



# 2013 Safety Report



# A Coordinated, Risk-based Approach to Improving Global Aviation Safety

The air transport industry plays a major role in world economic activity. One of the key elements to maintaining the vitality of civil aviation is to ensure safe, secure, efficient and environmentally sustainable operations at the global, regional and national levels.

A specialized agency of the United Nations, the **International Civil Aviation Organization (ICAO)** was created in 1944 to promote the safe and orderly development of international civil aviation throughout the world.

ICAO sets the Standards and Recommended Practices (SARPs) necessary for aviation safety, security, efficiency and environmental protection on a global basis. ICAO serves as the primary forum for cooperation in all fields of civil aviation among its 191 Member States.<sup>1</sup>

Improving the safety of the global air transport system is ICAO's guiding and most fundamental Strategic Objective. The Organization works constantly to address and enhance global aviation safety through the following coordinated activities:

**Policy and Standardization** initiatives.

**Monitoring** of key safety trends and indicators.

**Safety Analysis.**

**Implementing** programmes to address safety issues.

In every case, these activities are augmented by ICAO's detailed appraisal of global and regional aviation safety metrics on the basis of established risk management principles—a core component of contemporary State Safety Programmes (SSP) and Safety Management Systems (SMS). Applying these principles in the field of aviation safety requires ICAO to pursue a strategy comprised of proactive and reactive safety analysis and risk management processes.

In all of its coordinated safety activities, ICAO strives to achieve a balance between assessed risk and the requirements of practical, achievable and effective risk mitigation strategies.

The ICAO Safety Report is published annually each April in electronic format to provide updates on safety indicators including accidents and related risk factors occurring in the previous year.

In addition, ICAO will publish a triennial Special Edition – the State of Global Aviation Safety report – during August of each year in which an ICAO Assembly is held. The State of Global Aviation Safety reports provide Member States, the aviation community and the travelling public with a high-level analysis of air transport safety trends and indicators. They also include comprehensive accounts of the significant aviation safety programmes being undertaken by ICAO and its partners, highlighting the Organization's important leadership role in fostering increased cooperation and innovation to enhance air transport safety outcomes worldwide. The State of Global Aviation Safety Report will be published in six languages, electronically and in print.

<sup>1</sup> This information is current as of the date of publication of this report.

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International Civil Aviation Organization  
999 University Street  
Montréal, Quebec, Canada  
H3C 5H7

[www.icao.int](http://www.icao.int)

#### Disclaimer

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#### Note:

The United Nations' taxonomy of world regions is used in this report and is described in Appendix 2. This document focuses primarily on scheduled commercial flights, the data for which is based on the Official Airline Guide (OAG) combined with internal ICAO preliminary estimates.



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# Executive Summary

The air transport system carried approximately 2.9 billion passengers in 2012, up 5 per cent since 2011. Total scheduled passenger traffic in 2012, measured as revenue passenger-kilometres (RPKs), grew at a rate of 5.5 per cent over the previous year.

The number of accidents (as defined in ICAO Annex 13) decreased by 21 per cent and the global accident rate involving scheduled commercial operations for 2012 has decreased significantly to 3.2 accidents per million departures.

Compared to 2011, the number of fatalities decreased by 10 per cent making 2012 the safest year with regard to fatalities since 2004.

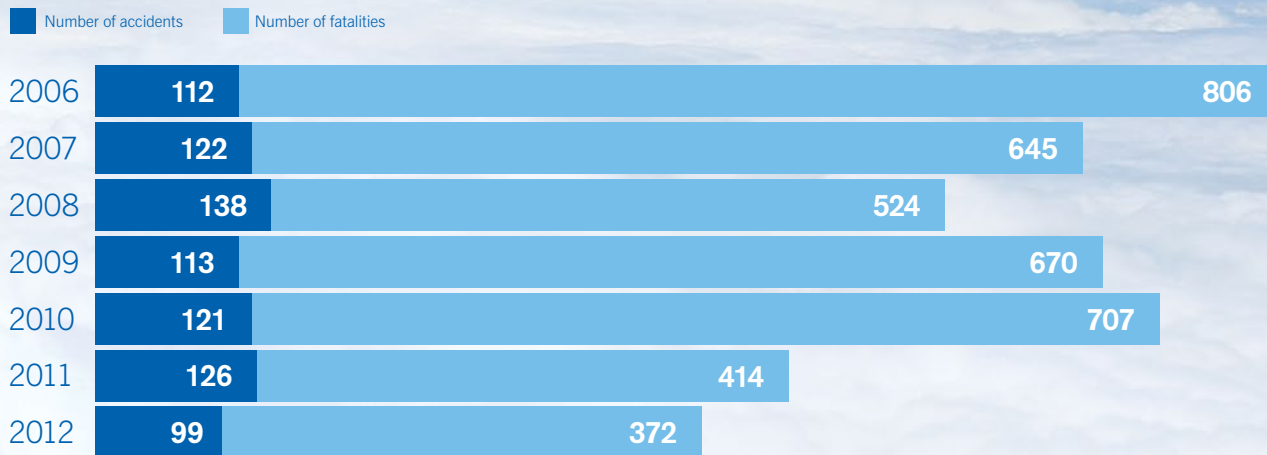




Cooperation is a consistent goal and recognized strength of the aviation community. To keep pace with expansion and progress sector wide, ICAO remains focused on the implementation and development of new safety initiatives. The Runway Safety Programme and Fatigue Risk Management Systems are examples of how ICAO is working with stakeholders to identify hazards and manage risk.

ICAO is committed to improving aviation safety and enabling seamless cooperation and communication between stakeholders. ICAO continues to collaborate with established regional organizations, such as Regional Aviation Safety Groups (RASGs) and Regional Safety Oversight Organizations (RSOOs), and to promote the training and support necessary to address emerging safety issues. In addition, ICAO continues to actively engage with other agencies of the United Nations—including the World Meteorological Organization in preparing for and responding to natural hazards such as volcanic eruptions that impact global air navigation safety and efficiency.

### Accident Records: 2006–2012 *Scheduled commercial flights*



## The Bottom Line

The marginal growth in traffic experienced in 2012 was coupled with a 21 per cent decrease in the number of accidents, resulting in an accident rate of 3.2 per million departures—a 24 per cent decrease compared to the previous year. ICAO is working in partnership with the international aviation community to achieve continuous reductions in the

global accident rate, with an emphasis on improving safety performance in those regions experiencing significantly higher accident rates or having specific safety challenges. This report provides a summary of key indicators with reference to the 2006–2011 benchmark period.

