned Factors, 1997–2006 19
Table 7 Crossing Accidents and Casualties by Type of Crossing and Protection, 1997–2006 20
Table 8 Crossing Accidents and Related Casualties by Province, 1997–2006 21
Table 9 Trespasser Accidents and Related Casualties by Province, 1997–2006 22
Table 10 Reportable Incidents by Type and Assigned Factor, 1997–2006 23
Table 11 Dangerous Goods Leaker Incidents by Province and Leak Location/Component, 1997–2006 24

FIGURES
Figure 1 Rail Accidents, 1997–2006 2
Figure 2 Rail Accidents by Type, 2006 3
Figure 3 Fatalities by Type of Occurrence, 1997–2006 3
Figure 4 Serious Injuries by Type of Occurrence, 1997–2006 4
Figure 5 Main-Track Accidents and Accident Rate, 1997–2006 4
Figure 6 Main-Track Collisions and Derailments, 1997–2006 5
Figure 7 Non-Main-Track Collisions and Derailments, 1997–2006 6
Figure 8 Crossing Accidents by Type of Crossing, 2006 7
Figure 9 Crossing Accidents by Province 8
Figure 10 Trespasser Accidents by Province 8
Figure 11 Rail Incidents, 1997–2006 9
Figure 12 Rail Incidents by Type 10

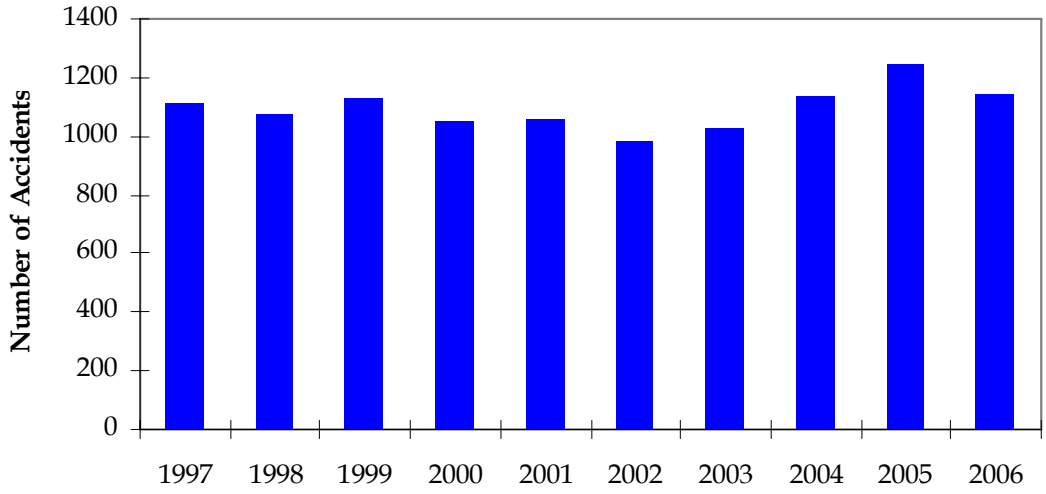
RAILWAY OCCURRENCES IN 2006

ACCIDENTS

Overview of Accidents and Casualties (Tables 1 to 3 in Appendix A)

In 2006, 1143 rail accidents were reported to the TSB (Figure 1), an 8% decrease from the 2005 total of 1247 but a 5% increase from the 2001–2005 average of 1091.

Figure 1 – Rail Accidents, 1997–2006

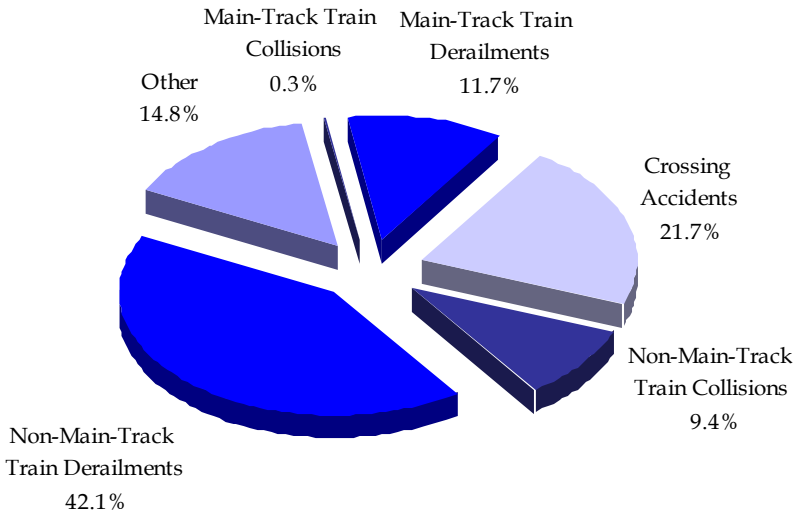


The largest proportion of reported rail accidents are non-main-track related. In 2006, these accounted for half of the total (Figure 2). Typically, most non-main-track accidents are minor, occurring during switching operations at speeds of less than 10 mph.

Main-track derailments and collisions accounted for 12% of all accidents in 2006, down from 16% last year.

In 2006, 22% of rail accidents involved vehicles or pedestrians at highway-rail crossings, down from 24% over the previous five years.

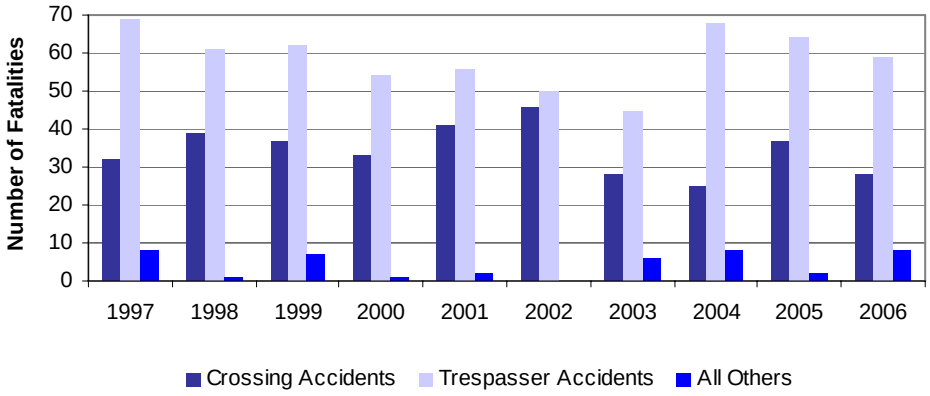
Figure 2 - Rail Accidents by Type, 2006



In 2006, 182 accidents involved dangerous goods (either rail cars or road vehicles carrying or having recently carried dangerous goods), down from the 2005 total of 214 and down from the five-year average of 215. Of these, 81% were non-main-track accidents. Two accidents resulted in a dangerous goods release, down five from the 2005 total and the five-year average.

