

THIRD EDITION

THE DEFINITIVE HANDBOOK OF

**BUSINESS**  
**CONTINUITY**  
**MANAGEMENT**



EDITED BY  
**ANDREW HILES**



The Definitive  
Handbook of  
Business Continuity  
Management

Third Edition

## *About the Editor*

**Andrew Hiles** is a founding Director of Kingswell International, a global consultancy in Enterprise Risk Management ([www.kingswell.net](http://www.kingswell.net)). He has over 30 years' international experience of Crisis and Business Continuity Management, having conducted projects in some 60 countries. In 1988 he was founder and, for some 15 years, Chairman of *Survive*, the first international user group for Business Continuity professionals, which was the incubator from which the Business Continuity Institute grew. He was founding Director and first Chairman of the Business Continuity Institute (Fellow #1) and was also a founding director of the World Food Safety Organization. He became a member of the British Computer Society and of the Institute for Data Processing Management in 1983. Andrew is a Freeman of the City of London.

Andrew was a member of the committee establishing the British Standards Institution BSI 7799 Information Security standard (which has now evolved into ISO 27001) and contributed to BS 25999. He has been a member of the advisory board of the Continuity Forum and an editorial board advisor to *Contingency Planning and Management* magazine (*CPM*) and to *Continuity Central*. He is a mentor under the BCI mentoring scheme.

He is the author of *Business Continuity - Best Practice* and *Enterprise Risk Assessment - Best Practices*, both published by Rothstein Associates ([www.rothstein.com](http://www.rothstein.com)), and the *Guide to Risk Management* published by the Institute of Chartered Accountants of England and Wales. Andrew co-edited the first edition of this book and edited the second edition; he also contributed to the *Guide to Business Continuity Management*, published for the Confederation of British Industry by Caspian Publishing and to *Business Continuity Management*, published by the UK Institute of Directors and the Department of Trade & Industry. His books are required or referenced reading at some 30 universities around the world. His software tool, BC Framework™, is a top-selling toolkit of models, templates, forms, checklists, guides and presentations accompanied by a step-by-step How to guide to BCM. He has over 300 published articles on Business Continuity to his credit.

Andrew has been a speaker or chair at many international conferences and has delivered over 500 successful public and in-company workshops and training courses, as well as broadcasting on television, radio, webinars and podcasts.

He developed the Business Risk Management course for the 330 000 members of the American Institute of Certified Public Accountants and Business Continuity workshops for the UK Office of Government Commerce (the UK Cabinet Office's advisory service for the public sector). He presents training in the Americas, Eastern, Central and Western Europe, Russia, the Middle East, Africa, China, the Indian subcontinent, Australia and the Pacific Rim for the world's leading training companies.

In 1997 Andrew was presented with the Western Press Award for services to business; in 1999 he was nominated for Lifetime Achievement in BC at the first BC Awards ceremony in the UK. In 2004 Andrew was inducted into the prestigious Business Continuity Hall of Fame by *CPM* magazine in Washington DC. Since then, Andrew has continued to provide consulting and training to blue chip clients around the world and written seminal papers on BC and related topics.

# The Definitive Handbook of Business Continuity Management

## Third Edition

Edited by

**Andrew Hiles FBCI**

*Director, Kingswell International Limited*



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*This book is dedicated to Murphy, an eternal optimist.*





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# Foreword

Lyndon Bird, FBCI – UK

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[www.thebci.org](http://www.thebci.org)

I am very pleased to be able to provide the foreword for *The Definitive Handbook of Business Continuity Management*. As International Technical Director of The Business Continuity Institute (BCI) I am delighted that the discipline of Business Continuity Management (BCM) is starting to be recognized internationally as a major contributor to both business resilience and ultimately improved performance.

The first edition succeeded in getting many of the world's leading experts together in one publication. It provided a wide range of views and challenging opinions. There were few people who agreed with everything in every article, but all were thought provoking. The second edition carried on this approach but as the subject had matured there was a more definitive feel to the contributions. However, despite not setting out to be a textbook it has, in fact, been taken on board by many universities as their subject matter book of choice. I think this says a lot about the quality of the authors selected and also the major contribution by the editor of his own thoughts and perceptions. The BCI continues to talk about promoting 'the art and science of BCM on a worldwide basis'. This might seem a little vague, but all serious subjects have a diverse range of professional opinion, each supported by highly committed, intelligent and articulate advocates. This should be seen as the strength of the discipline, not a weakness.