# USOAP Status

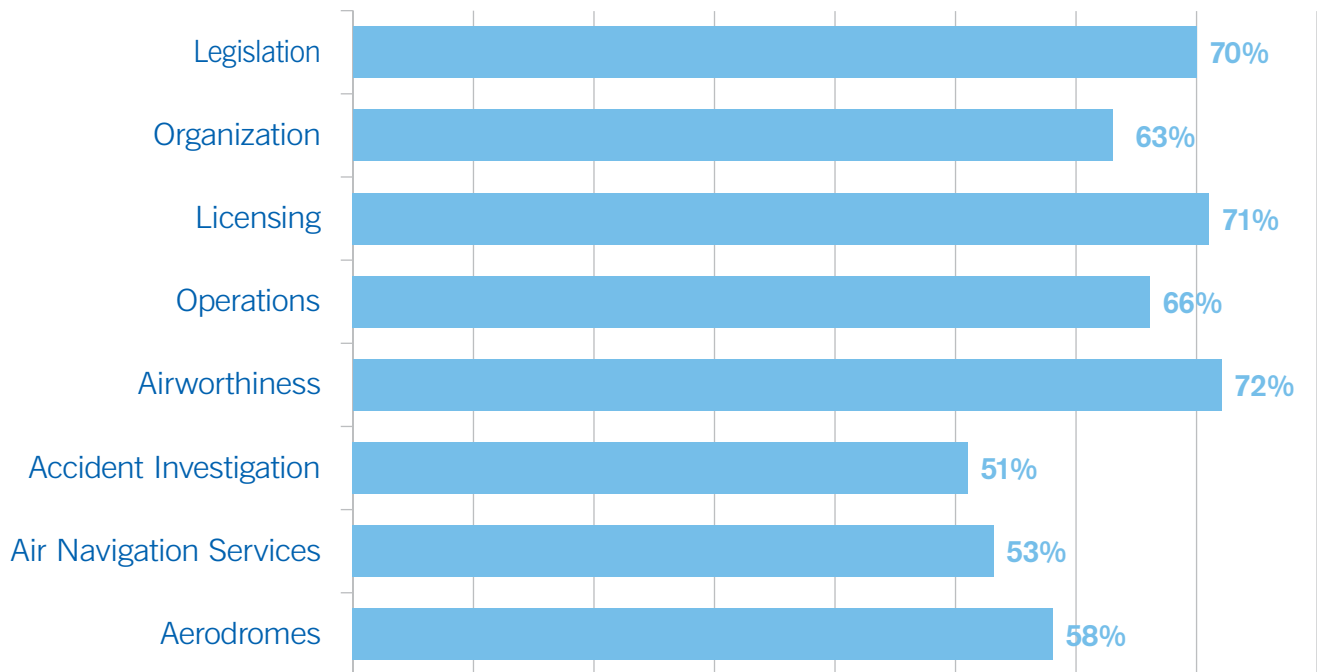
In an effort to establish and implement an effective safety oversight system that reflects the shared responsibility of the State and the broader aviation community, each ICAO Member State should address all of the eight Critical Elements (CEs). These eight categories address the entire spectrum of a State’s civil aviation oversight activities.

To standardize the conduct of its audits under the USOAP, ICAO has established audit protocol questionnaires. The protocol questions are based on the Chicago Convention, SARPs established in the safety-related Annexes to the

Convention, as well as associated ICAO guidance material including, but not limited to, the ICAO Safety Oversight Manual (Doc 9734—*The Establishment and Management of a State’s Safety Oversight System*) and Safety Management Manual (Doc 9859—*Safety Management Manual, 3<sup>rd</sup> ed*). Each audit protocol is a comprehensive checklist covering all areas of a State’s safety oversight system subject to the USOAP audit process. Using the audit protocol as a guideline, auditors are then able to determine a State’s capability for safety oversight.

## Global Audit Results

Effective Implementation of Safety Oversight Systems by Area





■ States having Effective Implementation **above** the global average



### States, listed in alphabetical order, having Effective Implementation **above** the global average of 61 per cent (based on USOAP audit results as of 31 December 2012)

Argentina	Croatia	Ghana	Latvia	Philippines	Togo
Armenia	Cuba	Greece	Lithuania	Poland	Trinidad and Tobago
Australia	Cyprus	Guatemala	Luxembourg	Portugal	Tunisia
Austria	Czech Republic	Hungary	Malaysia	Republic of Korea	Turkey
Belgium	Democratic People's Republic of Korea	Iceland	Malta	Romania	Turkmenistan
Belize	Denmark	India	Mauritania	Russian Federation	Ukraine
Bolivia (Plurinational State of)	Dominican Republic	Indonesia	Mexico	Saudi Arabia	United Arab Emirates
Bosnia and Herzegovina	Ecuador	Iran (Islamic Republic of)	Mongolia	Serbia	United Kingdom of Great Britain and Northern Ireland
Brazil	Egypt	Ireland	Montenegro	Singapore	United States of America
Brunei Darussalam	El Salvador	Israel	Morocco	Slovakia	Uzbekistan
Bulgaria	Estonia	Italy	Netherlands	Slovenia	Venezuela (Bolivarian Republic of)
Canada	Ethiopia	Japan	New Zealand	South Africa	Zimbabwe
Cape Verde	Fiji	Jordan	Nicaragua	Spain	
Chile	Finland	Kenya	Nigeria	Sri Lanka	
China	France	Kuwait	Norway	Sudan	
Colombia	Gambia	Kyrgyzstan	Pakistan	Sweden	
Costa Rica	Germany	Lao People's Democratic Republic	Panama	Switzerland	
			Peru	Thailand	





# Accident Statistics

As its primary indicator of aggregate safety in the global air transport sector, ICAO studies the accident rate based on scheduled commercial operations involving aircraft having a maximum take-off weight (MTOW) above 2250 kg. Aircraft accidents are categorized using the definition provided in Annex 13 to the Chicago Convention—*Aircraft Accident and Incident Investigation*.

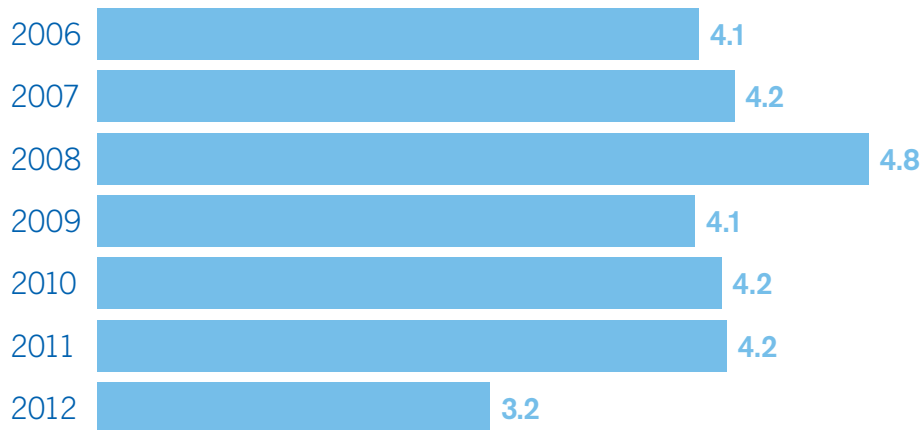
Exposure data is comprised of scheduled commercial operations that involve the transportation of passengers, cargo and mail for remuneration or hire.

The chart below shows the change in the accident rate over the previous seven years, with 2012 having an accident rate of 3.2 accidents per million departures, the lowest recorded since ICAO began tracking the global accident rate.

In addition to the global accident rate as calculated historically, ICAO is committed to working with its partners through the Global Safety Information Exchange (GSIE) to develop a harmonized accident rate based on common criteria. Details on the GSIE harmonized accident rate can be found later in this report.

## Global Accident Rate

Accidents per million departures



## Regional Accident Statistics

To further analyze the state of aviation safety, the accident data for scheduled commercial air transport is categorized according to United Nations regions, based on the state of occurrence for each accident. The table on the next page provides insight into the state of aviation safety in different regions in the context of global outcomes. While Africa had

the highest regional accident rate, it also accounted for the lowest percentage of global traffic volume, about 3 per cent of scheduled commercial traffic. However, it should be noted that for the second consecutive year, none of the regional accident rates were greater than twice the global rate.