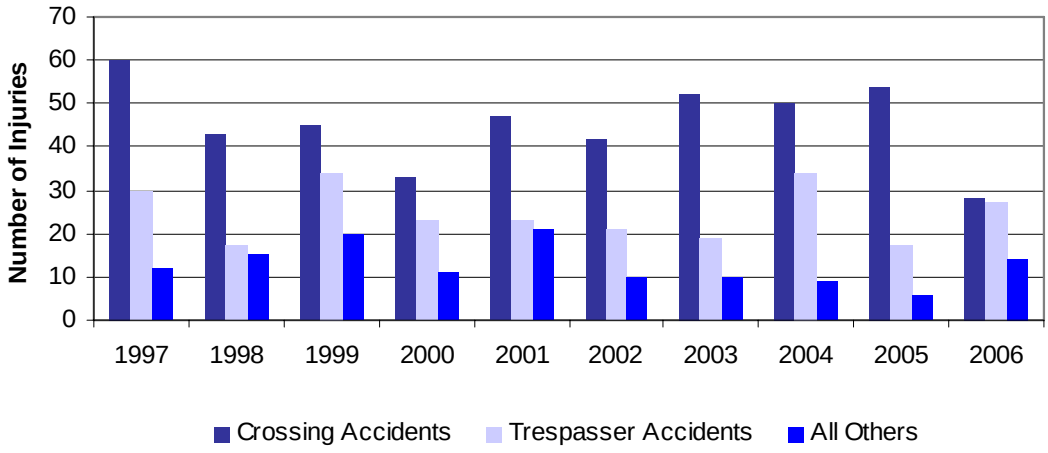
Rail fatalities totalled 95 in 2006, down from 103 in 2005 and comparable to the five-year average of 96. The total consisted mainly of trespasser fatalities with 59 in 2006, comparable to the five-year average of 57 (Figure 3). Crossing fatalities totalled 28 in 2006, down from 37 in 2005 and from the five-year average of 35. In 2006, six employees were fatally injured, up from the five-year average of three.

Figure 3 – Fatalities by Type of Occurrence, 1997–2006



A total of 69 serious injuries resulted from rail occurrences in 2006 (Figure 4), down from 77 in 2005 and from the five-year average of 83. Trespasser injuries totalled 27 in 2006, a 59% increase from the 2005 total of 17 and an 18% increase from the five-year average of 23. Crossing accidents resulted in 28 injuries, down from 54 in 2005 and from the five-year average of 49.

Figure 4 – Serious Injuries by Type of Occurrence, 1997–2006

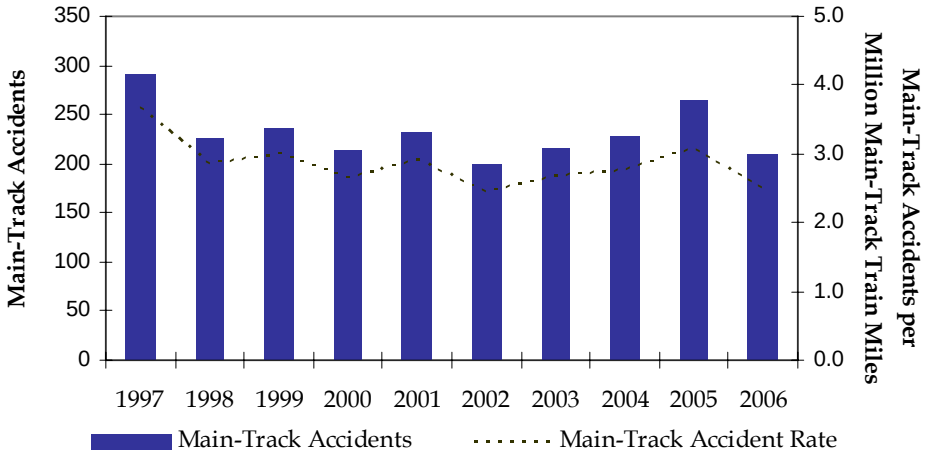


Freight trains accounted for 78% of all trains involved in rail accidents in 2006, followed by single cars/cuts of cars and passenger trains with proportions of 8% and 6% respectively.

Accidents by Type (Tables 4a to 9 in Appendix A)

Main-Track Accidents: The number of main-track accidents (accidents that occur on main tracks or spurs, other than crossing and trespasser accidents) totalled 209 in 2006 (Figure 5), down from 264 in 2005 and from the five-year average of 228. Rail activity on main tracks increased by 1% over last year, and the main-track accident rate decreased 23%, from 3.1 main-track accidents per million main-track train-miles in 2005 to 2.4 in 2006.

Figure 5 – Main-Track Accidents and Accident Rate, 1997–2006

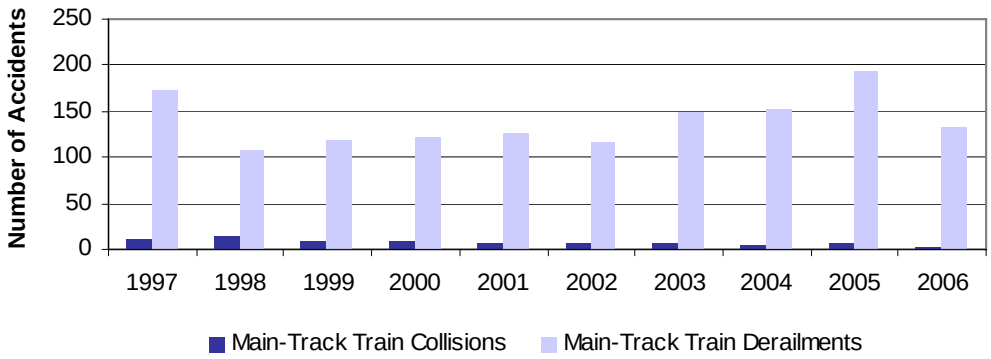


Main-track collisions and derailments are the most serious categories of rail accidents in terms of financial loss and potential risk to the public (for example, where passenger trains are involved or dangerous goods are released from trains that derail while travelling at high speeds in populated areas).

There were three main-track collisions in 2006, down three from the 2005 total (Figure 6) and from the five-year average. No fatalities or serious injuries resulted from main-track collisions in 2006, and none resulted in the release of dangerous goods.

A total of 134 main-track derailments were reported in 2006, a 31% decrease from the 2005 total of 194 and a 9% decrease from the five-year average of 148. The number of main-track derailments per million main-track train-miles decreased to 1.54 in 2006, down from 2.26 in 2005 and the five-year average of 1.80.

Figure 6 – Main-Track Collisions and Derailments, 1997–2006



Three fatalities and two serious injuries resulted from two main-track derailments in 2006, both in British Columbia.

In 2006, 19 main-track derailments involved dangerous goods, down from 33 in 2005 and from the five-year average of 30. Two of these resulted in a release of dangerous goods.

