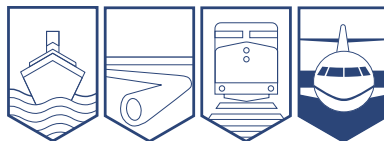
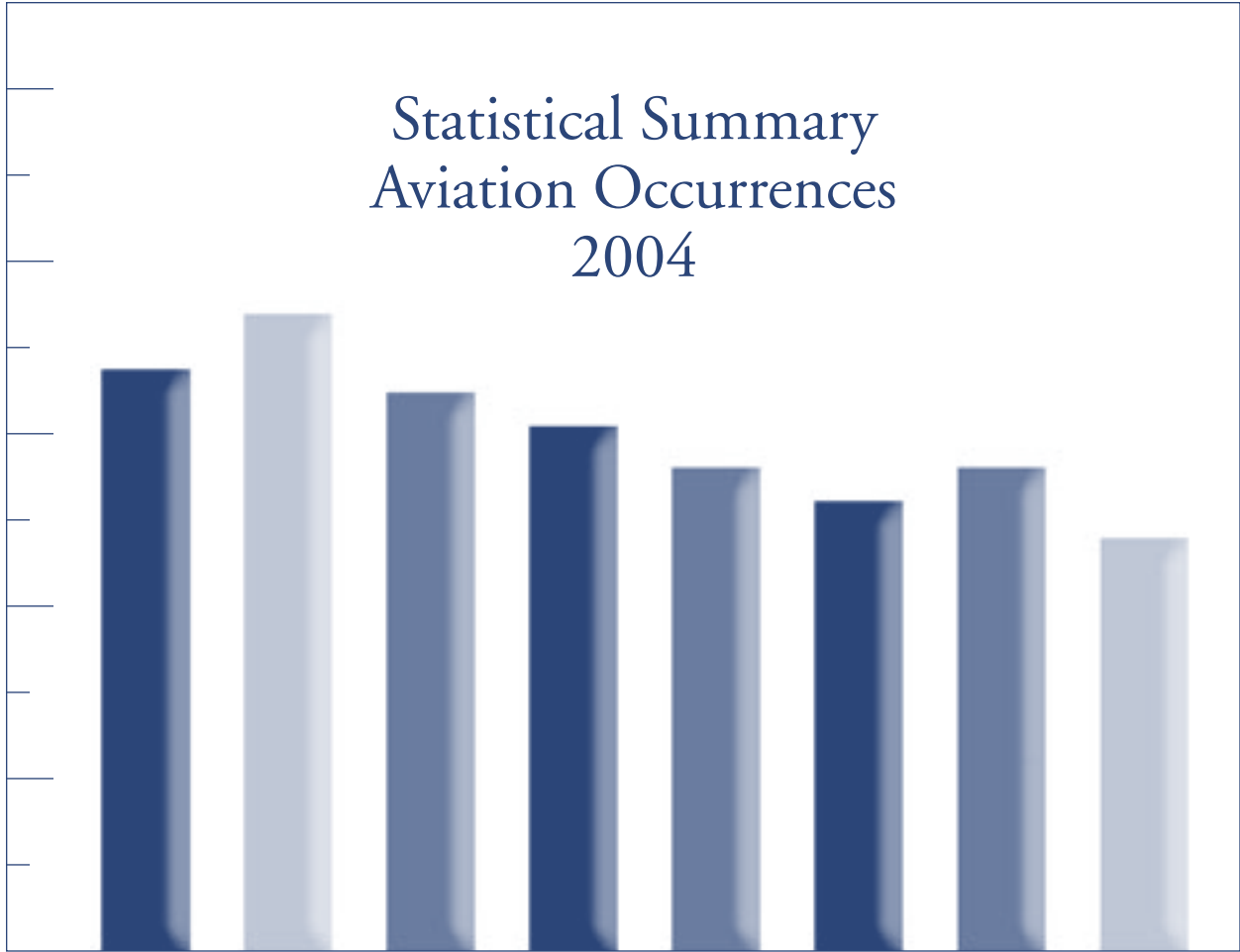




# Statistical Summary Aviation Occurrences 2004



## Foreword

This document provides users of Canadian aviation safety data with an annual summary of selected statistics on aviation occurrences. Information in this summary is also posted on the Transportation Safety Board of Canada (TSB) web site at [www.tsb.gc.ca](http://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 using these statistics. The 2004 statistics presented here reflect the TSB database updated as of 31 March 2005.

To enhance awareness and increase the safety value of the material presented in the TSB *Statistical Summary, Aviation Occurrences 2004*, 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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# AVIATION OCCURRENCES IN 2004

## ACCIDENTS

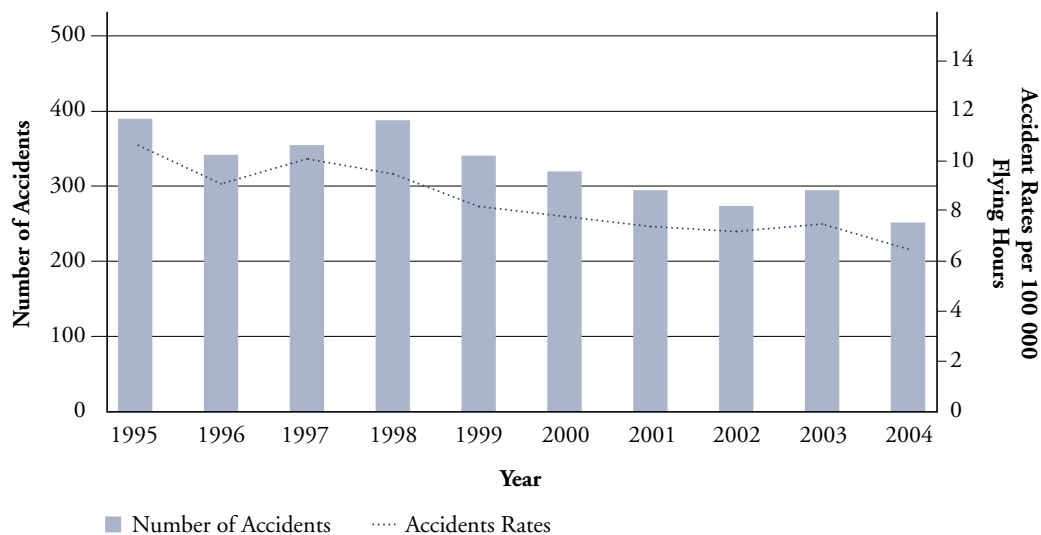
### *Overview of Accidents and Fatalities (Tables 1 and 2 in Appendix A)*

In 2004, a total of 308 aviation accidents were reported to the TSB. Of this number, which excludes ultralights, 252 involved Canadian-registered aircraft, a decrease of 15% from 2003 (Figure 1). Statistical analysis using linear regression indicates a significant downward trend ( $p < .001$ )<sup>1</sup> of reported aircraft accidents over the past 10 years.