## Accident Statistics and Accident Rates: 2012

UN Region	Accidents	Accident rate <sup>2</sup>	Fatal accidents	Fatalities	% accidents	% fatal accidents	% fatalities
Africa	5	4.8	2	167	5%	22%	45%
Asia	23	2.7	3	161	23%	33%	43%
Europe	30	4.2	3	42	30%	33%	11%
Latin America and the Caribbean	12	3.8	1	2	12%	12%	1%
Northern America	29	2.8	0	0	30%	0%	0%
Oceania	0	0.0	0	0	0%	0%	0%
<b>World</b>	<b>99</b>	<b>3.2</b>	<b>9</b>	<b>372</b>			

The distribution of accidents, fatal accidents and fatalities by region is shown in the table above. While Africa accounted for only 5 per cent of total accidents, 45 per cent of all fatalities occurred in that region. Northern America experienced no

fatal accidents while no accidents at all occurred in Oceania in 2012. Please note that the UN regions used in this report are indicated in Appendix 2. A list of 2012 accidents can be found in Appendix 3.

<sup>2</sup> The accident rate is defined by the number of accidents per million departures



# GSIE Harmonized Accident Rate

## Creating a Global Safety Information Exchange

In the spirit of promoting aviation safety, the Department of Transportation of the United States, the Commission of the European Union, the International Air Transport Association (IATA) and ICAO signed a Memorandum of Understanding (MoU) on a Global Safety Information Exchange (GSIE) on 28 September 2010 during the 37th Session of the ICAO Assembly. The objective of the GSIE is to identify information that can be exchanged between the parties to enhance risk reduction activities in the area of aviation safety.

The MoU calls for the establishment of a Steering Group which is responsible for the development and the effective functioning of the GSIE. Led by ICAO, the Steering Group has held four meetings intended to coordinate the collection, analysis and exchange of aviation safety information among the members of the GSIE as well as to disseminate pertinent information to the global aviation community.

The GSIE developed a harmonized accident rate beginning in 2011. This was accomplished through close cooperation between ICAO and IATA to align accident definitions, criteria and analysis methods used to calculate the harmonized rate, which is considered a key safety indicator for commercial aviation operations worldwide.

This combined accident rate below is the result of a joint analysis of all accidents in 2012 taking into account the different accident criteria used by each organization (e.g. ICAO includes injury only accidents as per ICAO Annex 13, IATA includes non-scheduled flights).

The figure for the combined accidents includes accidents meeting the ICAO Annex 13 criteria for all typical commercial airline operations for scheduled and non-scheduled flights.



Through this collaborative effort, and using the common accident criteria, the GSIE harmonized accident rate for 2012 is:

# 2.4 accidents per million departures

This combined rate represents a 33 per cent improvement in industry performance over 2011. ICAO and IATA will continue their efforts through the GSIE to align analysis methodologies in order to achieve greater harmonization in accident reporting with all involved industry stakeholders.



# ICAO Safety Initiatives

## Safety Management

### New Annex 19 – Safety Management

On 25 February 2013, the ICAO Council adopted a new Annex to the Chicago Convention of International Civil Aviation dedicated to Safety Management. The creation of Annex 19 results from a recommendation of the High-level Safety Conference held in Montréal during 2010. This new Annex consolidates existing provisions related to State safety programmes and safety management systems into a single Annex. The development of this new Annex was accomplished over the past three years through close collaboration between ICAO, its Member States and international organizations.

The establishment of Annex 19 supports the continued evolution of a proactive strategy to improve safety. The foundation of this proactive safety strategy is based on the implementation of a State Safety Programme (SSP) that systematically addresses safety risks. Factors that affect the time required to establish an SSP include the complexity of the air transportation system as well as the maturity of the aviation safety oversight capabilities of the State.

The publication of the new Annex 19 will be accompanied by a roll-out plan including the publication of the third edition of ICAO Doc 9859, *Safety Management Manual* and an updated Safety Management website (<http://www.icao.int/Safety/SafetyManagement>). An update to the safety management training material is also in progress.

Annex 19 will become applicable on 14 November 2013.

## Aerodrome Safety

### Procedures for Air Navigation Services (PANS) – Aerodromes

Annex 14, Volume I – *Aerodrome Design and Operations*, contains SARPs that prescribe the physical characteristics and obstacle limitation surfaces to be provided at an aerodrome, including certain facilities and technical services. To complement the Annex to address many operational challenges that aerodromes face today, particularly where larger aircraft need to be accommodated and/or the development of the aerodrome is physically constrained, ICAO has developed draft procedures in a new PANS document entitled PANS-Aerodromes for the management of aerodrome operational issues. The work has been assisted by a PANS-Aerodromes Study Group (PASG) comprising representatives from 11 States and seven international organizations.

The first edition of PANS-Aerodromes, currently undergoing deliberations in the Air Navigation Commission, aims at assisting States and aerodrome operators to address priority issues identified by ICAO USOAP audits. It contains procedures on the certification of an aerodrome and the methodology to conduct an aerodrome compatibility study, incorporating safety assessments in order to manage changes to the operations of the aerodrome.

The second edition of PANS-Aerodromes, which has been initiated, will include procedures, processes and actions involved in the day-to-day operations of an aerodrome, such as airside inspections, obstacle control and management, wildlife hazard management and work in progress at aerodromes. Through implementing these procedures, States and aerodrome operators are expected to be able to further enhance aerodrome safety and efficiency.





## Medical and Health Safety

### **Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA)**

The aviation sector is familiar with preparedness planning as there are several situations that require emergency response planning e.g. accident or security incidents. However, planning for a public health emergency requires a different approach as it involves public health departments, rather than the emergency medical services that are more commonly involved in aviation events such as an accident. Aviation personnel should have a knowledge of the effect of public health events on aviation since both safety and efficiency, as well as the economies of States and private enterprises, can be adversely impacted.

Safety, security, operations and efficiency are potentially affected when large numbers of personnel are not available for work due to illness and the associated impacts of epidemics. ICAO also regards the protection of the health of passengers, staff and crew as integral to safe air travel, including the terminal and aircraft cabin. Those working in the aviation sector may be exposed to increased health risks if they come into contact with unwell travelers.

The economies of many States are heavily dependent on aviation, and a reduction in flights because of an actual (or perceived) health risk can cause widespread financial impacts. Aircraft and airport operators are particularly affected, along with supporting industries. During the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 and the H1N1 pandemic of 2009 passenger travel to Hong Kong and Mexico respectively fell by 80 per cent and 40 per cent. Such a reduction in traffic is difficult to sustain without significant financial repercussions.

In view of the importance of public health to the aviation sector, ICAO has been collaborating with the World Health Organization (WHO), International Air Transport Association (IATA), Airports Council International (ACI) and others to develop a harmonized approach. All four organizations have relevant documentation on their websites (see [www.capsca.org](http://www.capsca.org) for ICAO documentation and links to other sites). For WHO, the International Health Regulations (IHR, 2005), which are binding on States, have many articles relating to “points of entry” (airports) and “conveyance operators” (aircraft operators), and ICAO has amended a number of Annexes in line with the requirements of the IHR.