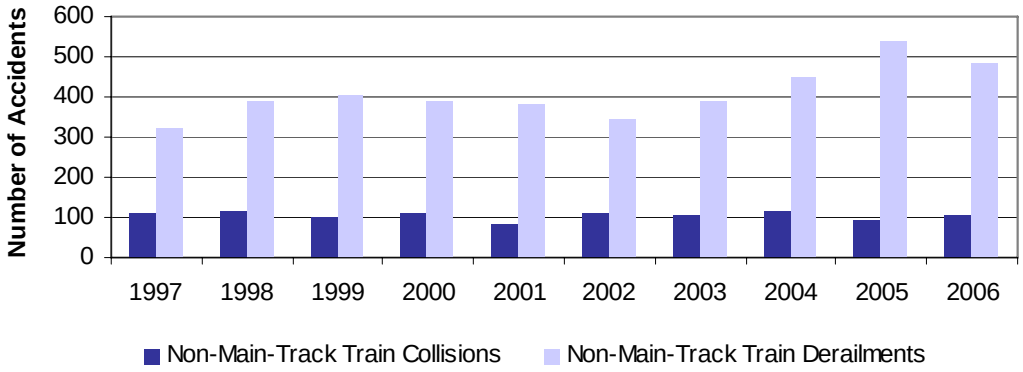
In 2006, there was a 28% decrease in factors assigned[1] to main-track derailments compared to the five-year average (due in part to a 9% decrease in main-track derailments). However, factor types were proportionately unchanged, with 35% being equipment-related in 2006 compared to the five-year average of 40%, and 42% being track-related compared to the five-year average of 39%.

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 108 in 2006, up from 93 in 2005 (Figure 7) and from the five-year average of 102. Derailments occurred in 50% of non-main-track collisions, 72% of which involved the derailment of one or two cars.

Figure 7 – Non-Main-Track Collisions and Derailments, 1997–2006



No fatalities or serious injuries resulted from non-main-track collisions in 2006.

Dangerous goods were involved in 47% 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 (99%) (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 481 non-main-track derailments in 2006 (Figure 7), down 11% from last year but up 14% from the five-year average of 422. Three-quarters of these accidents involved the derailment of one or two cars.

No fatalities or serious injuries resulted from non-main-track derailments in 2006.

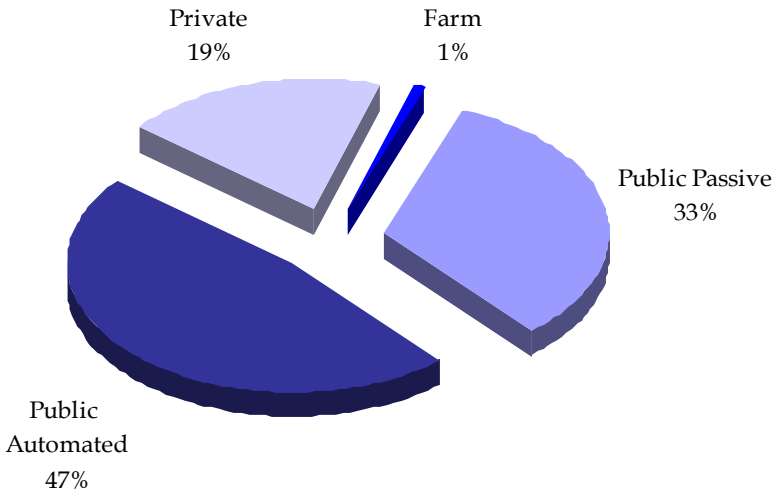
Dangerous goods cars were involved in 22% of non-main-track derailments, but none resulted in a release of dangerous goods.

In 2006, there was a 3% decrease in rules-related factors (for example, non-compliance with prescribed procedures) assigned to non-main-track derailments compared to the five-year average and a 3% increase 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 248 crossing accidents in 2006, down from 269 in 2005 and from the five-year average of 260. This reduction consisted mainly of a decrease in accidents at public automated crossings. While accidents at public automated crossings (117) decreased 27% from the 2005 total of 160 and 15% from the five-year average of 137, accidents at private crossings increased 18% from the five-year average of 40. The proportion of accidents occurring at public automated crossings decreased to 47% in 2006 (Figure 8), from 59% in 2005. 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, 2006

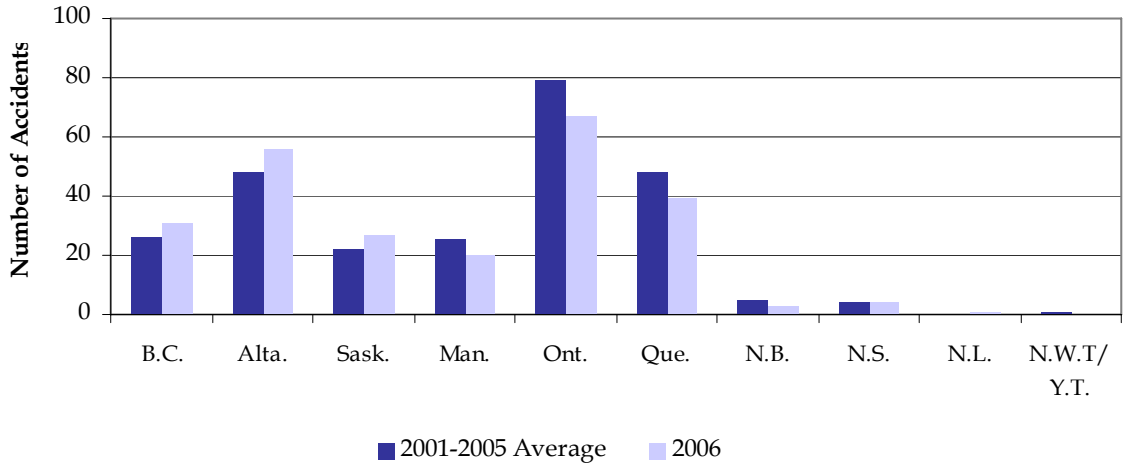


Fatal crossing accidents totalled 25 in 2006, down from 34 in 2005 and the five-year average of 31. Although crossing accidents involving pedestrians accounted for 5% of crossing accidents in 2006, they accounted for 36% of fatal crossing accidents. Crossing-related fatalities totalled 28 in 2006, down 24% from the 2005 total of 37 and 20% from the five-year average of 35.

In 2006, 4 crossing accidents resulted in a derailment, down from the 2005 total of 12 and the five-year average of 9. Although heavy vehicles (for example, dump trucks, tractor-trailers) were involved in 19% of crossing accidents in 2006, they were involved in all of those resulting in a derailment.

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

Figure 9 – Crossing Accidents by Province

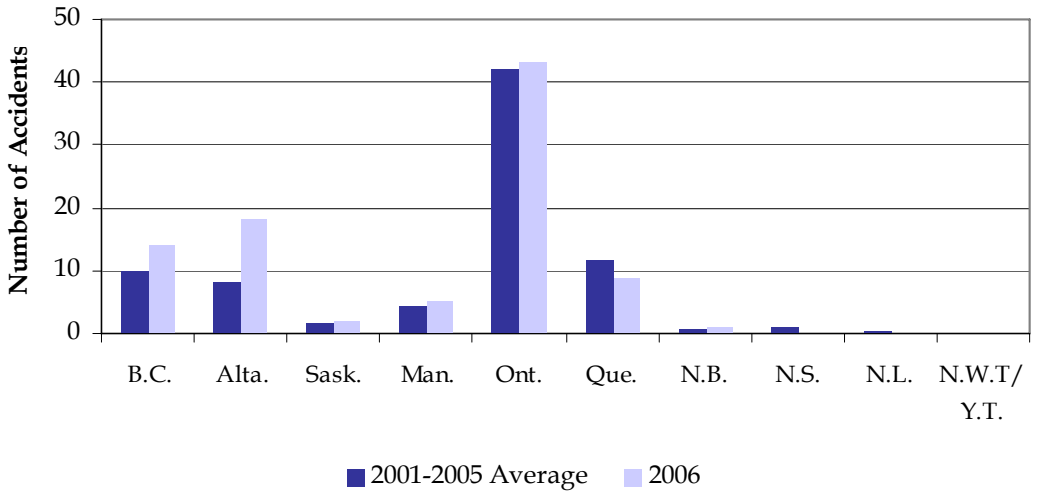


Trespasser Accidents: Trespasser accidents involve persons, primarily pedestrians, not authorized to be on railway rights-of-way and who are struck by rolling stock other than at railway crossings. They totalled 92 in 2006, up from the 2005 total of 83 and the five-year average of 80.