Based on an estimated small increase in flying activity, the accident rate is estimated to have decreased from 7.5 accidents per 100 000 flying hours in 2003 to 6.5 in 2004.

The 252 accidents involving Canadian-registered aircraft (excluding ultralights) included 206 aeroplanes (55 of which were commercially operated) and 41 helicopters. The remaining 9 were either balloons, gliders or gyrocopters.<sup>2</sup>

Figure 1 – Accidents and Accident Rates,<sup>3</sup> 1995–2004



<sup>1</sup> 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,  $p < .05$ ).

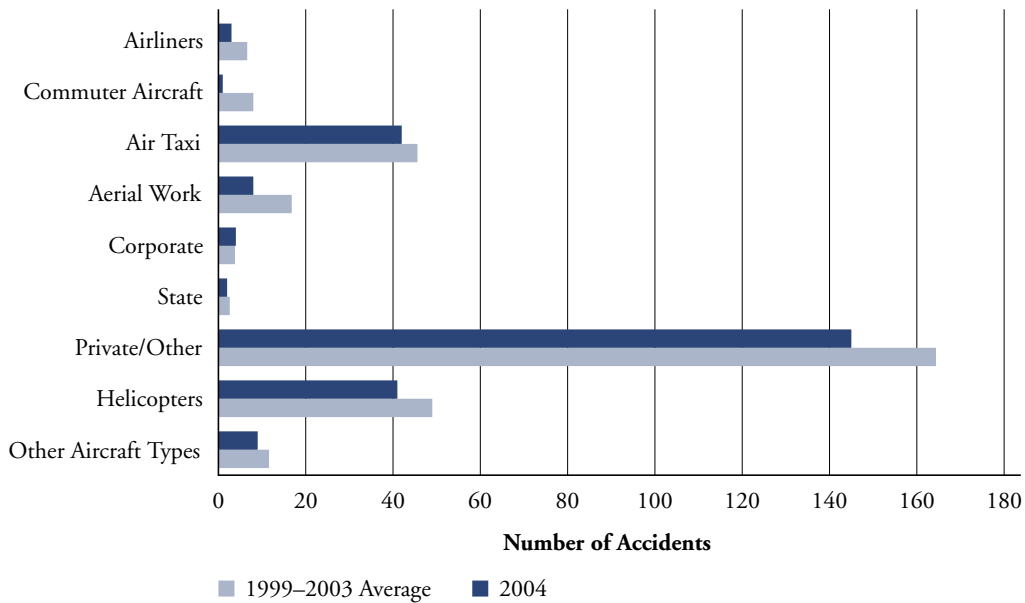
<sup>2</sup> As some occurrences involve more than one aircraft, users are cautioned to note differences between the number of occurrences and the number of aircraft involved in occurrences. All tables except Table 1 exclude ultralight aircraft; all tables except tables 1 and 3 also exclude balloons, gliders and gyrocopters.

<sup>3</sup> Canadian-registered aircraft (excluding ultralights)

Of the 55 commercial aeroplanes (3 airliners, 1 commuter aircraft, 43 air taxi and 8 aerial work) involved in accidents in 2004 (Figure 2), 3 air taxi aircraft were involved in fatal accidents. There were no fatal accidents involving airliners, commuters or aerial work aircraft.

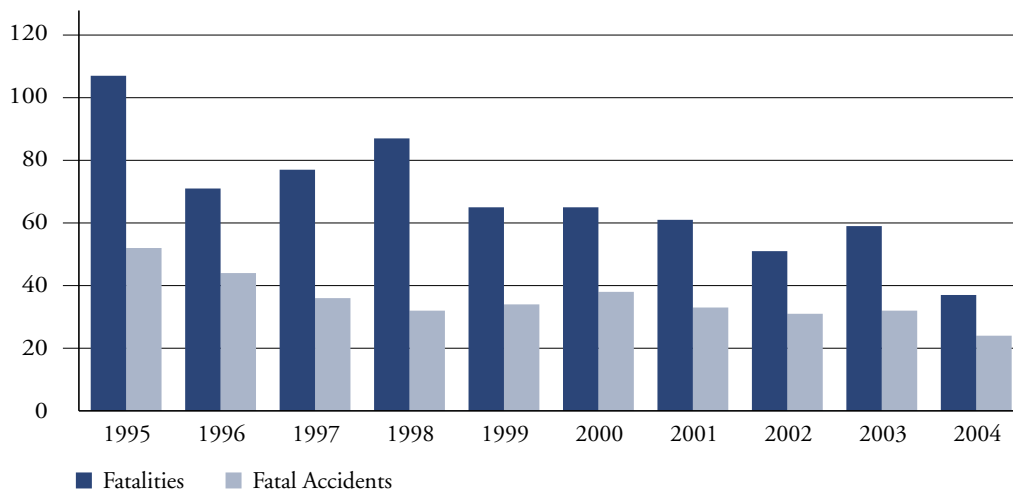
A total of 145 private aeroplanes were involved in accidents, 12% lower than the five-year average of 164. In 2004, 15 such accidents resulted in fatalities, comparable to 18 in 2003 and the five-year average of 17.

Figure 2—Canadian-Registered Aircraft Accidents by Aircraft Type, 2004



In 2004, Canadian-registered aircraft, excluding ultralights, were involved in 24 fatal accidents<sup>4</sup> (Figure 3), 29% less than the 1999–2003 average of 34 and 25% less than last year’s total of 32. The number of fatalities and serious injuries (37 and 26 respectively) decreased both by 40% from the five-year average (60 and 43 respectively).

Figure 3—Fatalities and Fatal Accidents, 1995–2004



<sup>4</sup> Two of the 24 accidents involved gliders.



Aeroplanes operated by the state (that is, operated by federal or provincial governments) were involved in 2 accidents in 2004 with no fatalities.