To assist States with the implementation of these changes in the Annexes, which from 2013 will be audited as part of the Universal Safety Oversight Audit Programme, ICAO established CAPSCA, consisting of five regional projects: Asia-Pacific; Africa; Americas; Middle East; and Europe. Each region hosts an annual regional seminar and offers Assistance Visits to States, when a gap analysis is carried out and a confidential report provided. Ninety ICAO Member States have joined CAPSCA and over 50 Assistance Visits have been carried out. Until the end of 2012, such activities were funded primarily by the UN Central Fund for Influenza Action (CFIA), a fund administered by the UN Development Programme, but this fund was ended in December 2012. Nevertheless, other sources of funding are being sought and non-member States are encouraged to join CAPSCA and request an Assistance Visit, in preparation for the next public health emergency that affects the aviation sector.

### **Upper Age Limit for Pilots**

The current upper age limit for pilots engaged in international commercial air transport operations requiring two pilots, is 65 years. This limit applies to both pilots-in-command (PICs) and co-pilots, as a Standard for PICs and a Recommended Practice for co-pilots (Annex 1, paragraph 2.1.10). However, if one pilot is 60 years or more the other must be under 60 (colloquially known as the “one over one under” provision).

When the limit was increased in 2006 from 60 to 65 years, the ICAO Council and Air Navigation Commission (ANC) requested a review after five years of experience had been gained. A questionnaire was distributed to States and international organizations in 2012 and the results were considered by the ANC. This resulted in a new proposal which, if adopted, will permit two pilots aged 60-64 years to be simultaneously at the controls, and change the age limit for co-pilots from a Recommended Practice to a Standard. A State letter will be distributed in the first half of 2013 with a request for comments on the new proposal and if new provisions are agreed they could become applicable as early as November 2014.





## Flight Operations

### Loss of Control In-flight

An accident caused by the loss of control of an aircraft in-flight, commonly known as a LOC-I accident, is rare. However, over the last eight years, LOC-I accidents have resulted in more fatalities in scheduled commercial operations than any other type, including runway incursions, runway excursions and controlled flight into terrain. Therefore, ICAO will be implementing a number of strategies in 2013 to assist the community in addressing issues surrounding LOC-I accidents.

ICAO collaborated with numerous State and industry partners to develop a training manual on Upset Avoidance and Recovery. The manual will be finalized during 2013 and is also intended to support implementation of new ICAO Standards for upset and recovery training to be proposed by the end of 2013. ICAO and its partners are also actively examining the human performance issues that are associated with this type of accident. The manual on Upset Avoidance and Recovery will be enriched with additional guidance once these materials are available.

ICAO will host a Loss of Control In-flight Symposium on 20–22 May, 2014 with the aim of providing a variety of tools to pilots, operators, regulators and training organizations in a cohesive package. This event will showcase work being undertaken throughout the industry that addresses individual and crew strategies, operational countermeasures, as well as training and educational approaches to prevent and recover from a loss of control in-flight.

### Recurrent Simulator Training

Recurrent simulator training for airline pilots has remained relatively unchanged since the advent of flight simulators. However, airplanes have evolved substantially over the years from the first generation of jet airplanes (e.g. Boeing 707s and DC-8s) to a generation of highly sophisticated and reliable fly-by-wire aircraft. Yet, in almost all States, recurrent simulator training has not evolved at the same rate as aircraft technology. Working in cooperation with IATA's Training and Qualification Initiative and other industry partners, ICAO completed the provisions that support a new approach to recurrent simulator training called "Evidence Based Training (EBT)". To support the implementation of EBT, data was gathered concerning the training needs for each identified generation of airplanes and model training programmes were developed that address these specific needs. The new provisions will become applicable in mid-2013 and represents a major paradigm shift in flight crew training.

### Extended Diversion Time Operations

Today's long-range airliners frequently fly routes that take them many hours away from a usable airport. While the requirements for two-engine airplanes to fly extended diversion routes (ETOPS) are robust and long established, there was previously no ICAO requirement for three and four engine airplanes. During 2012, ICAO completed the development of new Standards that cover all "Extended Diversion Time Operations". This major development was the result of a strong partnership between regulators and the industry so that genuine risks were identified and provisions developed to mitigate these risks.

### Fuel

The ICAO provisions stipulating the amount of fuel to be carried on flights have not been updated since 1958. At the same time, current airplane, meteorological and navigation technologies permit airlines to more accurately predict the amount of fuel they will need to fly any given route. Several States have updated their rules concerning fuel carriage and their airlines have realized significant fuel savings that also benefit the global environment through reduced emissions. During 2012, ICAO updated the International Standards concerning fuel carriage utilizing the best practices of States and the industry. To support the safest implementation of these new Standards, ICAO also updated the phraseology used by pilots to communicate the amount of fuel they have on board to air traffic controllers.

### Cabin Safety

ICAO also expanded its work in the area of cabin safety and, for the first time, established a dedicated cabin safety programme with a major update to the ICAO Cabin Crew Safety Training Manual as its first deliverable. This work was advanced through a joint government/industry working group comprising civil aviation authorities, airlines, manufacturers and international organizations. The manual was expanded considerably in scope to cover such important areas as training facilities, representative training devices, instructor qualifications, cabin crew in-charge specific training and management of on board medical events.



## Volcanic Activity and Ash

The eruption of Iceland's Eyjafjallajökull volcano in 2010 demonstrated the vulnerability of aviation to volcanic eruptions. More than 100,000 flights were cancelled and over US\$<sup>3</sup> billion in global GDP was lost due to the largest shutdown of European air traffic since World War II. IATA estimated that its airlines alone lost US\$1.7 billion due to this single volcanic event.

Subsequently, programmes were undertaken by ICAO and its partners to draw lessons from Eyjafjallajökull. One particular initiative was the establishment by ICAO of an International Volcanic Ash Task Force ([www.icao.int/safety/meteorology/ivatf/](http://www.icao.int/safety/meteorology/ivatf/)). Working in a complementary capacity to the International Airways Volcano Watch Operations Group, which administers the operation and the development of ICAO's International Airways Volcano Watch (see next page), the task force was mandated to develop a global safety risk management framework that would make it possible to determine safe levels of operations in airspace contaminated by volcanic ash.

Over a period of 24 months until June 2012, the task force worked through four distinct but interrelated subgroups: airworthiness and aircraft operations, atmospheric sciences, air traffic management, and international airways volcano watch coordination.

One of the main results was the 2012 publication of a new ICAO Manual on *Flight Safety and Volcanic Ash* (Doc 9974); a co-branded industry publication by ACI, CANSO, IATA, ICAO, ICCAIA, IFALPA and IFATCA. The manual provides guidance where volcanic ash may be a hazard for flight operations, with the guiding principle being that such operations should use a risk management approach.

The task force advanced the understanding of volcanic eruptions and their impacts on flight operations, volcanic ash cloud observation and forecasting, and ATM contingency planning. Global ICAO provisions including the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444) and guidance material including the *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* (Doc 9691) and the *Handbook on the International Airways Volcano Watch – Operational Procedures and Contact List* (Doc 9766) have been or will be amended in light of the outcomes of the task force. The task force developed recommendations to assist the pursuit of further progress relating to aircraft occupant susceptibility to volcanic gases and airframe and engine susceptibility to volcanic ash.

<sup>3</sup> Oxford Economics





### The International Airways Volcano Watch

The International Airways Volcano Watch (IAVW) was established by ICAO in coordination with the World Meteorological Organization (WMO) in 1987. It helps aviation mitigate the risks posed by volcanic eruptions and ash on safe and efficient aircraft operations.