Over 80% of trespasser accidents occurred in Ontario, Alberta and British Columbia, accounting for 47%, 20% and 15% of accidents respectively (Figure 10).

In 2006, the proportion of fatal trespasser accidents (63%) was lower than the five-year average proportion of 70%. Consequently, the proportion of trespasser accidents resulting in serious injuries (29%) was higher than the five-year average proportion of 28%.

Figure 10 – Trespasser Accidents by Province



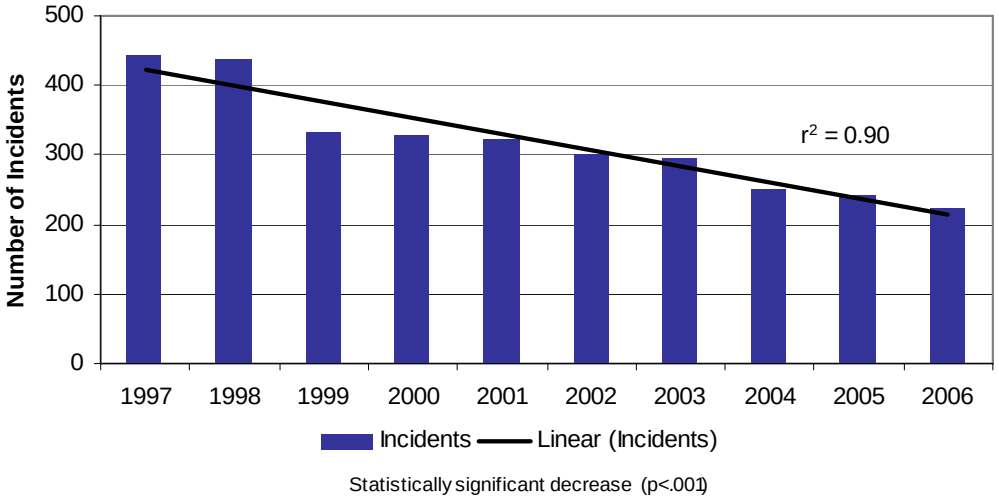
INCIDENTS

Overview of Incidents (Tables 10 and 11 in Appendix A)

In 2006, reported rail incidents reached a 24-year low of 225, down from 243 in 2005 and the five-year average of 283.

Statistical analysis using linear regression indicates that there has been a significant downward trend ($p<.001$)[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, 1997–2006



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 38% of reported rail incidents in 2006, showed a 30% and 44% decrease respectively from the 2005 total of 123 and the five-year average of 153 (Figure 12). In 2006, there were 101 incidents where the movement exceeded the limits of authority, compared to 89 in 2005 and the five-year average of 94.

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

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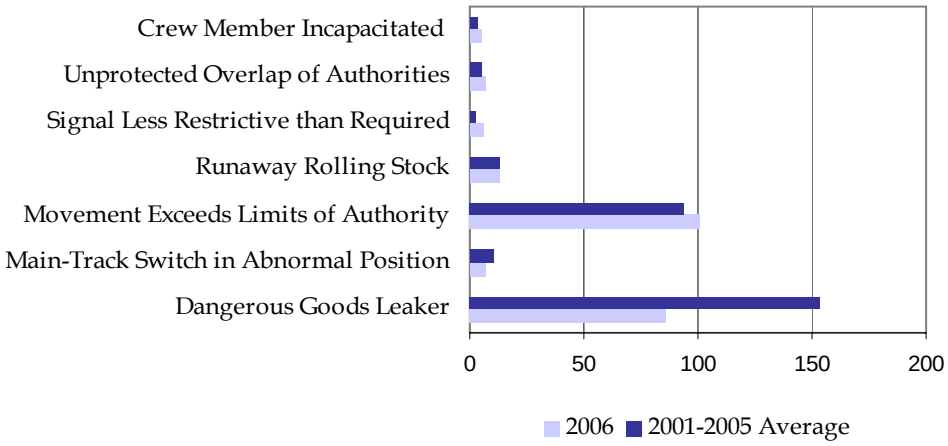
[2] It is agreed by convention that, for a result to be considered statistically significant, its probability must be lower than 1 in 20 (that is, $p<.05$).

Figure 12 – Rail Incidents by Type



APPENDIX A – RAIL OCCURRENCE TABLES

Table 1

Railway Occurrences[1] and Casualties
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Accidents										
Main-Track Train Collisions	12	14	10	9	7	8	6	5	6	3
Main-Track Train Derailments	172	108	119	122	127	116	149	152	194	134
Crossing Accidents	307	273	283	264	280	263	251	236	269	248
Non-Main-Track Train Collisions	113	114	100	113	86	112	104	116	93	108
Non-Main-Track Train Derailments	322	388	403	387	385	347	389	450	540	481
Collisions/Derailments Involving Track Units	19	13	27	16	18	11	23	26	19	16
Employee/Passenger Accidents	6	10	13	13	8	8	6	12	8	15
Trespasser Accidents	98	78	95	79	80	73	65	100	83	92
Fires/Explosions	44	51	53	32	36	24	23	15	17	25
Other	23	26	26	19	31	22	14	22	18	21
Total	**1116**	**1075**	**1129**	**1054**	**1058**	**984**	**1030**	**1134**	**1247**	**1143**
Reportable Incidents										
Dangerous Goods Leaker	285	272	167	188	194	167	151	131	123	86
Main-Track Switch in Abnormal Position	12	14	15	17	9	9	11	12	10	7
Movement Exceeds Limits of Authority	104	107	115	102	95	93	102	90	89	101
Runaway Rolling Stock	16	20	15	9	9	18	13	11	16	13
Other	26	25	21	14	15	15	18	8	5	18
Total	**443**	**438**	**333**	**330**	**322**	**302**	**295**	**252**	**243**	**225**
Million Main-Track Train-Miles (MMTTM)[2]	79.5	79.0	78.8	80.1	79.9	81.3	80.6	82.6	85.8	86.8
Main-Track Accidents[3]/MMTTM	3.7	2.9	3.0	2.7	2.9	2.4	2.7	2.8	3.1	2.4
Accidents Involving Dangerous Goods										
Main-Track Train Derailments	32	25	19	30	17	24	38	37	33	19
Crossing Accidents	4	8	8	12	7	6	3	11	15	4
Non-Main-Track Train Collisions	61	56	48	50	40	48	37	44	44	40
Non-Main-Track Train Derailments	172	136	133	149	128	130	139	106	113	108
All Others	18	15	16	8	13	13	8	10	9	11
Total	**287**	**240**	**224**	**249**	**205**	**221**	**225**	**208**	**214**	**182**
Accidents with a Dangerous Goods Release	8	5	9	7	5	5	9	7	7	2
Fatalities										
Crossing Accidents	32	39	37	33	41	46	28	25	37	28
Trespasser Accidents	69	61	62	54	56	50	45	68	64	59
All Others	8	1	7	1	2	0	6	8	2	8
Total	**109**	**101**	**106**	**88**	**99**	**96**	**79**	**101**	**103**	**95**
Serious Injuries										
Crossing Accidents	60	43	45	33	47	42	52	50	54	28
Trespasser Accidents	30	17	34	23	23	21	19	34	17	27
All Others	12	15	20	11	21	10	10	9	6	14
Total	**102**	**75**	**99**	**67**	**91**	**73**	**81**	**93**	**77**	**69**