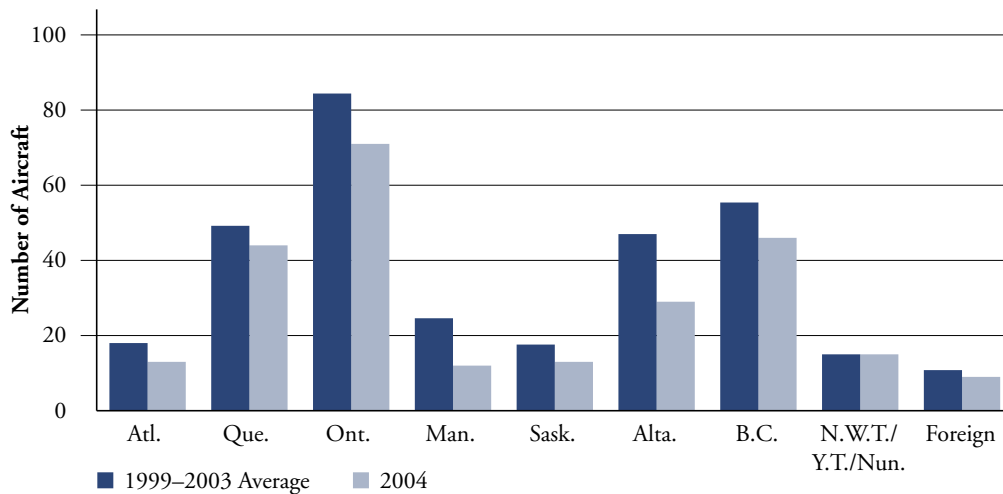
In 2004, there were 41 helicopter accidents, a 16% decrease from the five-year average of 49. Of the 41 helicopter accidents, 4 were fatal, resulting in 4 fatalities. Over the past 10 years, the highest proportion of helicopter accidents occurred during air transport operations (27%) and training (13%).

In 2004, 36 ultralight aircraft and 20 foreign-registered aircraft were involved in accidents in Canada. Of the accidents involving ultralight aircraft, 6 resulted in 10 fatalities, which is consistent with previous years. Of the accidents involving foreign-registered aircraft, 3 resulted in 10 fatalities.

### Accidents by Selected Categories

**Province (Table 3):** The total number of accidents for Canadian-registered aircraft, excluding ultralights, decreased from 295 in 2003 to 252 in 2004. The number of accidents decreased in every province except for the Northwest Territories, which remained the same. The most noted decreases were in Manitoba, Alberta, Saskatchewan and the Atlantic provinces, which compared to their five-year averages, decreased by 51%, 38%, 26% and 28% respectively (Figure 4).

Figure 4 – Aircraft Involved in Accidents by Province



**Events and Phases (Tables 4 to 6):** Accidents are frequently classified according to the first event (or abnormal condition) in the sequence of events that led to the occurrence. This classification serves to demonstrate the nature and distribution of safety-significant events, and how these events shift over time. However, the first event should not be construed to be the cause of the accident.

In 2004, the most common first event in aeroplane accidents was a take-off/landing event (18%). Control loss (15%), power loss (10%) and collision with terrain (10%) were the next most common first events. In helicopter accidents, collision with terrain (17%), operations-related event (15%) and aircraft damage (10%) were the most common first events.

The statistics show that the first event leading to an accident varies substantially according to the flight phase of the aircraft involved. For aeroplanes, accidents during the landing phase account for about 36% of total accidents. The most common first events in such accidents were landing (such as nose over, tire blow-out, etc.) and control loss. Approximately 23% of aeroplane accidents occur during the take-off phase; in these accidents, power loss and control loss were the most common first events. The en-route phase accounted for about 15% of aeroplane accidents, with power loss being the most common first event in that flight phase.

The approach/landing phase accounted for 30% of helicopter accidents, with the most common first events being collision with object and control loss. The manoeuvring phase (17%) had power loss and collision with object as the most common first events. About 16% of helicopter accidents occurred in the en-route phase, with power loss and collision with terrain being common first events. The hover/lift phase (15%) had sling-related event as the most common first event.

**Operation Type (Table 7):** In 2004, aeroplane accidents occurred mainly on recreational flights (57%), followed by air transport (18%) and training flights (12%). Helicopter accidents occurred mainly on air transport flights (27%) and during training (13%).

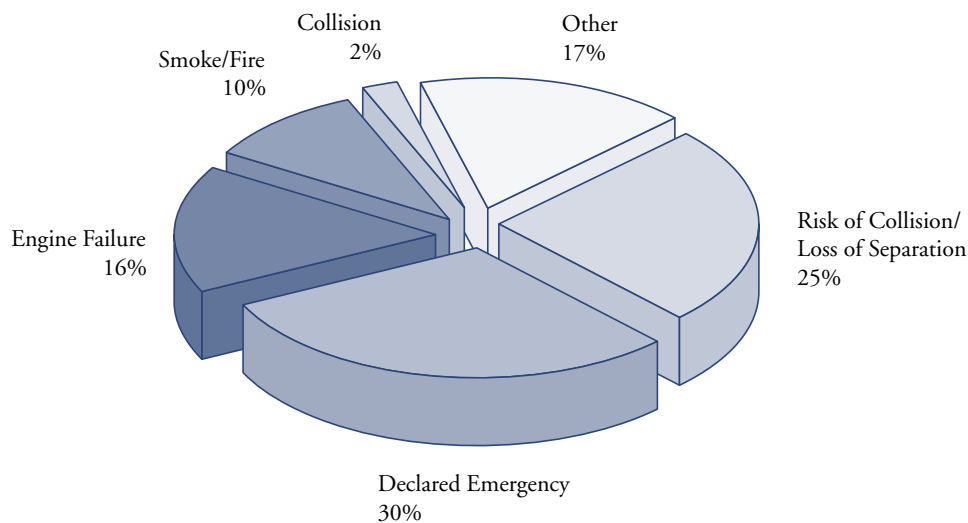
## INCIDENTS

### Overview of Incidents (Tables 1, 8 and 9)

Pursuant to TSB mandatory incident reporting requirements, 909 incidents were reported in 2004, 736 of which involved Canadian-registered aircraft.

In 2004, the most frequent incident types were declared emergency (30%), risk of collision or loss of separation (25%), and engine failure (16%), with the remainder being mostly smoke/fire incidents (Figure 5).

Figure 5 – Incidents Involving Aircraft by Type, 2004



The first event in declared emergency on Canadian-registered aircraft usually involved component failures, the most common of which were landing gear, hydraulic system, and electrical system.

Over the past five years, the majority of risk of collision incidents involving Canadian-registered aircraft had air traffic services (ATS)-related or air proximity events<sup>5</sup> as their first event.

<sup>5</sup> Please refer to the definitions in Appendix B for explanations for ATS-related and air proximity events.