Business Continuity has grown up since the first edition. It now has its own formal standards, its own institutions and its own influence on governments. It has a global reach and a resonance that is understood from Europe to America, from Asia to Africa. Its principles work for multinational corporations and small businesses, for public as well as private sector organizations and in all geographical and political terrains. Perhaps most of all it has its personalities, thought leaders and an abundance of passionate advocates on the subject - many of whom are represented in this book.

I have known Andrew Hiles since around 1988, when we shared a vision of what the embryonic Disaster Recovery industry could become. I suspect that for both of us it has exceeded our expectations and this has much to do with changes we both strongly promoted. In particular the change of emphasis from

IT Disaster Recovery to full Business Continuity in the early 1990s was crucial to its development. Along that route The Business Continuity Institute was formed in 1994 and has gone from strength to strength.<sup>1</sup> From a small UK-based group of 'believers' (which included both Andrew and myself) it is now arguably the most influential body in Business Continuity globally. With over 5000 members in 90 countries and a growing list of international chapters, the BCI is increasingly setting the agenda for 'state-of-the-art' BCM ideas, concepts and practical applications.

Many of the contributors to this book are Members of the BCI and the experience and wisdom they can bring to the subject is immense. This is a book that no serious BCM practitioner can afford to ignore, and newcomers to the subject will find no better way of gaining trusted knowledge quickly.

<sup>1</sup> The BCI evolved from a Certification Special Interest Group within *Survive*, the first international user group for BC professionals, and was funded in its formative years by *Survive* before being handed over to its membership - *Editor*

# Preface

David Honour

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David is editor, <http://www.continuitycentral.com>, the global news, jobs and information portal for the Business Continuity profession.

Since the second edition of *The Definitive Handbook of Business Continuity Management* was published in 2007 the world has gone through a period of major turbulence, with the 'credit crunch' leading to a global financial sector crisis and subsequent recession. These events resulted in greater scrutiny of financial sector regulation and calls for better Enterprise Risk Management (ERM). Focus has now turned to how ERM and Business Continuity Management relate to each other and what convergence should be seen between these two disciplines.

The other major global crisis which occurred since 2007 was the declaration in April 2009 that the H1N1 'Swine Flu' virus had reached pandemic status. The previous couple of years had seen much contingency planning in this area, and every Business Continuity Plan worth its salt included pandemic planning provisions. The pandemic declaration saw many of these plans being invoked. In hindsight the linking of plans with the World Health Organization's pandemic warning levels may have been too prescriptive, resulting in what many saw as overreaction and hype. However, whatever criticism they may have faced, Business Continuity managers shouldn't lose sight of the fact that the pandemic virus could have been much more virulent. And the next might be. There is no room for complacency where pandemic planning is concerned; and there is no guarantee that it will be twenty years before the next pandemic outbreak.

Other notable events which have raised the profile of Business Continuity Management since 2007 include:

- severe summer and autumnal storms causing major floods across Europe;
- winter snow events causing prolonged disruption in the US, the UK and western Europe;
- powerful earthquakes in Haiti, Chile and China;
- ongoing terrorist attacks linked to Al Qaeda;
- the eruption of an Icelandic volcano, releasing clouds of volcanic ash that closed European airspace for several days.

Within the Business Continuity profession the years since 2007 have been ones of consolidation and evolution rather than dynamic change. Business Continuity standards have been scrutinized and improved and industry-wide tests, notably in the financial sector, have provided lessons for improvement, as well as benchmarking information to enable higher quality Business Continuity Management systems to be developed.

If Business Continuity philosophy has progressed at a relatively stately pace, the technology areas which Business Continuity Management supports have seen major changes. Cloud computing and virtualization present the promise of reduced costs for IT Disaster Recovery as well as providing many opportunities for reducing the costs of implementing high-availability environments. Advances in deduplication and data compression techniques also provide new tools for Disaster Recovery and data protection.

When *The Definitive Handbook of Business Continuity Management* was first published in 1999, Business Continuity Management was seen as an esoteric novelty, which was only of relevance to the largest of organizations and mainly focused on the recovery of IT systems. Now, in 2010, Business Continuity is truly a mainstream management discipline, taught at universities around the world (often using this book) and represented in senior posts within the vast majority of companies and the public sector, in every corner of the world. It is an indisputable fact that Business Continuity Management has come of age.

# Introduction to the 3rd Edition

Andrew Hiles, FBCI – UK

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Andrew is a Director of Kingswell International Limited, a global consultancy in all aspects of Business Risk Management.