1 For federally regulated railways only

2 2006 main-track train-miles are estimated (Source: railways annual reports submitted to Transport Canada).

3 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
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Main-Track Train Collisions										
Fatalities	0	0	0	0	0	0	0	1	0	0
Serious Injuries	0	2	0	0	0	2	0	0	0	0
Main-Track Train Derailments										
Fatalities	3	0	4	0	0	0	2	2	0	3
Serious Injuries	5	0	6	1	9	0	2	0	0	2
Crossing Accidents										
Fatalities	32	39	37	33	41	46	28	25	37	28
Serious Injuries	60	43	45	33	47	42	52	50	54	28
Non-Main-Track Train Collisions										
Fatalities	1	0	0	0	1	0	0	0	0	0
Serious Injuries	1	0	2	0	0	0	0	0	0	0
Non-Main-Track Train Derailments										
Fatalities	1	0	0	0	1	0	1	0	0	0
Serious Injuries	0	0	0	0	0	0	0	0	1	0
Collisions/Derailments Involving Track Units										
Fatalities	1	0	0	0	0	0	0	0	0	0
Serious Injuries	0	3	0	1	0	0	0	0	1	0
Employee/Passenger Accidents										
Fatalities	2	1	3	1	0	0	1	5	2	4
Serious Injuries	4	10	10	8	8	6	3	7	4	8
Trespasser Accidents										
Fatalities	69	61	62	54	56	50	45	68	64	59
Serious Injuries	30	17	34	23	23	21	19	34	17	27
Fires/Other										
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	1	0	0	0	1	0	1	0	0	1
Dangerous Goods Leaker										
Fatalities	0	0	0	0	0	0	0	0	0	0
Serious Injuries	0	0	0	0	0	0	1	0	0	1
Other Incidents										
Fatalities	0	0	0	0	0	0	2	0	0	1
Serious Injuries	1	0	2	1	3	2	3	2	0	2
Fatalities by Person Type										
Employees	7	0	7	1	2	0	6	6	2	6
Passengers	2	0	0	0	0	0	0	0	0	3
Pedestrians	7	8	7	8	6	10	6	4	11	9
Vehicle Occupants	24	31	30	28	34	38	23	23	28	16
Trespassers	69	61	61	51	56	48	44	68	62	59
Other Persons	0	1	1	0	1	0	0	0	0	2
Total	**109**	**101**	**106**	**88**	**99**	**96**	**79**	**101**	**103**	**95**
Serious Injuries by Person Type										
Employees	7	12	17	10	16	10	11	9	6	13
Passengers	5	3	7	1	7	0	0	0	1	1
Pedestrians	2	4	5	7	5	6	6	2	2	5
Vehicle Occupants	58	39	38	27	42	36	44	48	51	24
Trespassers	29	16	32	21	20	21	20	32	17	25
Other Persons	1	1	0	1	1	0	0	2	0	1
Total	**102**	**75**	**99**	**67**	**91**	**73**	**81**	**93**	**77**	**69**

Table 3
Rail Accidents by Train Type[1]
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Freight Train										
Main-Track Train Collisions	11	19	15	13	9	19	10	7	7	3
Main-Track Train Derailments	164	106	111	114	120	115	150	142	185	128
Non-Main-Track Train Collisions	150	141	132	125	105	133	108	119	88	116
Non-Main-Track Train Derailments	306	351	367	327	346	319	339	411	485	399
Crossing	267	239	241	229	245	236	221	194	220	201
Trespasser	73	52	70	49	56	44	47	73	58	69
Other	63	70	82	55	55	45	41	36	34	48
Total	**1034**	**978**	**1018**	**912**	**936**	**911**	**916**	**982**	**1077**	**964**
Passenger Train										
Main-Track Train Collisions	4	3	2	1	1	0	1	1	0	0
Main-Track Train Derailments	4	1	9	3	5	0	2	3	5	3
Non-Main-Track Train Collisions	1	4	0	0	0	0	8	5	4	1
Non-Main-Track Train Derailments	1	4	3	4	8	7	11	10	10	10
Crossing	30	29	32	18	26	23	18	32	37	35
Trespasser	24	25	23	29	23	29	18	26	24	17
Other	5	9	8	9	13	8	1	3	4	6
Total	**69**	**75**	**77**	**64**	**76**	**67**	**59**	**80**	**84**	**72**
Track Unit										
Main-Track Train Collisions	0	1	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	0	1	0	0	0
Non-Main-Track Train Derailments	0	0	1	0	1	0	0	0	0	0
Crossing	5	2	7	5	5	1	5	8	8	7
Trespasser	0	0	1	0	1	0	0	1	0	1
Other	22	24	40	28	28	17	37	48	31	34
Total	**27**	**27**	**49**	**33**	**35**	**18**	**43**	**57**	**39**	**42**
Single Car/Cut of Cars										
Main-Track Train Collisions	4	6	0	0	0	0	0	0	0	0
Main-Track Train Derailments	1	0	3	2	1	2	1	0	2	1
Non-Main-Track Train Collisions	41	39	42	56	35	51	49	61	49	59
Non-Main-Track Train Derailments	15	21	20	17	23	22	32	20	35	39
Crossing	0	0	0	1	0	1	0	0	0	1
Trespasser	0	0	1	0	0	0	0	0	0	0
Other	15	9	8	5	10	5	10	12	7	3
Total	**76**	**75**	**74**	**81**	**69**	**81**	**92**	**93**	**93**	**103**
Other										
Main-Track Train Collisions	0	2	0	1	0	0	0	0	2	0
Main-Track Train Derailments	4	1	3	4	1	2	1	8	4	2
Non-Main-Track Train Collisions	4	12	3	21	4	7	7	11	7	11
Non-Main-Track Train Derailments	10	21	17	42	14	7	16	21	26	31
Crossing	5	3	6	11	4	3	7	2	4	6
Trespasser	0	1	0	1	0	0	0	0	1	2
Other	4	1	5	5	1	0	1	2	3	3
Total	**27**	**41**	**34**	**85**	**24**	**19**	**32**	**44**	**47**	**55**