# APPENDIX A—AVIATION OCCURRENCE TABLES

## Table 1

Aviation Occurrences and Casualties  
1995–2004

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Canadian-Registered Aircraft Accidents<sup>1</sup></b>	<b>390</b>	<b>342</b>	<b>355</b>	<b>388</b>	<b>341</b>	<b>320</b>	<b>295</b>	<b>274</b>	<b>295</b>	<b>252</b>
Aeroplanes Involved <sup>2</sup>	314	273	294	318	286	258	243	210	242	206
Airliners	7	4	8	14	6	9	5	6	7	3
Commuter Aircraft	19	12	12	10	13	4	8	6	9	1
Air Taxi	128	91	110	108	70	45	37	41	35	43
Aerial Work	6	13	10	18	18	19	18	12	17	8
Corporate	10	6	9	11	6	5	4	2	2	4
State	2	2	2	2	2	1	3	4	3	2
Private/Other <sup>3</sup>	142	145	143	155	171	175	168	139	169	145
Helicopters Involved	68	56	56	57	46	53	46	56	44	41
Other Aircraft Involved <sup>4</sup>	13	13	10	17	15	12	9	10	12	9
Hours Flown (thousands) <sup>5</sup>	3576	3624	3476	3931	4046	3982	3885	3713	3790	3809
Accident Rate (per 100 000 hours) <sup>6</sup>	10.7	9.1	10.1	9.5	8.2	7.8	7.4	7.2	7.5	6.5
<b>Fatal Accidents</b>	<b>52</b>	<b>44</b>	<b>36</b>	<b>32</b>	<b>34</b>	<b>38</b>	<b>33</b>	<b>31</b>	<b>32</b>	<b>24</b>
Aeroplanes Involved <sup>2</sup>	45	34	29	25	28	26	25	23	26	18
Airliners	1	1	0	0	1	1	0	0	0	0
Commuter Aircraft	2	1	0	1	2	1	1	0	0	0
Air Taxi	20	11	11	8	5	3	5	5	5	3
Aerial Work	1	0	0	0	1	2	1	1	3	0
Corporate	2	0	1	1	2	0	1	0	0	0
State	0	0	1	0	0	1	0	2	0	0
Private/Other <sup>3</sup>	19	21	16	15	17	18	17	15	18	15
Helicopters Involved	11	7	8	6	4	11	6	6	3	4
Other Aircraft Involved <sup>4</sup>	0	3	0	2	4	1	3	3	4	2
Fatalities	107	71	77	87	65	65	61	51	59	37
Serious Injuries	54	38	69	49	42	53	37	42	43	26
<b>Canadian-Registered Ultralight Aircraft Accidents</b>	<b>43</b>	<b>30</b>	<b>55</b>	<b>37</b>	<b>35</b>	<b>38</b>	<b>35</b>	<b>36</b>	<b>46</b>	<b>36</b>
Fatal Accidents	8	4	7	4	12	5	6	9	7	6
Fatalities	10	5	9	7	19	9	8	12	9	10
Serious Injuries	12	8	7	7	7	10	8	4	14	7
<b>Foreign-Registered Aircraft Accidents in Canada</b>	<b>18</b>	<b>22</b>	<b>16</b>	<b>21</b>	<b>21</b>	<b>17</b>	<b>29</b>	<b>13</b>	<b>30</b>	<b>20</b>
Fatal Accidents	5	4	5	5	5	6	8	1	6	3
Fatalities	17	13	11	236	8	16	10	2	8	10
Serious Injuries	2	2	5	3	0	2	5	0	3	2
<b>All Aircraft: Reportable Incidents</b>	<b>603</b>	<b>705</b>	<b>685</b>	<b>771</b>	<b>699</b>	<b>725</b>	<b>853</b>	<b>865</b>	<b>834</b>	<b>909</b>
Risk of Collision/Loss of Separation	138	193	217	181	168	161	204	193	154	223
Declared Emergency	185	197	192	226	207	225	255	280	292	278
Engine Failure	159	174	144	170	155	161	175	160	132	143
Smoke/Fire	53	75	61	106	87	84	107	101	103	94
Collision	5	2	7	4	7	8	19	22	16	21
Other	63	64	64	84	75	86	93	109	137	150

<sup>1</sup> Ultralight aircraft excluded

<sup>2</sup> As some accidents may involve multiple aircraft, the number of aircraft involved may differ from the total number of accidents.

<sup>3</sup> Other: Contains, but is not limited to, organizations that rent aircraft (that is, flying schools, flying clubs, etc.)

<sup>4</sup> Includes gliders, balloons and gyrocopters

<sup>5</sup> Source: Transport Canada (2003 and 2004 hours flown are estimated)

<sup>6</sup> Accident rate does not include "Other Aircraft Involved"

Figures are preliminary as of 31 March 2005.



**Table 2****Canadian-Registered Aircraft Involved in Accidents, Accident Rates, and Fatalities by Operator Type  
1995–2004**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Accidents</b>										
Aeroplanes Involved										
Airliners	7	4	8	14	6	9	5	6	7	3
Commuter Aircraft	19	12	12	10	13	4	8	6	9	1
Air Taxi	128	91	110	108	70	45	37	41	35	43
Aerial Work	6	13	10	18	18	19	18	12	17	8
State	2	2	2	2	2	1	3	4	3	2
Corporate/Private/Other <sup>1</sup>	152	151	152	166	177	180	172	141	171	149
Helicopters Involved	68	56	56	57	46	53	46	56	44	41
<b>Total</b>	<b>382</b>	<b>329</b>	<b>350</b>	<b>375</b>	<b>332</b>	<b>311</b>	<b>289</b>	<b>266</b>	<b>286</b>	<b>247</b>
<b>Hours Flown (thousands)<sup>2</sup></b>										
Aeroplanes										
Airliners	1053	1079	1070	1210	1247	1198	1168	1124	1148	1192
Commuter Aircraft	297	299	294	329	344	337	322	311	318	316
Air Taxi	785	803	732	805	825	792	754	683	651	650
Aerial Work	133	137	141	173	197	219	242	262	313	332
State	106	146	142	174	196	220	240	258	307	285
Corporate/Private/Other	625	587	553	630	629	612	555	496	463	448
Helicopters	577	574	543	610	609	604	604	578	590	586
<b>Total</b>	<b>3576</b>	<b>3624</b>	<b>3476</b>	<b>3931</b>	<b>4046</b>	<b>3982</b>	<b>3885</b>	<b>3713</b>	<b>3790</b>	<b>3809</b>
<b>Accident Rates (per 100 000 hours)</b>										
Aeroplanes										
Airliners	0.7	0.4	0.7	1.2	0.5	0.8	0.4	0.5	0.6	0.3
Commuter Aircraft	6.4	4.0	4.1	3.0	3.8	1.2	2.5	1.9	2.8	0.3
Air Taxi	16.3	11.3	15.0	13.4	8.5	5.7	4.9	6.0	5.4	6.6
Aerial Work	4.5	9.5	7.1	10.4	9.1	8.7	7.4	4.6	5.4	2.4
State	1.9	1.4	1.4	1.1	1.0	0.5	1.3	1.6	1.0	0.7
Corporate/Private/Other	24.3	25.7	27.5	26.3	28.1	29.4	31.0	28.4	36.9	33.3
Helicopters	11.8	9.8	10.3	9.3	7.6	8.8	7.6	9.7	7.5	7.0
<b>Total (all aircraft)</b>	<b>10.7</b>	<b>9.1</b>	<b>10.1</b>	<b>9.5</b>	<b>8.2</b>	<b>7.8</b>	<b>7.4</b>	<b>7.2</b>	<b>7.5</b>	<b>6.5</b>
<b>Fatalities: Crew</b>										
Aeroplanes										
Airliners	1	1	0	0	2	2	0	0	0	0
Commuter Aircraft	4	2	0	2	2	2	2	0	0	0
Air Taxi	18	10	13	9	6	2	4	1	5	2
Aerial Work	1	0	0	0	1	3	1	1	4	0
Corporate	2	0	0	2	1	0	1	0	0	0
State	0	0	1	0	0	2	0	1	0	0
Private/Other	18	22	16	16	16	20	17	15	15	14
Helicopters	8	4	9	5	5	10	7	6	3	4
<b>Total</b>	<b>52</b>	<b>39</b>	<b>39</b>	<b>34</b>	<b>33</b>	<b>41</b>	<b>32</b>	<b>24</b>	<b>27</b>	<b>20</b>
<b>Fatalities: Passengers</b>										
Aeroplanes										
Airliners	0	0	0	0	0	0	0	0	0	0
Commuter Aircraft	4	0	0	9	0	0	0	0	0	0
Air Taxi	31	9	9	16	4	5	8	7	10	14
Aerial Work	0	0	0	0	0	1	1	0	0	0
Corporate	1	0	2	1	4	0	1	0	0	0
State	0	0	2	0	0	0	0	0	0	0
Private/Other	11	15	13	11	14	6	12	16	16	1
Helicopters	8	2	12	13	6	8	2	0	3	0
<b>Total</b>	<b>55</b>	<b>26</b>	<b>38</b>	<b>50</b>	<b>28</b>	<b>20</b>	<b>24</b>	<b>23</b>	<b>29</b>	<b>15</b>