## Introduction

'Welcome to what we believe to be the most authoritative work on Business Continuity Planning yet produced.' These were the opening words to the introduction to the first edition of this book, written in 1999. We believe these words were equally true for the second edition, published in 2007, and remain true for this, the third, edition.

Since the second edition of this book, much has changed – and much has not. Threats, whether natural or man-made, abound. Organizations are making the same mistakes: history repeats itself. The world economic order has changed, perhaps for good. Supply chain issues and interdependencies have been highlighted. Virtualization technology and techniques have had a major impact on ICT Disaster Recovery. BC standards and guidelines have spawned and multiplied from the welcome firstborn to an extended family of squawking, confusing and sometimes contradictory – and plain ornery – relatives. We have seen a similar growth in the number of related professional institutes and the number of existing institutes extending their reach into risk and continuity. While acknowledging and reflecting this, we have tried to avoid being partisan, reflecting good practice, whatever its source.

You will notice the book has got heavier! In presenting this third edition, we have retained sound components and solid foundations provided by the first and second editions, which we have thoroughly updated where they have been retained. We have incorporated current thinking on well-established disciplines. In addition, we have sought to broaden the book's global reach, embracing good practices with contributions from all over the world. We have tried to make it more inclusive, inviting input from the premier league of BC professionals, professional associations and institutes, with some 25 contributors from all round the globe. We have also reflected the increasing acceptance of Business Continuity as an academic discipline by inviting contributions from leading BC academics.

The third edition contains not only updated material, but much completely new material on:

- enterprise management and risk assessment;
- BC and business strategy;
- risk and business impact analysis;
- emergency response and operations;
- BCP development;
- ICT Disaster Recovery including virtualization, cloud computing and data backup;
- BC in the supply chain;
- BC in financial institutions;
- BC for retail;
- BC benchmarking;
- BC-related legislation and standards;
- professional associations, certification standards and resources;
- international BC practices, with country perspectives from India, China, the Middle East and Africa;
- 'how we did it' war stories;
- new and updated disaster case studies.

A random snapshot of disasters and developments which have all occurred since the second edition was published in 2007 follows.

## Disasters 2008

For four days over the New Year period, Kenya experienced tribal riots resulting in arson that destroyed homes, businesses and farms and left an estimated 300 people dead.

January 28, 2008. China suffered severe snow storms and bad weather. 78 million people were affected: over 800 000 people were evacuated, millions were without power, 600 000 train passengers were stranded and 24 people died. The cost was put at \$3.2 billion.

January to April, 2008. A dengue fever outbreak in Brazil infected over 75 000 people and killed at least 80.

February 3, 2008. Some 45 people were killed and about 450 more injured after two earthquakes in the Republic of Congo, measuring 6.0 and 5.0 respectively on the Richter scale.

February 5, 2008. Some 55 people were killed and hundreds more injured after tornadoes hit Tennessee, Arkansas, Kentucky and Alabama.

February 7, 2008. An explosion at an Imperial Sugar Refinery near Savannah, Georgia killed 14 people and injured more.



March 14, 2008. In Georgia, USA, bad weather and tornadoes killed two people and injured over 30. The CNN Center was one of the many commercial businesses hit.

March 17, 2008. Flooding and bad weather affected states from Pennsylvania to Texas causing road closures, evacuations and the deaths of 13 people.

March 19, 2008. The Ulyanovskaya mine, located in the Kemerovo region of Siberia, about 2000 miles east of Moscow, suffered a massive methane explosion nearly 900 feet deep. Rescuers saved 90 miners, leaving 107 dead.

March 22, 2008. A stockpile of old ammunition, stored at a Mozambican army facility in the outskirts of the city of Maputo, blew up. It started fires and killed 117 people.

May 11, 2008. Tornadoes killed 20 people and left many homeless in southern states of the USA.

May 12, 2008. An earthquake measuring 7.9 on the Richter scale killed over 67 000 in China, leaving hundreds of thousands injured. Subsequent floods and landslides killed many more.

June 9, 2008. Central states of the USA experienced record flooding, ten people died, dams were broken and thousands were evacuated.

June 9, 2008. An ageing oil pipeline sprung a leak in North Pyongyang province. Local residents tried to scavenge the fuel, which caught fire and exploded. At least 110 people died.

June 17, 2008. A flood, the worst in 50 years, hit southern China, killing over 60 people and destroying 5.4 million acres of crops.

June 21, 2008. Typhoon Fengshen struck the ferry *Princess of the Stars* in the Philippines, killing most of the 865 passengers and crew.