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
1997–2006

By Province

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Newfoundland and Labrador	1	1	0	2	3	1	0	0	2	1
Nova Scotia	0	1	3	2	2	1	0	2	0	1
New Brunswick	3	0	0	2	3	0	1	3	3	0
Quebec	25	21	22	15	19	23	26	21	25	18
Ontario	49	37	30	28	33	35	57	46	60	40
Manitoba	22	12	11	17	14	11	6	10	11	8
Saskatchewan	20	7	10	14	12	10	14	14	22	12
Alberta	18	15	16	15	17	16	17	24	29	19
British Columbia	34	14	26	27	24	19	28	32	42	35
Northwest Territories/Yukon	0	0	1	0	0	0	0	0	0	0
Canada	**172**	**108**	**119**	**122**	**127**	**116**	**149**	**152**	**194**	**134**
Derailments per MMTTM[1]	2.16	1.37	1.51	1.52	1.59	1.43	1.85	1.84	2.26	1.54
Derailments per BGTM[2]	0.49	0.32	0.33	0.32	0.33	0.31	0.38	0.36	0.44	

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

2 BGTM – Billion gross ton-miles; 2006 data not yet available (Source: Railway Association of Canada)

By Total Number of Derailed Cars per Accident

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Derailed Cars										
1	71	43	50	43	51	45	68	73	80	62
2	20	20	14	11	15	13	8	14	16	15
3	5	3	8	11	8	4	8	6	9	3
4	5	8	5	6	9	6	5	8	9	0
5–10	37	18	24	24	22	26	35	22	41	24
10+	34	16	18	27	22	22	25	29	39	30
Total	**172**	**108**	**119**	**122**	**127**	**116**	**149**	**152**	**194**	**134**

Table 4b

Main-Track Train Derailments by Assigned Factors[1]
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Environmental	**11**	**4**	**10**	**0**	**5**	**2**	**4**	**7**	**9**	**5**
Equipment – Total	**69**	**43**	**40**	**50**	**46**	**53**	**53**	**53**	**65**	**34**
Axle	16	9	15	20	16	15	20	12	15	3
Brakes	10	6	2	7	5	9	5	6	13	7
Draft System	5	4	7	8	6	4	3	11	5	1
Superstrucure	9	5	2	7	6	7	5	3	6	3
Truck	15	12	8	1	3	10	12	8	7	4
Wheel	14	7	6	7	10	8	8	13	19	16
Track – Total	**67**	**49**	**54**	**46**	**40**	**39**	**56**	**60**	**70**	**41**
Geometry	38	31	31	20	15	20	26	20	30	19
Object on Track	3	1	1	2	3	1	1	0	2	2
Other Track Material (OTM)	3	4	5	3	5	2	1	7	2	2
Rail	11	9	9	19	7	10	18	24	30	13
Roadbed	9	3	6	0	5	1	4	5	1	3
Switch	0	0	0	2	3	1	0	1	1	2
Turnouts	3	1	2	0	2	4	6	3	4	0
Actions – Total	**50**	**45**	**23**	**21**	**27**	**18**	**25**	**20**	**21**	**17**
Failure to Protect	10	4	6	6	4	3	5	4	4	2
Failure to Secure	1	0	0	0	1	0	1	1	0	0
Failure to Use Equipment Properly	7	10	7	5	9	11	10	6	7	3
Improper Loading/Lifting	3	1	1	1	1	1	0	1	0	1
Improper Placement/Position for Task	2	4	2	6	2	1	2	3	5	1
Inadequate/Inappropriate Maintenance of Equipment	19	20	3	1	4	1	2	3	4	4
Operating at Improper Speed	7	5	1	1	5	1	4	1	0	4
Vandalism	0	0	2	0	1	0	0	0	0	0
Other	1	1	1	1	0	0	1	1	1	2
Total	**197**	**141**	**127**	**117**	**118**	**112**	**138**	**140**	**165**	**97**

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
1997–2006

By Province

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Newfoundland and Labrador	0	0	0	0	0	0	0	0	0	0
Nova Scotia	2	0	0	1	0	0	2	0	0	0
New Brunswick	7	0	1	1	2	1	2	1	1	4
Quebec	22	20	19	14	14	15	15	19	13	18
Ontario	30	36	31	42	28	48	44	28	28	26
Manitoba	7	10	13	11	11	11	7	12	11	7
Saskatchewan	8	7	6	4	4	5	7	4	5	8
Alberta	19	31	19	26	15	17	20	33	20	23
British Columbia	18	10	11	14	12	15	7	19	15	21
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	1
Canada	**113**	**114**	**100**	**113**	**86**	**112**	**104**	**116**	**93**	**108**

By Total Number of Derailed Cars per Accident

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Derailed Cars										
0[1]	50	54	49	55	43	60	61	62	58	54
1	26	35	23	25	22	21	20	26	14	28
2	20	11	13	19	10	16	13	14	12	11
3	4	5	7	7	5	8	1	9	5	6
4	4	2	1	2	3	3	4	2	1	4
5–10	8	7	6	4	3	2	4	3	3	5
10+	1	0	1	1	0	2	1	0	0	0
Total	**113**	**114**	**100**	**113**	**86**	**112**	**104**	**116**	**93**	**108**

1 Number of collisions with no derailment

Table 5b

Non-Main-Track Train Collisions by Assigned Factors[1]
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Environmental	**0**	**1**	**2**	**1**	**1**	**3**	**1**	**3**	**3**	**0**
Equipment – Total	**1**	**0**	**4**	**1**	**2**	**2**	**3**	**1**	**0**	**0**
Brakes	0	0	2	0	1	0	0	1	0	0
Draft System	1	0	2	1	1	1	1	0	0	0
Superstructure	0	0	0	0	0	1	2	0	0	0
Wheel	0	0	0	0	0	0	0	0	0	0
Track – Total	**0**	**1**	**4**	**3**	**1**	**0**	**5**	**2**	**3**	**1**
Appurtenances	0	1	2	1	1	0	3	1	3	0
Geometry	0	0	1	0	0	0	0	0	0	0
Others	0	0	1	2	0	0	2	1	0	1
Actions – Total	**125**	**117**	**63**	**85**	**72**	**87**	**71**	**84**	**67**	**68**
Failure to Protect	74	67	35	43	47	63	55	52	45	39
Failure to Secure	19	29	11	24	19	15	11	24	14	18
Failure to Use Equipment Properly	12	12	5	7	3	6	2	3	1	1
Improper Placement/Position for Task	1	4	2	1	0	0	0	1	0	1
Inadequate/Inappropriate Communications	3	2	4	2	1	0	0	1	2	2
Inadequate/Inappropriate Maintenance of Equipment	0	3	1	0	0	0	0	0	0	1
Operating at Improper Speed	14	0	4	5	1	1	2	3	4	6
Vandalism	1	0	0	0	0	2	1	0	0	0
Other	1	0	1	3	1	0	0	0	1	0
Total	**126**	**119**	**73**	**90**	**76**	**92**	**80**	**90**	**73**	**69**