<sup>1</sup> Other: Contains, but is not limited to, organizations that rent aircraft (that is, flying schools, flying clubs, etc.)

<sup>2</sup> Source: Transport Canada (1995 to 2004 hours flown are estimated)

Figures are preliminary as of 31 March 2005.



**Table 3****Accidents Involving Canadian-Registered Aircraft by Province/Territory  
1995–2004**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Accidents</b>										
Newfoundland and Labrador	9	10	9	7	5	14	10	6	9	5
Prince Edward Island	0	2	1	0	0	1	1	0	1	0
Nova Scotia	8	5	4	7	4	9	3	7	1	3
New Brunswick	5	1	6	6	7	5	4	2	1	5
Quebec	78	39	60	42	46	55	48	42	55	44
Ontario	74	72	84	106	106	73	64	74	80	71
Manitoba	29	18	25	29	32	17	28	17	28	12
Saskatchewan	28	24	22	21	22	9	18	18	16	13
Alberta	46	56	46	62	52	39	36	46	34	29
British Columbia	72	83	72	70	40	68	58	41	54	46
Nunavut <sup>1</sup>	0	0	0	0	0	4	2	1	0	2
Northwest Territories	16	13	9	13	14	11	12	4	5	7
Yukon	11	11	5	8	4	6	4	4	4	6
Outside Canada	14	8	12	17	9	9	7	12	7	9
<b>Total</b>	<b>390</b>	<b>342</b>	<b>355</b>	<b>388</b>	<b>341</b>	<b>320</b>	<b>295</b>	<b>274</b>	<b>295</b>	<b>252</b>
<b>Fatal Accidents</b>										
Newfoundland and Labrador	0	2	1	1	1	2	1	1	2	1
Prince Edward Island	0	1	0	0	0	0	0	0	0	0
Nova Scotia	3	0	0	2	0	3	0	2	0	1
New Brunswick	1	0	0	0	0	0	0	0	0	0
Quebec	7	6	7	9	5	5	6	6	5	4
Ontario	10	9	7	4	9	4	6	5	11	2
Manitoba	4	3	1	2	4	0	2	1	0	2
Saskatchewan	2	1	4	2	1	2	0	2	1	2
Alberta	4	3	2	4	5	3	2	2	3	2
British Columbia	14	12	11	5	8	10	11	9	8	6
Nunavut <sup>1</sup>	0	0	0	0	0	3	1	0	0	1
Northwest Territories	1	4	0	0	1	1	3	0	0	1
Yukon	3	0	0	0	0	1	0	0	1	0
Outside Canada	3	3	3	3	0	4	1	3	1	2
<b>Total</b>	<b>52</b>	<b>44</b>	<b>36</b>	<b>32</b>	<b>34</b>	<b>38</b>	<b>33</b>	<b>31</b>	<b>32</b>	<b>24</b>
<b>Fatalities</b>										
Newfoundland and Labrador	0	5	2	1	1	3	3	2	3	1
Prince Edward Island	0	1	0	0	0	0	0	0	0	0
Nova Scotia	4	0	0	4	0	4	0	2	0	1
New Brunswick	2	0	0	0	0	0	0	0	0	0
Quebec	9	12	18	29	9	8	13	14	9	4
Ontario	31	12	8	9	14	5	8	6	27	14
Manitoba	7	4	4	5	7	0	4	1	0	2
Saskatchewan	3	1	9	5	1	2	0	2	1	2
Alberta	5	3	4	10	8	3	4	3	4	2
British Columbia	32	20	22	12	24	19	17	16	13	6
Nunavut <sup>1</sup>	0	0	0	0	0	5	3	0	0	1
Northwest Territories	4	5	0	0	1	3	8	0	0	2
Yukon	7	0	0	0	0	2	0	0	1	0
Outside Canada	3	8	10	12	0	11	1	5	1	2
<b>Total</b>	<b>107</b>	<b>71</b>	<b>77</b>	<b>87</b>	<b>65</b>	<b>65</b>	<b>61</b>	<b>51</b>	<b>59</b>	<b>37</b>

<sup>1</sup> This territory was created on 01 April 1999.

Figures are preliminary as of 31 March 2005.