August 23, 2008. 12 people died, many more were injured and left homeless as Tropical Storm Faye hit Florida and other southern states.

August 28, 2008. The Kosi River in India flooded, killing 75 and leaving millions homeless or living in camps.

August 28, 2008. Over 130 people died and many more were injured when Hurricane Gustav struck the Caribbean.

September 1, 2008. Hurricane Gustav left Cuba and struck the USA, devastating the Gulf Coast and killing some 26 people in Louisiana, Georgia and Mississippi.

September 5, 2008. Tropical Storm Hanna hit Haiti, killing hundreds and injuring thousands.

September 7, 2008. After a hit by a tropical storm a few weeks earlier, Hurricane Ike killed some 60 people in Haiti. Four more were killed in Cuba, and 80% of homes were destroyed on Turks and Caicos Islands.

September 13, 2008. Hurricane Ike caused more deaths, severe flooding, evacuations and power outages in Texas, Louisiana, Kansas, Missouri and Illinois.

October 6, 2008. An earthquake, measuring 6.6 on the Richter scale, destroyed the town of Nura, Kyrgyzstan. 70 people died and hundreds more were injured.

October 29, 2008. A 6.4 magnitude earthquake struck south-western Pakistan, killing at least 170 people and destroying around 15 000 homes.

November 22, 2008. Brazil again experienced severe weather, leaving 19 people dead and destroying over 80 000 homes.

December 11, 2008. New England, USA suffered precipitation of ice and snow during storms. Power was out and a state of emergency was declared.

## Disasters 2009 and 2010

### Natural disasters

The World Disaster Report (WDR)'s 2009 (June) Disaster Report announced that disaster deaths totalled 242 662. 93% of these deaths were caused by the cyclone in Myanmar and the earthquake in China, both in May 2008. This is only slightly below the 2004 disaster death toll – the year remembered for the Asian Tsunami.

In 2009, the United Nations International Strategy for Disaster Reduction Secretariat (UNISDR) published a number of documents on disaster reduction.<sup>1</sup> The 2009 figures released by the Belgian WHO collaborating Centre for Research on Epidemiology of Disasters (CRED) cover the period from January 1 to November 2009.

- Out of the 245 disasters in 2009, 224 were weather related, accounting for 55 million people out of the 58 million people affected, 7000 out of 8900 of those killed, and US\$15 billion out of the US\$19 billion in economic damages.
- In 2009, 11 million people were affected by floods, compared to 178 million people in 2007 and 45 million in 2008.

Insurance company Munich Re's statistics for 2009, published on December 29, 2009, said natural catastrophe losses were far lower in calendar year 2009 than in 2008 due to the absence on the whole of major catastrophes and a very benign North Atlantic hurricane season. However, the total number of destructive natural hazard events was above the long-term average, 850 being recorded in all. Consequently, despite the lack of really disastrous events, there were substantial economic losses of US\$50 billion and insured losses amounted to US\$22 billion compared with economic losses of US\$200 billion and insured losses of US\$50 billion in the previous year.

By way of further comparison, the average number of natural hazard events with relevant losses over the past ten years was approximately 770 per annum. Economic losses came to some US\$115 billion on average and insured losses US\$36 billion. There were about 75 000 deaths per year due to natural catastro-

<sup>1</sup> <http://www.unisdr.org/publications/index.php?pid=0&tid=33&rid=0>

phes on average. Not only the losses but also the death toll from natural catastrophes in 2009 – around 10 000 – were well below average.

Munich Re's list of the top ten events in terms of fatalities is as follows:

- September–October 2009 (Indonesia): earthquakes, 1195 deaths.
- September 2009 (South East Asia, East Asia): Typhoon Ketsana, 694 deaths.
- October 2009 (China, Philippines, Taiwan): Typhoon Morakot, 614 deaths.
- October 2009 (South East Asia, East Asia): Typhoon Parma, 469 deaths.
- May 2009 (Bangladesh, Bhutan, India): Cyclone Aila, 320 deaths.
- September–October 2009 (India): floods, 300 deaths.
- April 2009 (Italy): earthquakes, 295 deaths.
- September–October 2009 (India): floods, 223 deaths.
- August–September 2009 (West Africa, Central Africa): floods, 215 deaths.
- November 2009 (El Salvador, Nicaragua, Mexico, USA): Hurricane Ida, 204 deaths.