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
1997–2006

By Province

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Newfoundland and Labrador	0	1	0	1	0	0	0	0	1	1
Nova Scotia	3	2	3	2	5	6	17	10	6	5
New Brunswick	16	11	15	7	15	19	20	13	15	15
Quebec	61	78	74	69	65	53	63	79	91	58
Ontario	102	118	117	108	138	126	126	162	152	136
Manitoba	31	42	37	38	27	17	25	30	38	33
Saskatchewan	21	34	32	26	30	19	30	27	47	37
Alberta	52	64	64	88	50	68	63	85	119	119
British Columbia	36	38	61	48	55	38	45	44	70	77
Northwest Territories/Yukon	0	0	0	0	0	1	0	0	1	0
Canada	**322**	**388**	**403**	**387**	**385**	**347**	**389**	**450**	**540**	**481**

By Total Number of Derailed Cars per Accident

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Derailed Cars										
1	128	152	175	177	188	136	184	242	285	248
2	79	101	93	93	80	82	87	102	120	115
3	40	52	44	37	49	44	48	37	43	36
4	27	27	34	22	28	26	27	27	28	33
5–10	39	47	54	53	38	53	40	36	57	39
10+	9	9	3	5	2	6	3	6	7	8
Total	**322**	**388**	**403**	**387**	**385**	**347**	**389**	**450**	**540**	**479**

Table 6b

Non-Main-Track Train Derailments by Assigned Factors[1]
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Environmental	**30**	**12**	**15**	**5**	**19**	**10**	**15**	**24**	**16**	**9**
Equipment – Total	**16**	**27**	**39**	**25**	**26**	**29**	**30**	**38**	**40**	**27**
Axle	1	0	0	2	1	0	0	0	1	1
Brakes	3	5	5	7	6	7	3	6	10	8
Draft System	0	2	10	5	2	8	8	9	10	6
Superstructure	2	5	1	2	5	6	6	4	5	3
Truck	4	3	12	1	4	3	5	9	9	7
Wheel	6	12	11	8	8	5	8	10	5	2
Track – Total	**138**	**192**	**161**	**154**	**145**	**118**	**121**	**134**	**175**	**143**
Appurtenances	2	0	1	1	0	3	1	1	1	1
Geometry	67	73	60	62	48	29	43	44	56	49
Rail	11	22	21	17	14	14	16	12	17	15
Roadbed	8	4	5	4	5	2	2	7	5	1
Other Track Material	16	37	14	24	29	21	16	19	17	19
Turnouts	33	53	55	26	31	45	33	33	50	35
Object on Track	1	3	5	5	10	1	6	5	8	13
Switch	0	0	0	15	8	2	4	13	21	10
Other	0	0	0	0	0	1	0	0	0	0
Actions – Total	**191**	**238**	**159**	**181**	**138**	**135**	**146**	**155**	**203**	**151**
Failure to Protect	99	107	96	111	83	68	88	97	122	92
Failure to Secure	9	12	4	10	11	11	17	11	20	5
Failure to Use Equipment Properly	35	35	18	17	15	34	12	20	37	33
Improper Loading/Lifting	2	1	1	13	2	1	2	0	4	3
Improper Placement/Position for Task	6	8	2	9	5	0	3	4	10	6
Inadequate/Inappropriate Communication	1	1	1	2	1	1	1	3	2	2
Inadequate/Inappropriate Maintenance of Equipment	28	56	17	6	10	10	4	9	2	5
Operating at Improper Speed	3	2	5	7	4	2	9	4	2	1
Vandalism	7	15	12	6	6	7	10	6	4	2
Others	1	1	3	0	1	1	0	1	0	2
Total	**375**	**469**	**374**	**365**	**328**	**292**	**312**	**351**	**434**	**330**

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
1997–2006

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Accidents											
Public Crossings[1]											
Total Passive Warnings	(12 138)	109	95	97	85	79	97	73	64	71	82
Flashing Lights and Bells	(4193)	113	96	91	95	101	89	85	75	104	73
Gates	(2175)	32	34	36	42	43	39	50	42	53	36
Other Automated Warnings	(47)	1	2	0	2	1	0	1	0	3	8
Total Automated Warnings	(6415)	146	132	127	139	145	128	136	117	160	117
Sub-total	(18 553)	255	227	224	223	222	223	208	181	231	199
Private Crossings		48	41	49	37	48	33	36	51	33	47
Farm Crossings		4	5	10	3	8	5	6	4	5	2
Total		**307**	**273**	**283**	**264**	**280**	**263**	**251**	**236**	**269**	**248**
Fatal Accidents		**30**	**38**	**32**	**30**	**35**	**41**	**24**	**21**	**34**	**25**
Fatalities											
Public Crossings											
Total Passive Warnings		10	14	19	10	14	16	8	7	7	8
Flashing Lights and Bells		11	11	5	12	11	14	9	10	13	10
Gates		8	9	10	10	10	13	7	8	12	7
Other Automated Warnings		0	0	0	0	0	0	0	0	0	0
Total Automated Warnings		19	20	15	22	21	27	16	18	25	17
Sub-total		29	34	34	32	35	43	24	25	32	25
Private Crossings		1	5	3	1	5	3	2	0	4	3
Farm Crossings		2	0	0	0	1	0	2	0	1	0
Total		**32**	**39**	**37**	**33**	**41**	**46**	**28**	**25**	**37**	**28**
Serious Injuries											
Public Crossings											
Total Passive Warnings		21	16	13	6	12	18	15	15	9	9
Flashing Lights and Bells		30	16	21	16	20	13	23	21	23	11
Gates		5	5	6	7	6	6	8	11	14	6
Other Automated Warnings		0	0	0	0	0	0	0	0	1	0
Total Automated Warnings		35	21	27	23	26	19	31	32	38	17
Sub-total		56	37	40	29	38	37	46	47	47	26
Private Crossings		3	5	5	3	7	5	6	3	6	2
Farm Crossings		1	1	0	1	2	0	0	0	1	0
Total		**60**	**43**	**45**	**33**	**47**	**42**	**52**	**50**	**54**	**28**

1 Figures in brackets denote the number of public grade crossings for federally regulated railways in Canada by warning type as of June 2007. (There are approximately 28 500 private and farm crossings in Canada.) (Source: Transport Canada)