**Table 4****Canadian-Registered Aircraft Involved in Accidents by First Event and Phase of Flight  
1995–2004**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Aeroplanes Involved in Accidents by First Event</b>										
Control Loss	45	31	33	35	30	41	37	23	27	30
Power Loss	50	44	46	55	41	37	37	28	36	20
Collision with Object	35	39	32	40	36	24	21	16	25	16
Collision with Terrain	18	21	18	18	22	30	17	16	25	20
Collision with Moving Aircraft	6	0	3	3	9	3	3	2	1	3
Operations-Related Event	18	14	13	10	12	5	6	6	5	4
Component System Malfunction	22	13	16	15	18	15	13	14	7	16
Landing Gear Collapsed/Retracted	3	15	18	18	15	8	7	10	9	10
Runway Overrun	6	5	5	5	4	2	1	1	1	2
Take-off/Landing Event	46	48	45	59	53	46	47	45	55	38
Wheels-up Landing	7	4	13	6	9	4	5	9	5	6
Component System-Related Event	18	4	16	13	4	10	9	7	13	3
Weather-Related Event	16	12	12	10	7	15	12	12	9	16
Aircraft Damage	4	8	7	10	1	5	4	3	4	2
Other/Unknown	20	15	17	21	25	13	24	18	20	20
<b>Total</b>	<b>314</b>	<b>273</b>	<b>294</b>	<b>318</b>	<b>286</b>	<b>258</b>	<b>243</b>	<b>210</b>	<b>242</b>	<b>206</b>
<b>Helicopters Involved in Accidents by First Event</b>										
Control Loss	9	3	6	10	3	3	5	6	3	3
Power Loss	6	5	9	6	12	9	5	9	11	3
Collision with Object	11	7	6	12	8	14	8	5	3	3
Collision with Terrain	1	3	5	3	6	5	4	9	5	7
Collision with Moving Aircraft	2	0	0	0	0	0	1	0	0	0
Operations-Related Event	8	6	1	0	5	1	2	0	2	6
Sling-Related Event	9	5	2	2	2	2	2	4	2	2
Dynamic System Malfunction	1	2	3	1	0	2	2	2	1	1
Dynamic Rollover	0	0	1	2	0	3	1	3	1	3
Autorotative Landing	1	3	6	1	2	2	3	4	4	0
Weather-Related Event	3	2	0	1	1	3	4	2	1	2
Aircraft Damage	5	11	5	6	3	2	3	1	3	4
Other/Unknown	12	9	12	13	4	7	6	11	8	7
<b>Total</b>	<b>68</b>	<b>56</b>	<b>56</b>	<b>57</b>	<b>46</b>	<b>53</b>	<b>46</b>	<b>56</b>	<b>44</b>	<b>41</b>
<b>Aeroplanes Involved in Accidents by Phase of Flight</b>										
Standing/Taxiing	22	19	22	26	17	21	18	22	23	16
Take-off	80	57	64	72	72	59	52	50	47	49
En Route	56	44	43	52	38	39	34	30	40	20
Manoeuvring	18	19	14	22	21	17	15	11	11	8
Approach	40	27	39	28	30	24	36	18	21	23
Landing	97	104	109	112	105	91	87	72	93	83
Post-Impact	0	0	0	0	1	0	0	0	1	1
Unknown	1	3	3	6	2	7	1	7	6	6
<b>Total</b>	<b>314</b>	<b>273</b>	<b>294</b>	<b>318</b>	<b>286</b>	<b>258</b>	<b>243</b>	<b>210</b>	<b>242</b>	<b>206</b>
<b>Helicopters Involved in Accidents by Phase of Flight</b>										
Standing	6	7	4	1	4	2	3	2	1	6
Take-off	13	5	9	3	4	9	5	9	5	6
En Route	11	7	14	9	6	8	10	7	6	6
Hover/Lift	14	13	6	13	10	4	5	3	4	4
Manoeuvring	6	11	9	13	8	14	2	9	9	7
Approach/Landing	17	13	14	17	12	13	19	21	18	11
Unknown	1	0	0	1	2	3	2	5	1	1
<b>Total</b>	<b>68</b>	<b>56</b>	<b>56</b>	<b>57</b>	<b>46</b>	<b>53</b>	<b>46</b>	<b>56</b>	<b>44</b>	<b>41</b>

Figures are preliminary as of 31 March 2005.

## Table 5

### Canadian-Registered Aircraft Involved in Accidents

#### First Event vs. Phase of Flight

1995–2004

	Phase of Flight							Total
	Standing/ Taxiing	Take-off	En Route	Manoeuvring	Approach	Landing	Other/ Unknown	
<b>Aeroplanes Involved in Accidents by First Event</b>								
Control Loss	11	112	17	27	20	140	5	332
Power Loss	0	118	170	38	63	3	2	394
Collision with Object	59	64	22	30	43	64	2	284
Collision with Terrain	3	57	39	23	31	37	15	205
Collision with Moving Aircraft	9	7	3	7	6	1	0	33
Operations-Related Event	9	36	21	4	8	13	2	93
Component System Malfunction	13	31	14	2	35	53	1	149
Landing Gear Collapsed/Retracted	15	11	0	0	0	87	0	113
Runway Overrun	1	3	0	0	0	27	1	32
Take-off/Landing Event	4	87	3	1	23	364	0	482
Wheels-up Landing	0	0	0	0	1	67	0	68
Component System-Related Event	5	22	24	3	11	31	1	97
Weather-Related Event	9	24	43	5	24	15	1	121
Aircraft Damage	31	4	1	1	0	9	2	48
Other/Unknown	37	26	39	15	21	42	13	193
<b>Total</b>	<b>206</b>	<b>602</b>	<b>396</b>	<b>156</b>	<b>286</b>	<b>953</b>	<b>45</b>	<b>2644</b>

	Phase of Flight							Total
	Standing	Take-off	En Route	Hover/Lift	Manoeuvring	Approach/ Landing	Other/ Unknown	
<b>Helicopters Involved in Accidents by First Event</b>								
Control Loss	4	9	1	5	7	23	2	51
Power Loss	0	10	21	11	18	15	0	75
Collision with Object	3	12	3	13	18	26	2	77
Collision with Terrain	4	8	11	4	9	10	2	48
Collision with Moving Aircraft	0	0	3	0	0	0	0	3
Operations-Related Event	2	9	3	4	4	9	0	31
Sling-Related Event	1	5	1	17	5	3	0	32
Dynamic System Malfunction	0	2	6	3	3	1	0	15
Dynamic Rollover	1	6	0	0	1	5	1	14
Autorotative Landing	0	0	2	1	4	18	1	26
Weather-Related Event	0	1	10	2	0	6	0	19
Aircraft Damage	12	1	3	8	2	15	2	43
Other/Unknown	9	5	20	8	17	24	6	89
<b>Total</b>	<b>36</b>	<b>68</b>	<b>84</b>	<b>76</b>	<b>88</b>	<b>155</b>	<b>16</b>	<b>523</b>

Figures are preliminary as of 31 March 2005.