FEMA responded to 59 disasters in 2009, ranging from fires in California, Montana, Hawaii and Arizona; storms and some consequent flooding in Georgia, Kansas, New York, Arkansas, Louisiana, Nebraska, New Jersey and Alabama; earthquake, tsunami and flooding in American Samoa; through to explosion and fire in Puerto Rico.

Three events triggering losses in excess of \$1 billion all occurred in the United States after severe weather and tornadoes hit southern and midwestern regions of the country in February, April and June. The February event triggered the second biggest loss of 2009, with insurance claims totalling around \$1.35 billion. The events in April and June caused insured losses of \$1.13 billion and \$1.05 billion, respectively.

Aon's *2009 Global Climate and Catastrophe Report* stated that the largest insured losses of 2009 occurred in the US and Europe, but the developing world continued to suffer billions in uninsured economic losses, according to a recently released study.

- According to Aon, Typhoon Morakot that swept through Asia destroyed 3.9 million structures and produced economic losses of over \$5 billion, but insured losses only amounted to \$100 million.
- Separately, September 30th's magnitude 7.6 earthquake in West Sumatra damaged or destroyed over 249 800 structures in Indonesia, causing economic losses of \$2.2 billion: insured losses were less than 2% of the economic loss total. Indonesian governmental agencies estimated that reconstruction costs would be around \$860 million.
- Aon says that Europe and the United States tallied the most insured losses for 2009, primarily due to damaging winter and springtime weather. The largest insured loss of 2008 was Winterstorm Klaus, which hit France and Spain with hurricane-force winds in January 2009, with gusts peaking at 195 km per hour

(120 mph), killing 25 people. The storm was the most powerful to hit France since Windstorm Martin in 1999. It cost an estimated \$3.3 billion in insured losses according to Aon and \$3.5 billion according to Swiss Re. Elsewhere in Europe, severe hailstorms hit Switzerland, Austria, Poland and the Czech Republic on July 23, causing a total insured loss of \$1.25 billion.

- Asia, however, accounted for most of the economic losses of 2009, with flooding and typhoons accounting for the majority of their losses, the report said.

On March 10, 2009 the eruption of the Mount Galeras volcano in Colombia resulted in the evacuation of 8000 people living nearby.

In February 2010, Britain experienced its worst snowstorm since February 1991, disrupting transportation. Over 250 flights were cancelled at Heathrow Airport (London's largest and busiest airport) as it closed its runways, and London's bus and train services were suspended, stranding millions of people (Reuters). The lack of transportation caused nearly 6.4 million employees to miss work, and these disruptions are likely to cost businesses \$4.3 billion (Associated Press).

## Flood

We have already mentioned floods across the USA and Europe. Amongst other 2009 flooding incidents were:

- January 12 Fiji - 8 dead, 6000 people displaced. Subsequent landslides from January 15 killed 20 and displaced 6000 people.
- January 16, floods in Jakarta, Indonesia, disrupted power supplies.
- February 5, in the Solomon Islands flooding killed at least ten people. Another ten were missing, feared dead. Torrential rains from January 29 caused widespread flooding and left an estimated 20 000 people homeless and without food, out of a national population of about 550 000 people.
- May 22, Australian authorities declared a natural disaster on Friday and thousands of people were evacuated after days of torrential rain and flooding killed one man and inundated large parts of the country's east coast. Around 5000 residents in Lismore, in northern New South Wales state, were evacuated from their homes as floodwaters, in some places more than ten metres deep, surged across riverlands stretching along 300 km of coastline.
- July 28, 100-year floods hit Kanata and Stittsville, Canada.
- July, the rains arrived in Zambia earlier than usual, leading to devastating floods. The floodwaters rose and covered the high ground to which the villagers usually retreat, resulting in hunger, disease and the loss of possessions.
- September 27, floods in the Philippines, said to be the worst since 1967, took out information systems and networks.
- November 25, uncommonly heavy rainfall sparked a flash flood in Jeddah, the kingdom of Saudi Arabia's second largest city. The flood submerged homes

and roadways, drowning 120 people and leaving another 40 unaccounted for. Thousands were left homeless and more than 7000 vehicles were destroyed in the city, which has a population estimated at more than three million.

- A report from the Association of British Insurers (ABI) estimated that the floods in Cumbria in the north-western part of England and parts of southern Scotland in November 2009 exceeded £200 million (\$322 million). The ABI reported that insurance claims following the floods were estimated at £206 million (\$332 million) and that 60% of this cost related to business damage.