Through a global, collaborative approach led by ICAO, the IAVW has matured into a comprehensive worldwide monitoring and notification system consisting of volcanological observatories, meteorological offices (including volcanic ash advisory centres), air traffic service units and users.

ICAO provisions relating to the IAVW ensure the necessary monitoring of volcanoes, the observation, reporting and predicted movement of volcanic ash in the atmosphere, the issuing of information to aircraft and to aerodromes warning of the presence or expected presence of volcanic ash, information regarding the closure of air routes and aerodromes, the activation of alternative contingency routes, and the reporting by pilots to air traffic service units of any observed volcanic activity or encounters with a volcanic ash cloud.







## Focus on Africa

Traffic growth projections in Africa are promising. Forecasts indicate an annual growth rate for international traffic of 6.1 per cent over the five-year period from 2010–2015. A solid strategic planning process for safe and efficient operations, both nationally and regionally, is necessary to accommodate the expected traffic growth. Such a process will benefit from measurable targets and involve the active participation of States, international and regional organizations, industry partners, development banks and investors. The African community has shown its leadership towards this end. During the Ministerial Conference on Aviation Safety in Africa held in Abuja in July 2012, specific measurable targets were adopted, including the resolution of Significant Safety Concerns (SSCs) as a matter of urgency and a progressive increase of the effective implementation of applicable ICAO Standards and Recommended Practices (SARPs) identified by the Universal Safety Oversight Audit Programme (USOAP) to no less than 60 per cent.

To attain the agreed safety targets and achieve long-lasting improvements, the cooperation of all stakeholders will be required. Some efforts in this regard being implemented by ICAO in coordination with aviation safety partners are the Comprehensive Regional Implementation Plan for Aviation Safety in Africa (AFI Plan), the development of tailored ICAO Plans of Action for States with SSCs or serious safety deficiencies, and the Cooperative Inspectorate Scheme for the African and Indian Ocean Region (AFI-CIS).

These efforts have already shown tangible results in this region. Following the validation of corrective actions or mitigating measures implemented, Mali, Mozambique, Rwanda, Seychelles, Sudan and Zambia have successfully resolved the SSCs identified. Mauritania and Sudan have met the target of 60 per cent of effective implementation of safety-related SARPs and significant improvements were also noted by the USOAP in Benin and Madagascar. ICAO will continue to provide assistance and coordinate the efforts of the international aviation community to support States willing to improve their safety oversight capabilities.





## Appendix 1:

# Analysis of Accidents–Scheduled Commercial Air Transport

This Appendix provides a detailed analysis of accidents occurring during 2012, as well as a review of accidents over the past seven years.

The data used in the analyses are for operations involving aircraft providing scheduled commercial air transport having a maximum take-off weight exceeding 2250 kg.

## High-risk Accident Occurrence Categories

Based on an analysis of accident data covering the 2006–2011 time period, ICAO identified three high-risk accident occurrence categories:

- runway safety-related events<sup>4</sup>
- loss of control in-flight (LOC-I)
- controlled flight into terrain (CFIT)

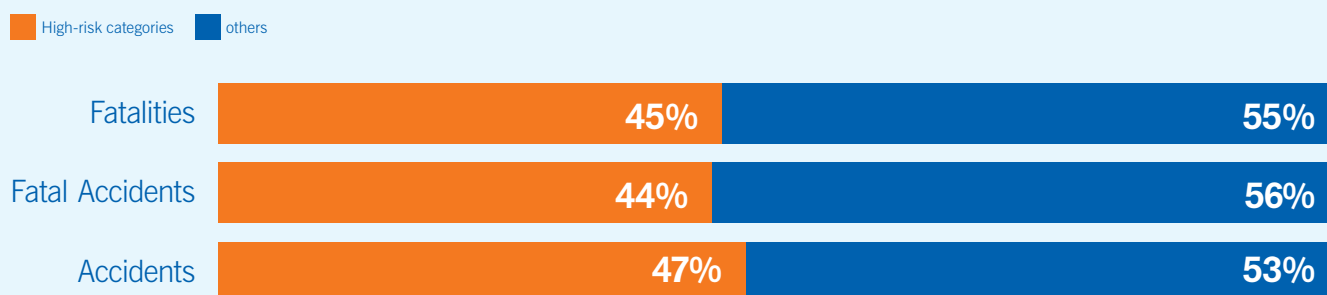
As indicated in the first chart below, these three categories represented 63 per cent of the total number of accidents, 69 per cent of fatal accidents and 66 per cent of all fatalities between 2006 and 2011.

### Distribution of High-risk Accidents: 2006–2011



In 2012, high-risk accident categories accounted for less than 50 per cent of accidents, fatal accidents and fatalities.

### Distribution of High-risk Accidents: 2012



<sup>4</sup> Runway safety-related events include the following ICAO accident occurrence categories: Abnormal Runway Contact, Bird Strike, Ground Collision, Ground Handling, Runway Excursion, Runway Incursion, Loss of Control on Ground, Collision with Obstacle(s), Undershoot / Overshoot, Aerodrome

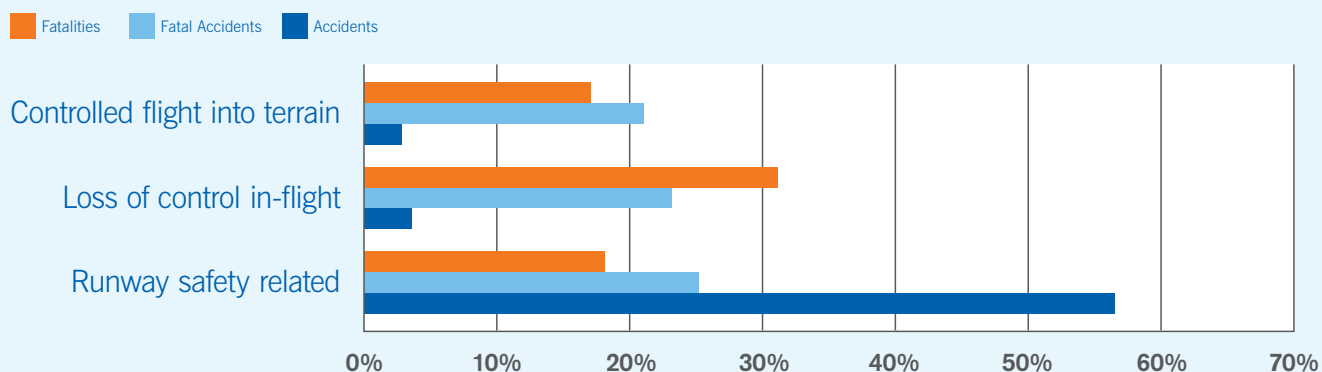




The following charts provide a comparison of the distribution of accidents, fatal accidents and fatalities related to the three high-risk occurrence categories during the baseline 2006–2011

period and 2012. Runway safety-related accidents accounted for the majority of all accidents during the 2006–2011 period, as well as 18 per cent of all fatalities.