Table 8
Crossing Accidents and Related Casualties by Province
1997–2006

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Accidents[1]											
Newfoundland and Labrador	(7)	0	0	0	0	0	0	0	0	1	1
Nova Scotia	(160)	5	3	7	3	10	1	2	2	5	4
New Brunswick	(308)	5	2	5	2	8	2	9	2	3	3
Quebec	(1767)	51	48	51	44	43	44	36	62	56	39
Ontario	(4947)	75	65	94	88	80	77	80	69	92	67
Manitoba	(2363)	30	34	19	22	25	36	28	19	18	20
Saskatchewan	(5439)	33	38	30	32	29	24	24	16	19	27
Alberta	(2655)	70	54	52	45	54	55	38	38	56	56
British Columbia	(888)	38	29	24	28	30	24	33	26	18	31
Northwest Territories/Yukon	(19)	0	0	1	0	1	0	1	2	1	0
Canada	(18 553)	**307**	**273**	**283**	**264**	**280**	**263**	**251**	**236**	**269**	**248**
Crossing Accidents per MMTTM[2]		3.43	3.25	3.17	2.91	3.08	2.90	2.90	2.66	2.79	2.55
Crossing Accidents with Derailment		5	5	8	9	12	9	4	9	12	4
Fatalities											
Newfoundland and Labrador		0	0	0	0	0	0	0	0	0	0
Nova Scotia		0	0	0	1	2	0	0	0	0	0
New Brunswick		2	0	0	0	0	0	0	0	1	0
Quebec		7	7	6	8	4	9	4	9	7	7
Ontario		10	14	20	12	17	15	15	12	16	12
Manitoba		2	7	2	2	3	5	2	1	2	2
Saskatchewan		1	5	1	5	8	3	4	1	2	2
Alberta		6	4	5	3	5	10	3	2	6	4
British Columbia		4	2	3	2	2	4	0	0	3	1
Northwest Territories/Yukon		0	0	0	0	0	0	0	0	0	0
Canada		**32**	**39**	**37**	**33**	**41**	**46**	**28**	**25**	**37**	**28**
Serious Injuries											
Newfoundland and Labrador		0	0	0	0	0	0	0	0	1	1
Nova Scotia		2	0	0	0	0	0	0	0	2	0
New Brunswick		1	1	0	0	2	1	1	2	0	0
Quebec		10	7	4	6	4	6	5	14	11	4
Ontario		11	7	19	7	15	14	19	11	20	8
Manitoba		5	6	3	4	3	3	4	6	1	4
Saskatchewan		6	6	7	3	5	4	4	3	4	2
Alberta		19	13	11	8	13	12	11	9	12	8
British Columbia		6	3	1	5	4	2	8	5	3	1
Northwest Territories/Yukon		0	0	0	0	1	0	0	0	0	0
Canada		**60**	**43**	**45**	**33**	**47**	**42**	**52**	**50**	**54**	**28**

1 Figures in brackets denote the estimated number of public crossings for federally regulated railways in each province as of June 2007. 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
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Accidents										
Newfoundland and Labrador	0	0	0	0	0	0	0	1	0	0
Nova Scotia	0	0	0	0	1	0	0	2	2	0
New Brunswick	0	0	0	1	0	2	0	0	2	1
Quebec	15	12	26	14	10	13	6	16	14	9
Ontario	47	36	46	41	42	43	38	45	43	43
Manitoba	4	4	1	1	7	3	3	3	6	5
Saskatchewan	4	2	3	2	3	0	2	3	0	2
Alberta	7	10	10	6	9	3	7	16	6	18
British Columbia	21	14	9	14	8	9	9	14	10	14
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**98**	**78**	**95**	**79**	**80**	**73**	**65**	**100**	**83**	**92**
Fatal Accidents	**69**	**59**	**61**	**54**	**56**	**50**	**45**	**67**	**64**	**58**
Fatalities										
Newfoundland and Labrador	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	0	1	0	0	1	1	0
New Brunswick	0	0	0	1	0	2	0	0	1	0
Quebec	10	11	19	10	9	9	4	10	12	6
Ontario	34	30	31	30	29	33	30	32	33	31
Manitoba	3	3	0	0	2	1	2	3	4	1
Saskatchewan	2	1	1	1	3	0	0	4	0	1
Alberta	3	8	7	4	7	1	5	11	5	11
British Columbia	17	8	4	8	5	4	4	7	8	9
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**69**	**61**	**62**	**54**	**56**	**50**	**45**	**68**	**64**	**59**
Serious Injuries										
Newfoundland and Labrador	0	0	0	0	0	0	0	1	0	0
Nova Scotia	0	0	0	0	0	0	0	1	1	0
New Brunswick	0	0	0	0	0	0	0	0	1	1
Quebec	5	1	7	3	1	3	2	6	2	3
Ontario	13	8	16	9	12	9	7	13	9	13
Manitoba	1	0	1	1	5	2	1	0	1	3
Saskatchewan	3	1	2	1	0	0	2	0	0	1
Alberta	4	2	3	5	2	2	2	5	1	3
British Columbia	4	5	5	4	3	5	5	8	2	3
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**30**	**17**	**34**	**23**	**23**	**21**	**19**	**34**	**17**	**27**

Table 10

Reportable Incidents by Type and Assigned Factor
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Incidents										
Dangerous Goods Leaker	285	272	167	188	194	167	151	131	123	86
Main-Track Switch in Abnormal Position	12	14	15	17	9	9	11	12	10	7
Movement Exceeds Limits of Authority	104	107	115	102	95	93	102	90	89	101
Runaway Rolling Stock	16	20	15	9	9	18	13	11	16	13
Signal Less Restrictive than Required	1	9	8	2	7	3	2	1	1	6
Unprotected Overlap of Authorities	24	16	11	11	4	6	10	5	3	7
Crew Member Incapacitated	1	0	2	1	4	6	6	2	1	5
Total	**443**	**438**	**333**	**330**	**322**	**302**	**295**	**252**	**243**	**225**
Assigned Factors[1]										
Equipment	0	5	4	1	4	3	7	1	1	1
Individual/Personal	107	108	109	57	35	29	40	20	17	13
Track	2	6	3	3	5	3	3	0	2	3
Actions	**159**	**174**	**110**	**134**	**112**	**104**	**117**	**108**	**110**	**95**
Failure to Protect	12	14	34	44	42	39	39	37	34	26
Failure to Secure	9	11	16	11	6	9	8	5	10	7
Failure to Use Equipment Properly	0	8	2	7	1	3	5	6	2	3
Inadequate/Inappropriate Communications	6	16	4	8	6	3	5	5	7	8
Overlap of Authorities	120	113	40	56	49	45	58	48	50	45
Vandalism	9	6	1	2	5	2	1	4	4	0
Other	3	6	13	6	3	3	1	3	3	6
Total	**268**	**293**	**226**	**195**	**156**	**139**	**167**	**129**	**130**	**112**

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
1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Incidents										
Newfoundland and Labrador	0	0	0	0	0	0	0	0	0	0
Nova Scotia	0	0	0	0	1	0	0	0	1	0
New Brunswick	9	10	8	3	5	6	10	7	1	1
Quebec	50	25	14	12	8	8	9	7	8	8
Ontario	100	89	65	59	74	65	46	34	29	33
Manitoba	6	9	11	24	8	9	9	17	3	5
Saskatchewan	13	10	4	2	8	4	2	4	4	4
Alberta	55	74	37	54	43	43	45	31	29	13
British Columbia	52	55	28	34	47	32	30	31	48	22
Northwest Territories/Yukon	0	0	0	0	0	0	0	0	0	0
Canada	**285**	**272**	**167**	**188**	**194**	**167**	**151**	**131**	**123**	**86**
Leak by Location/Component[1]										
Structural	2	1	3	2	0	4	3	0	1	2
Safety Appurtenances	82	66	19	37	25	34	27	28	20	8
Operating Appurtenances	177	148	107	105	110	86	65	74	83	52
Auxiliary Appurtenances	31	46	32	28	34	25	25	15	12	2
Others	14	19	11	14	19	7	14	8	6	8
Total	**306**	**280**	**172**	**186**	**188**	**156**	**134**	**125**	**122**	**72**

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.