## **Terrorism**

Terrorist activity continued unabated. United States law enforcement agents and partners reported 'encounters' with suspected terrorists 55 000 times in the last year; a check against the terrorist watchlist found a match 19 000 times (including multiple hits on the same people), according to testimony presented to the Senate in December 2009.

According to a Time.com posting on December 23, 2009, out of 32 USA domestic terrorist events since 9/11, 12 of them occurred in 2009. Events included an al-Qaeda plot to blow up a train in Penn Station and another plot to blow up a federal building in Springfield. On May 2, 2010, Times Square was evacuated following an attempted car bombing. Faisal Shahzad, a naturalized US citizen, was later arrested.

Wikipedia reports some 282 terrorist attacks worldwide in 2009. While most attacks were in Afghanistan, Iraq and Pakistan, terrorist incidents also took place in Algeria, Canada, Chechnya, China, Colombia, Corsica, France, Greece, Hong Kong, India, Indonesia, Israel, Lebanon, Majorca, Nepal, Norway, Philippines, Somalia, Spain, Sri Lanka, Thailand, Turkey, UK, USA and Yemen.

## **Fire and explosion**

On January 31, 2009 an oil truck overturned in Molo, Kenya, spilling oil. Locals rushed to collect free fuel when the spill ignited, resulting in the deaths of at least 113 people and critical injuries to another 200. The fire came less than a week after a fire in a Nairobi supermarket killed 25. In June, another oil tanker spilled, with four deaths and 25 injuries in an incident similar to that in Molo.

In February 2009, at the end of a major heatwave, bushfires in the state of Victoria, Australia, killed 173 people and injured some 500. The fires destroyed over 2000 homes and deleted whole towns from the map. They were the worst bushfires in Australia's history and also one of Australia's worst natural disasters.

From March 31-April 27, 2009 Shell shut down a major crude oil pipeline and several adjoining flow stations in Nigeria's southern Rivers State following a fire.

On April 17, 2009 there was a major fire at Paarl Print plant in South Africa. The fire at the Dal Josafat Industrial Estate, Paarl, Cape Boland killed 13 employees and contractors and was probably caused by a paper dust explosion.

The July 2009 hailstorms in Switzerland, according to Guy Carpenter, resulted in 150 000 claims totalling more than CHF733 million (\$684 million).

Bearing a remarkable resemblance to the 2005 Buncefield fire in the UK (q.v.), from October 23 to October 25, 2009 a fire engulfed the Caribbean Petroleum Corporation refinery and depot in Puerto Rico. The fire destroyed storage tanks containing gasoline, jet fuel and bunker fuel. Flames reached a height of 100 feet (30m) above the refinery. The resulting explosion was measured as a 2.8-magnitude earthquake on the Richter scale and could be heard over five miles away. The tanks exploded at about 00:23 hours and shook windows and doors over two miles away.

In February 2009, the US National Fire Prevention Association presented its overview of fires for 2008:

- 3320 civilians lost their lives as the result of fire;
- 16 705 civilian injuries occurred as the result of fire;
- 118 firefighters were killed while on duty;
- fire killed more Americans than all natural disasters combined;
- 16% of all civilian fire deaths occurred in non-residential property;
- there were an estimated 1.5 million fires in 2008;
- direct property loss due to fire was estimated at \$15.5 billion (this figure includes the 2008 California Wildfires with an estimated loss of \$1.4 billion);
- an estimated 32 500 intentionally set structure fires resulted in 315 civilian deaths;
- intentionally set structure fires resulted in an estimated \$866 million in property damage.

The latest fire statistics for England, published by Communities and Local Government and covering the 12-month period up to March 3, 2009, identified 27 000 fires in non-residential buildings.

In August 2009 a transformer explosion occurred in Siberia at the world's fourth largest hydro-electric plant, destroying three out of ten turbines. Eight people were reported dead, with some 50 missing.

On November 21, 2009 an explosion occurred in the Xinxing coal mine near Hegang in northeast China. 108 people died and 29 more were put in hospital. The explosion happened when 528 people were thought to be in the mine.

On April 20, 2010 an explosion set fire to and subsequently sank the Deepwater Horizon rig, owned and operated by Transocean and leased to BP, drilling 50 miles (80 kilometres) off the Louisiana coast in the Gulf of Mexico. 11 workers were presumed dead. An estimated 19 000 barrels of oil a day leaked. By the end of June 2010, the value of BP shares had plummeted to less than half their pre-disaster price; losses and clean-up costs could be similar; punitive damages could follow; future deep sea drilling is under threat. In June 2010 BP had to put \$20 billion