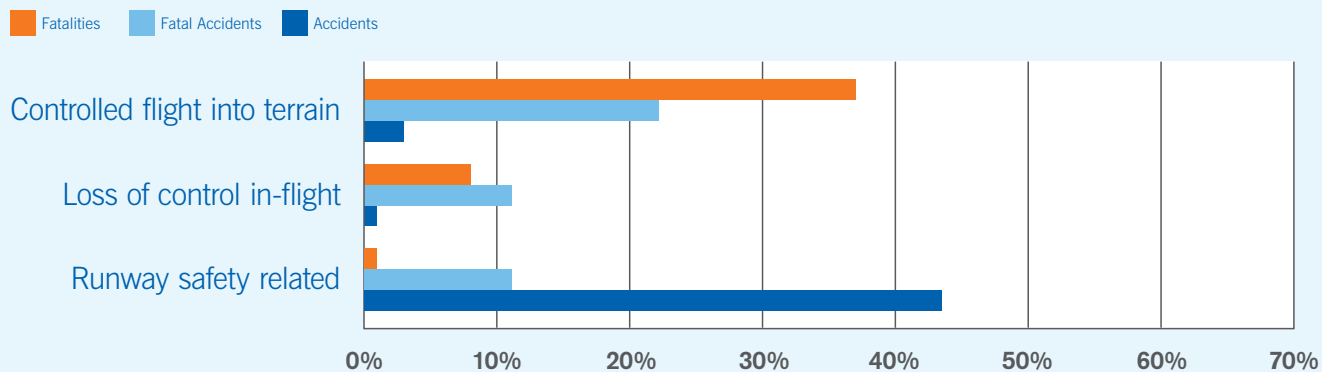
### Percentage of All Accidents: 2006–2011



Notable observations from 2012 accidents include:

- The percentage of runway safety-related accidents was reduced significantly, representing 43 per cent of all accidents, accounting for only 11 per cent of all fatal accidents and 1 per cent of all related fatalities—a major decrease from the 2006–2011 baseline period.
- While the loss of control in-flight occurrence category represented only 1 per cent of all accidents, this category is of significant concern as it accounts for 11 per cent of all fatal accidents and 8 per cent of all fatalities.
- Accidents related to controlled flight into terrain accounted for only 3 per cent of all accidents but represented 22 per cent of all fatal accidents and 37 per cent of fatalities (a major increase from the baseline).

### Percentage of All Accidents: 2012

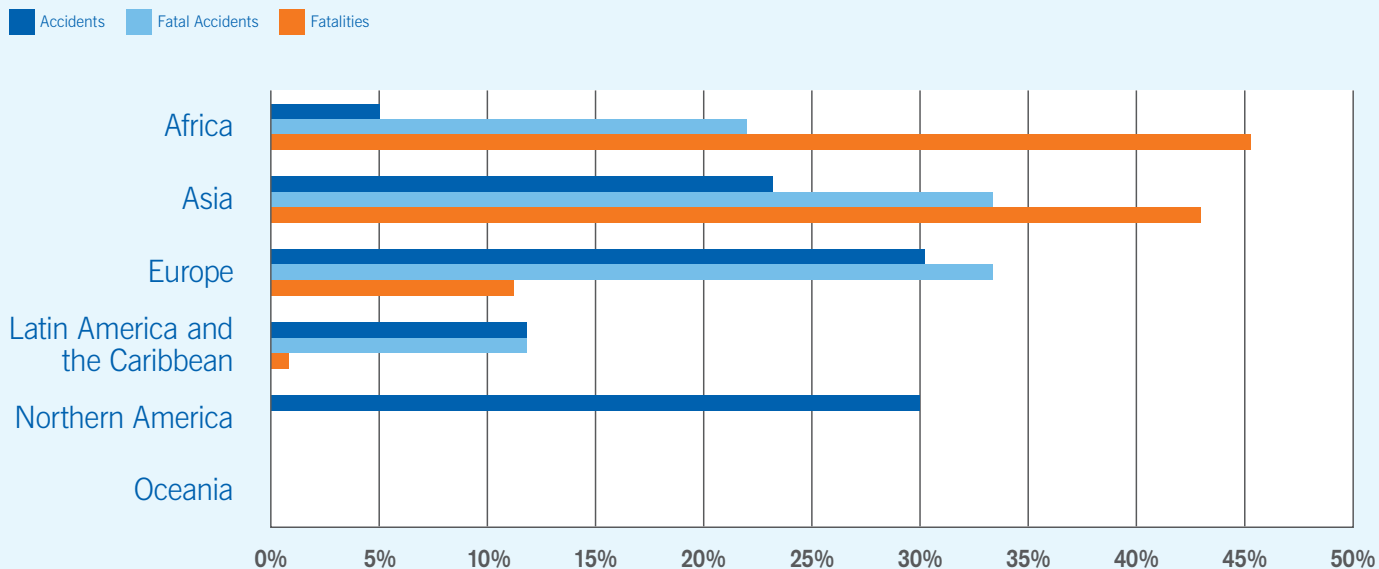




## 2012 Accidents by UN Region

The chart and the table below indicate the percentage of accidents and related fatalities attributable to the region in which they occurred.

### Accidents by Region of Occurrence: 2012



2012	Africa	Asia	Europe	Latin America and the Caribbean	Northern America	Oceania	Total
Accidents	5	23	30	12	29	0	99
Fatal Accidents	2	3	3	1	0	0	9
Fatalities	167	161	42	2	0	0	372

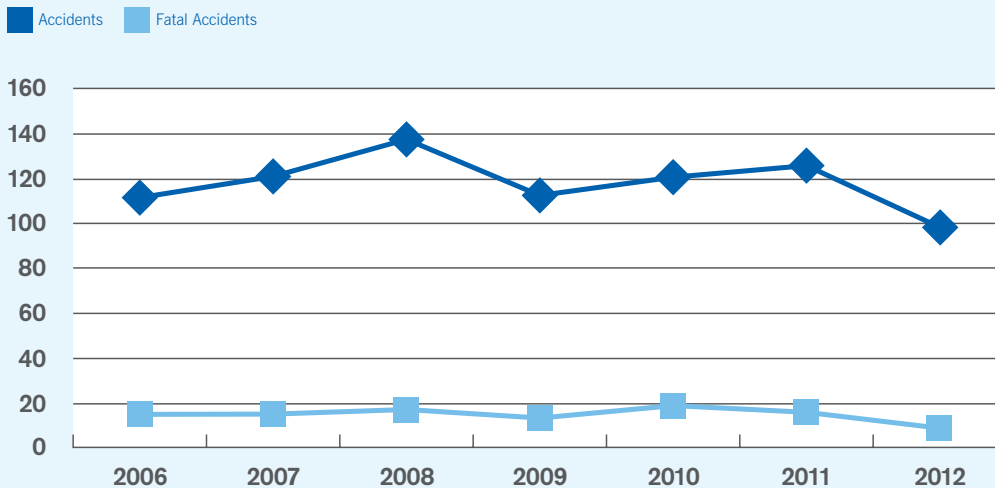
Please note that the UN regions used in this report are indicated in Appendix 2.



## 2006–2012 Accident Trends

The chart below shows the number of total and fatal accidents on commercial scheduled flights during the 2006–2012 period.