## Table 6

### Canadian-Registered Aeroplanes Involved in Accidents

#### First Event vs. Aeroplane Type

1995–2004

	Aeroplane Type						
	Airliner	Commuter	Air Taxi	Aerial Work	Corporate	State	Private/Other
<b>Aeroplanes Involved in Accidents by First Event</b>							
Control Loss	2	10	73	10	9	0	228
Power Loss	6	2	92	36	9	1	248
Collision with Object	14	14	67	28	7	7	147
Collision with Terrain	3	6	72	9	3	2	110
Collision with Moving Aircraft	0	1	8	2	1	1	20
Operations-Related Event	1	4	21	8	1	0	58
Component System Malfunction	5	11	49	6	6	3	69
Landing Gear Collapsed/Retracted	5	9	32	2	1	1	63
Runway Overrun	2	0	11	0	1	0	18
Take-off/Landing Event	12	17	138	17	8	4	286
Wheels-up Landing	1	2	25	2	3	1	34
Component System-Related Event	4	4	20	3	4	0	62
Weather-Related Event	1	5	39	6	2	0	68
Aircraft Damage	6	3	11	1	0	1	26
Other/Unknown	7	6	50	9	4	2	115
<b>Total</b>	<b>69</b>	<b>94</b>	<b>708</b>	<b>139</b>	<b>59</b>	<b>23</b>	<b>1552</b>
<b>Aeroplanes Involved in Fatal Accidents by First Event</b>							
Control Loss	0	1	11	1	2	0	27
Power Loss	1	0	4	1	1	0	19
Collision with Object	0	0	4	1	0	1	19
Collision with Terrain	2	2	33	3	2	2	52
Collision with Moving Aircraft	0	1	3	0	1	1	9
Operations-Related Event	0	2	1	0	0	0	7
Component System Malfunction	0	1	2	0	0	0	3
Landing Gear Collapsed/Retracted	0	0	0	0	0	0	0
Runway Overrun	0	0	0	0	0	0	0
Take-off/Landing Event	0	1	1	1	0	0	2
Wheels-up Landing	0	0	0	0	0	0	0
Component System-Related Event	0	0	1	0	0	0	1
Weather-Related Event	0	0	5	0	0	0	7
Aircraft Damage	0	0	0	0	0	0	2
Other/Unknown	1	0	11	2	1	0	23
<b>Total</b>	<b>4</b>	<b>8</b>	<b>76</b>	<b>9</b>	<b>7</b>	<b>4</b>	<b>171</b>

Figures are preliminary as of 31 March 2005.

**Table 7****Canadian-Registered Aircraft Involved in Accidents by Operation Type  
1995–2004**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Aeroplanes Involved in Accidents</b>										
Training	34	31	42	49	43	45	46	20	34	25
Pleasure/Travel	147	130	138	130	130	116	108	102	122	118
Business	17	9	9	15	10	9	10	6	8	5
Test/Demonstration/Ferry	10	15	9	14	9	5	7	7	5	7
Aerial Application	13	17	11	17	9	12	13	6	13	3
Fire Fighting/Fire Management	1	0	2	3	2	3	2	2	2	3
Survey/Inspection	1	3	4	3	2	0	2	5	2	1
Air Ambulance	3	1	3	3	3	0	3	2	1	2
Air Transport	76	50	62	67	67	53	43	49	42	37
Sightseeing	1	1	4	1	0	5	1	1	4	0
Other/Unknown	11	16	10	16	11	10	8	10	9	5
<b>Total</b>	<b>314</b>	<b>273</b>	<b>294</b>	<b>318</b>	<b>286</b>	<b>258</b>	<b>243</b>	<b>210</b>	<b>242</b>	<b>206</b>
<b>Aeroplanes Involved in Fatal Accidents</b>										
Training	1	0	2	5	2	2	2	1	3	4
Pleasure/Travel	20	16	16	11	14	12	10	11	15	10
Business	2	1	2	2	3	3	4	0	0	0
Test/Demonstration/Ferry	5	5	1	2	1	1	2	3	0	0
Aerial Application	1	0	0	0	1	2	0	0	1	0
Fire Fighting/Fire Management	1	0	1	0	0	0	1	0	1	0
Survey/Inspection	1	1	1	0	1	0	0	2	0	0
Air Ambulance	1	0	0	0	0	0	1	0	0	0
Air Transport	12	6	6	4	5	4	4	5	4	3
Sightseeing	0	1	0	0	0	1	0	1	0	0
Other/Unknown	1	4	0	1	1	1	1	0	2	1
<b>Total</b>	<b>45</b>	<b>34</b>	<b>29</b>	<b>25</b>	<b>28</b>	<b>26</b>	<b>25</b>	<b>23</b>	<b>26</b>	<b>18</b>
<b>Helicopters Involved in Accidents</b>										
Training	4	4	9	5	6	11	11	9	6	4
Pleasure/Travel	5	1	6	0	0	3	4	2	1	5
Business	2	1	2	5	1	1	4	6	1	0
Test/Demonstration/Ferry	4	4	4	0	3	4	1	5	0	2
Aerial Application	4	2	0	1	1	2	1	1	2	1
Fire Fighting/Fire Management	9	5	2	10	7	2	2	6	6	4
Survey/Inspection	2	7	5	7	4	4	0	3	8	2
Air Ambulance	0	0	0	1	0	0	1	0	0	0
Air Transport	21	17	15	14	10	11	12	14	11	16
Sightseeing	0	1	0	0	1	0	0	0	0	0
Other/Unknown	17	14	13	14	13	15	10	10	9	7
<b>Total</b>	<b>68</b>	<b>56</b>	<b>56</b>	<b>57</b>	<b>46</b>	<b>53</b>	<b>46</b>	<b>56</b>	<b>44</b>	<b>41</b>
<b>Helicopters Involved in Fatal Accidents</b>										
Training	0	0	0	0	0	2	1	0	0	0
Pleasure/Travel	1	0	0	0	0	1	2	0	0	1
Business	0	0	0	3	0	0	0	1	0	0
Test/Demonstration/Ferry	1	2	1	0	0	1	1	2	0	0
Aerial Application	1	0	0	0	0	0	0	0	0	0
Fire Fighting/Fire Management	3	0	1	0	0	0	0	0	1	0
Survey/Inspection	0	1	1	0	0	1	0	0	1	1
Air Ambulance	0	0	0	0	0	0	0	0	0	0
Air Transport	4	3	3	2	1	1	1	0	0	2
Sightseeing	0	0	0	0	1	0	0	0	0	0
Other/Unknown	1	1	2	1	2	5	1	3	1	0
<b>Total</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>6</b>	<b>4</b>	<b>11</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>4</b>

Figures are preliminary as of 31 March 2005.