### Accident Trends: 2006–2012

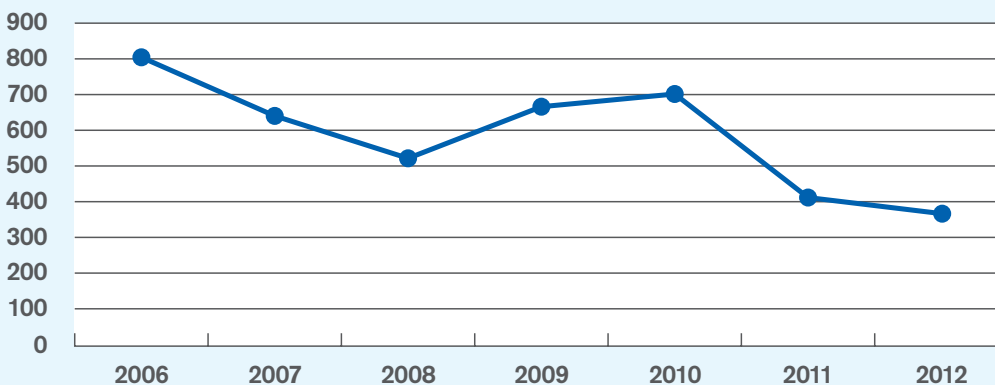


The number of accidents experienced annually was generally stable from 2006 to 2011, varying between 110 and 120 per year, resulting in an equivalently stable accident rate of approximately 4 accidents per million departures until 2011. There was a significant decrease in these figures in 2012.

2012 experienced a 21 per cent year-over-year decrease in the total number of accidents in scheduled commercial air transport compared to 2011, while traffic increased marginally (approximately 1 per cent) during the same period. As a result, the 2012 accident rate decreased to 3.2 accidents per million departures.

The chart below shows the number of fatalities associated with the above-mentioned fatal accidents.

### Fatality Trends: 2006–2012





## Appendix 2: UN Regions

The assignment of countries or areas to specific groupings is for statistical convenience and does not imply any assumption

regarding political or other affiliation of countries or territories by the United Nations.



### Africa

- Algeria
- Angola
- Benin
- Botswana
- Burkina Faso
- Burundi
- Cameroon
- Cape Verde
- Central African Republic
- Chad
- Comoros
- Congo
- Cote d'Ivoire

### Asia

- Afghanistan
- Armenia
- Azerbaijan
- Bahrain
- Bangladesh
- Bhutan
- Brunei Darussalam
- Cambodia
- China
- China, Hong Kong Special Administrative Region
- China, Macao Special Administrative Region

### Europe

- Åland Islands
- Albania
- Andorra
- Austria
- Belarus
- Belgium
- Bosnia and Herzegovina
- Bulgaria
- Channel Islands
- Croatia
- Czech Republic
- Denmark
- Estonia

### Latin America and the Caribbean

- Anguilla
- Antigua and Barbuda
- Argentina
- Aruba
- Bahamas
- Barbados
- Belize
- Bolivia (Plurinational State of)
- Bonaire, Saint Eustatius and Saba
- Brazil
- British Virgin Islands
- Cayman Islands

### Northern America

- Bermuda
- Canada
- Greenland
- Saint Pierre and Miquelon
- United States of America

### Oceania

- American Samoa
- Australia
- Cook Islands
- Fiji
- French Polynesia
- Guam





## Appendix 2: UN Regions

Africa	Asia	Europe	Latin America and the Caribbean	Oceania
Democratic Republic of the Congo	Cyprus	Faeroe Islands	Chile	Kiribati
Djibouti	Democratic People's Republic of Korea	Finland	Colombia	Marshall Islands
Egypt	Georgia	France	Costa Rica	Micronesia (Federated States of)
Equatorial Guinea	India	Germany	Cuba	Nauru
Eritrea	Indonesia	Gibraltar	Curaçao	New Caledonia
Ethiopia	Iran (Islamic Republic of)	Greece	Dominica	New Zealand
Gabon	Iraq	Guernsey	Dominican Republic	Niue
Gambia	Israel	Holy See	Ecuador	Norfolk Island
Ghana	Japan	Hungary	El Salvador	Northern Mariana Islands
Guinea	Jordan	Iceland	Falkland Islands (Malvinas)	Palau
Guinea-Bissau	Kazakhstan	Ireland	French Guiana	Papua New Guinea
Kenya	Kuwait	Isle of Man	Grenada	Pitcairn
Lesotho	Kyrgyzstan	Italy	Guadeloupe	Samoa
Liberia	Lao People's Democratic Republic	Jersey	Guatemala	Solomon Islands
Libya	Lebanon	Latvia	Guyana	Tokelau
Madagascar	Malaysia	Liechtenstein	Haiti	Tonga
Malawi	Maldives	Lithuania	Honduras	Tuvalu
Mali	Mongolia	Luxembourg	Jamaica	Vanuatu
Mauritania	Myanmar	Malta	Martinique	Wallis and Futuna Islands
Mauritius	Nepal	Monaco	Mexico	
Mayotte	Oman	Montenegro	Montserrat	
Morocco	Pakistan	Netherlands	Nicaragua	
Mozambique	Philippines	Norway	Panama	
Namibia	Qatar	Poland	Paraguay	
Niger	Republic of Korea	Portugal	Peru	
Nigeria	Saudi Arabia	Republic of Moldova	Puerto Rico	
Réunion	Singapore	Romania	Saint Kitts and Nevis	
Rwanda	Sri Lanka	Russian Federation	Saint Lucia	
Saint Helena	State of Palestine	San Marino	Saint Martin (French part)	
Sao Tome and Principe	Syrian Arab Republic	Sark	Saint Martin (French part)	
Senegal	Tajikistan	Serbia	Saint Vincent and the Grenadines	
Seychelles	Thailand	Slovakia	Saint-Barthélemy	
Sierra Leone	Timor-Leste	Slovenia	Sint Maarten (Dutch part)	
Somalia	Turkey	Spain	Suriname	
South Africa	Turkmenistan	Svalbard and Jan Mayen Islands	Trinidad and Tobago	
South Sudan	United Arab Emirates	Sweden	Turks and Caicos Islands	
Sudan	Uzbekistan	Switzerland	United States	
Swaziland	Viet Nam	The former Yugoslav Republic of Macedonia	Virgin Islands	
Togo	Yemen	Ukraine	Uruguay	
Tunisia		United Kingdom of Great Britain and Northern Ireland	Venezuela (Bolivarian Republic of)	
Uganda				
United Republic of Tanzania				
Western Sahara				
Zambia				
Zimbabwe				



## Appendix 3:

# Table of Scheduled Commercial Accidents for 2012

Date	AC Type	State of Occurrence	UN Region	Fatalities	Accident Category
2012-01-04	McDonnell Douglas MD-80	Venezuela (Bolivarian Republic of)	Latin America and the Caribbean		RS
2012-01-06	ATR 42	Brazil	Latin America and the Caribbean		OTH
2012-01-07	Xian MA-60	Indonesia	Asia		RS
2012-01-09	Xian MA-60	Bolivia	Latin America and the Caribbean		SCF
2012-01-16	De Havilland DHC8	United Kingdom	Europe		RS
2012-01-16	De Havilland DHC8	United States	Northern America		RS
2012-01-24	McDonnell Douglas MD-80	Afghanistan	Asia		UNK
2012-02-02	Antonov An-124	United States	Northern America		TURB
2012-02-03	Bombardier CL-600	United States of America	Northern America		RS
2012-02-07	Airbus A340	Brazil	Latin America and the Caribbean		TURB
2012-02-09	Boeing 737	Venezuela (Bolivarian Republic of)	Latin America and the Caribbean		OTH
2012-02-11	Boeing 737	Germany	Europe		RS
2012-02-12	De Havilland DHC8	Canada	Northern America		RS
2012-02-13	Saab 2000	Romania	Europe		RS
2012-02-14	Airbus A319	United Kingdom	Europe		RS
2012-02-15	Bombardier CL-600	Germany	Europe		UNK
2012-02-17	ATR 72-500	Myanmar	Asia		RS
2012-02-18	Boeing 737	United States	Northern America		TURB
2012-02-23	Boeing 737	United States	Northern America		TURB
2012-02-24	Airbus A321	United States	Northern America		TURB
2012-02-26	Boeing 767	United States	Northern America		TURB
2012-03-08	British Aerospace Jetstream 31	United Kingdom	Europe		SCF
2012-03-09	ATR 42	Pakistan	Asia		SCF
2012-03-17	Raytheon Beechcraft 1900	Canada	Northern America		RS
2012-03-20	Boeing 737	United States	Northern America		TURB
2012-03-29	Boeing 737	Norway	Europe		UNK