## Table 8

### Incidents Involving Canadian-Registered Aircraft by Incident Type 1995–2004

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Incidents</b>										
Risk of Collision/Loss of Separation	120	156	185	149	142	130	168	168	124	185
Declared Emergency	165	165	157	183	173	174	209	232	229	204
Engine Failure	120	133	115	133	121	129	157	135	104	118
Smoke/Fire	45	68	46	86	71	71	92	83	82	81
Collision	3	1	7	3	7	8	17	19	16	21
Control Difficulties	22	19	13	28	18	25	28	28	41	41
Crew Unable to Perform Duties	3	8	13	8	17	15	13	37	48	50
Dangerous Goods-Related	0	7	4	3	3	2	6	0	2	0
Depressurization	13	12	12	19	6	4	15	18	17	7
Fuel Shortage	2	0	2	6	7	1	2	1	6	10
Failure to Remain in Landing Area	11	8	9	8	10	13	4	6	3	10
Incorrect Fuel	0	0	0	0	0	0	0	1	0	2
Slung Load Released	3	1	2	1	5	6	8	3	4	5
Transmission or Gearbox Failure	0	2	1	1	3	2	2	2	1	2
<b>Total<sup>1</sup></b>	<b>507</b>	<b>580</b>	<b>566</b>	<b>628</b>	<b>583</b>	<b>580</b>	<b>721</b>	<b>733</b>	<b>677</b>	<b>736</b>

<sup>1</sup> Incidents involving Canadian-registered aircraft only; Table 1 includes those involving foreign aircraft

Figures are preliminary as of 31 March 2005.

## Table 9

### Canadian-Registered Aircraft Involved in Incidents Selected Incident Types vs. First Event 2000–2004

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Incident Type	First Event	
<b>Risk of Collision/ Loss of Separation</b> 1244 Aircraft Involved	Air Proximity	319
	ATS-Related Event	730
	Altitude-Related Event	32
	Runway Incursion	74
	Other	89
<b>Declared Emergency</b> 1048 Aircraft Involved	Landing Gear Failure	182
	Hydraulic Failure	148
	Electrical Failure	45
	Other Component Failure	362
	Other	311
<b>Engine Failure</b> 643 Aircraft Involved	Power Loss – First Engine	267
	Component Failure	319
	Other	57
<b>Smoke/Fire</b> 409 Aircraft Involved	Fire/Explosion	289
	Component Failure	105
	Other	15
<b>Control Difficulties</b> 163 Aircraft Involved	Component Failure	67
	Weather-Related Event	39
	Other	57

Figures are preliminary as of 31 March 2005.



## APPENDIX B – DEFINITIONS

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

### *Aviation Occurrence*

- a) Any accident or incident associated with the operation of an aircraft; 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 a) above.

### *Reportable Aviation Accident*

An accident resulting directly from the operation of an aircraft where

- a) a person sustains a serious injury or is killed as a result of
  - i) being on board the aircraft;
  - ii) coming into contact with any part of the aircraft or its contents; or
  - iii) being directly exposed to the jet blast or rotor downwash of the aircraft;
- b) the aircraft sustains damage that adversely affects the structural strength, performance or flight characteristics of the aircraft and that requires major repair or replacement of any affected component part; or
- c) the aircraft is missing or inaccessible.

### *Reportable Aviation Incident*

An incident resulting directly from the operation of an aeroplane having a maximum certificated take-off weight (MCTOW) greater than 5700 kg, or from the operation of a rotorcraft having a MCTOW greater than 2250 kg, where

- a) an engine fails or is shut down as a precautionary measure;
- b) a transmission gearbox malfunction occurs;
- c) smoke or fire occurs;
- d) difficulties in controlling the aircraft are encountered owing to any aircraft system malfunction, weather phenomena, wake turbulence, uncontrolled vibrations or operations outside the flight envelope;
- e) the aircraft fails to remain within the intended landing or take-off area, lands with all or part of the landing gear retracted, or drags a wing tip, an engine pod, or any other part of the aircraft;
- f) any crew member whose duties are directly related to the safe operation of the aircraft is unable to perform the crew member's duties as a result of physical incapacitation that poses a threat to the safety of any person, property, or the environment;
- g) depressurization occurs that necessitates an emergency descent;
- h) a fuel shortage occurs that necessitates a diversion or requires approach and landing priority at the destination of the aircraft;
- i) the aircraft is refuelled with the incorrect type of fuel or contaminated fuel;
- j) a collision, risk of collision, or loss of separation occurs;
- k) a crew member declares an emergency or indicates any degree of emergency that requires priority handling by an air traffic control unit or the standing by of emergency response services;
- l) a slung load is released unintentionally or as a precautionary or emergency measure from the aircraft; or
- m) any dangerous goods are released in or from the aircraft.

### *Serious Injury*

An injury that is sustained by a person in an accident and that

- a) requires hospitalization for more than 48 hours, commencing within seven days of the date the injury was received; or
- b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
- c) involves lacerations that cause severe haemorrhage or nerve, muscle or tendon damage; or
- d) involves injury to any internal organ; or
- e) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or
- f) involves verified exposure to infectious substances or injurious radiation.

### ***ATS-Related Event***

Any event related to the provision of air traffic control services including, but not limited to, failure or inability to provide service, emergency handling, or loss of in-flight separation.

### ***Air Proximity Event***

A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their positions and speed have been such that the safety of the aircraft involved may have been compromised.

### ***Commercial Operators***

Commercial operators include carriers that offer a “for-hire” service to transport people or goods, or to undertake specific tasks such as aerial photography, flight training, or crop spraying.

### ***Airliner***

An aeroplane used by a Canadian air operator in an air transport service or in aerial work involving sightseeing operations, that has a MCTOW of more than 8618 kg (19 000 pounds) or for which a Canadian type certificate has been issued authorizing the transport of 20 or more passengers.

### ***Commuter Aircraft***

An aeroplane used by a Canadian air operator, in an air transport service or in aerial work involving sightseeing operations, of any of the following aircraft:

- a) a multi-engined aircraft that has a MCTOW of 8618 kg (19 000 pounds) or less and a seating configuration, excluding pilot seats, of 10 to 19 inclusive;
- b) a turbo-jet-powered aeroplane that has a maximum zero fuel weight of 22 680 kg (50 000 pounds) or less and for which a Canadian type certificate has been issued authorizing the transport of not more than 19 passengers.

### ***Aerial Work Aircraft***

A commercially operated aeroplane or helicopter used in aerial work involving

- a) the carriage on board of persons other than flight crew members;
- b) the carriage of helicopter external loads;
- c) the towing of objects; or
- d) the dispersal of products.

### ***Air Taxi Aircraft***

A commercially operated aircraft used in an air transport service or in aerial work involving sightseeing operations, in which the aircraft is:

- a) a single-engined aircraft;
- b) a multi-engined aircraft, other than a turbo-jet-powered aeroplane, that has a MCTOW of 8618 kg (19 000 pounds) or less and a seating configuration, excluding pilot seats, of nine or less; or
- c) any aircraft that is authorized by the Minister of Transport to be operated under Part VII, Subpart 3, Division 1 of the *Canadian Aviation Regulations* (CARs).

### ***State Operators***

State operators include the federal and provincial governments.

### ***Corporate Operators***

Corporate operators include companies flying for business reasons.

### ***Private Operators***

Private operators include individuals flying for pleasure. Included are flights on which it is not possible to transport people or cargo on a “for-hire” basis.