## Appendix 3: Table of Scheduled Commercial Accidents for 2012

Date	AC Type	State of Occurrence	UN Region	Fatalities	Accident Category
2012-03-29	Fokker 50	Sudan	Africa		RS
2012-03-30	Fokker 50	Mongolia	Asia		RS
2012-03-31	Boeing 777	Japan	Asia		RS
2012-04-02	ATR 72	Russian Federation	Europe	31	LOC-I
2012-04-07	De Havilland DHC8	United States	Northern America		RS
2012-04-09	De Havilland DHC8	United Republic of Tanzania	Africa		RS
2012-04-14	Airbus A300	United Kingdom	Europe		UNK
2012-04-14	Boeing 737	France	Europe		RS
2012-04-14	Airbus A319	United States	Northern America		TURB
2012-04-19	BAe-146	Sweden	Europe		SCF
2012-04-20	Boeing 737	Pakistan	Asia	127	CFIT
2012-04-22	Boeing 737	Pakistan	Asia		SCF
2012-05-02	Raytheon Beechcraft 1900	Canada	Northern America		RS
2012-05-08	Boeing 737	Sweden	Europe		OTH
2012-05-10	Airbus A319	United States	Northern America		TURB
2012-05-11	Convair CV-440	Guatemala	Latin America and the Caribbean		RS
2012-05-13	ATR 72	Ireland	Europe		RS
2012-05-14	Dornier 228	Nepal	Asia	15	UNK
2012-05-14	Airbus A319	United Kingdom	Europe		RS
2012-05-17	ATR 72	Germany	Europe		SCF
2012-05-26	De Havilland DHC8	United Kingdom	Europe		RS
2012-05-28	Saab 2000	Italy	Europe		SCF
2012-05-29	British Aerospace Jetstream 31	United Kingdom	Europe		SCF
2012-05-30	Boeing 747	United States	Northern America		RS
2012-05-30	Airbus A320	United Kingdom	Europe		RS
2012-05-30	Embraer ERJ-135	United States	Northern America		RS
2012-06-01	Boeing 737	Indonesia	Asia		RS
2012-06-02	Boeing 727-200	Ghana	Africa		UNK
2012-06-03	McDonnell Douglas MD-83	Nigeria	Africa	163	UNK
2012-06-06	Fairchild Swearingen SA227 Metro III	Uruguay	Latin America and the Caribbean	2	UNK
2012-06-07	Boeing 757	United States	Northern America		TURB



## Appendix 3: Table of Scheduled Commercial Accidents for 2012

Date	AC Type	State of Occurrence	UN Region	Fatalities	Accident Category
2012-06-10	Airbus A320	United States	Northern America		TURB
2012-06-16	ATR 42	United Kingdom	Europe		RS
2012-06-20	Boeing 767	Japan	Asia		RS
2012-07-05	Boeing 737	Germany	Europe		TURB
2012-07-05	Boeing 747	Japan	Asia		TURB
2012-07-05	Boeing 777	Japan	Asia		TURB
2012-07-18	Boeing 707	Chile	Latin America and the Caribbean		RS
2012-07-18	Bombardier CRJ	United States	Northern America		SCF
2012-08-05	Embraer EMB-170	United States	Northern America		TURB
2012-08-06	Boeing 777	Chile	Latin America and the Caribbean		TURB
2012-08-10	De Havilland DHC8	United States	Northern America		RS
2012-08-21	Airbus A330	Japan	Asia		TURB
2012-08-22	Let 410	Kenya	Africa	4	UNK
2012-08-31	ATR 42	Pakistan	Asia		RS
2012-09-06	Bombardier CRJ	Spain	Europe		RS
2012-09-07	Airbus A320	Ireland	Europe		OTH
2012-09-10	De Havilland DHC8	Canada	Northern America		RS
2012-09-12	Antonov AN-26	Russian Federation	Europe	10	RS
2012-09-12	Antonov AN-28	Russian Federation	Europe		CFIT
2012-09-13	Boeing 767	Brazil	Latin America and the Caribbean		SCF
2012-09-18	Airbus A330	United States	Northern America		TURB
2012-09-20	Airbus A320	Syrian Arab Republic	Asia		OTH
2012-09-28	Dornier 228	Nepal	Asia	19	SCF
2012-09-30	Boeing 777	Italy	Europe		RS
2012-10-04	Boeing 717	United States	Northern America		RS
2012-10-13	McDonnell Douglas MD-11	Brazil	Latin America and the Caribbean		SCF
2012-10-14	Boeing 737	Turkey	Asia		F-NI
2012-10-15	De Havilland DHC8	Canada	Northern America		RS
2012-10-16	Bombardier CRJ	France	Europe		RS
2012-10-16	Boeing 737	United States	Northern America		OTH



## Appendix 3: Table of Scheduled Commercial Accidents for 2012

Date	AC Type	State of Occurrence	UN Region	Fatalities	Accident Category
2012-10-19	Boeing B737	United Kingdom	Europe		F-NI
2012-10-19	Boeing 737	Indonesia	Asia		RS
2012-10-23	Shorts 360	Israel	Asia		SCF
2012-11-11	Airbus A320	Italy	Europe	1	RS
2012-11-16	Airbus A300	Slovakia	Europe		SCF
2012-11-26	Boeing 767	Japan	Asia		TURB
2012-12-05	Bombardier CRJ	United States	Northern America		OTH
2012-12-14	ATR-72	Indonesia	Asia		RS
2012-12-25	Fokker 100	Myanmar	Asia		CFIT
2012-12-26	McDonnell Douglas MD-11	United States	Northern America		RS
2012-12-28	Embraer ERJ-145	United States	Northern America		OTH
2012-12-31	British Aerospace Jetstream 31	Honduras	Latin America and the Caribbean		RS

## Accident Categories

Code	Description
CFIT	Controlled flight into/towards terrain
RS	Runway safety-related
LOC-I	Loss of control in-flight
F-NI	Fire – non-impact
TURB	Turbulence encounter
OTH	Other
UNK	Unknown
SCF	System component failure



## International Civil Aviation Organization (ICAO)

999 University Street, Montréal, Quebec • Canada • H3C 5H7

Tel.: +1 514-954-8219 • Fax: +1 514-954-6077 • E-mail: [icao@icao.int](mailto:icao@icao.int)

[www.icao.int](http://www.icao.int)

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