HANDBOOK

Unplanned Explosions at Munitions Sites (UEMS)

Excess Stockpiles as Liabilities rather than Assets

Edited by Eric G. Berman and Pilar Reina

small arms survey

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Published in Switzerland by the Small Arms Survey

First published in June 2014

Small Arms Survey
Graduate Institute of International and Development Studies
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1202 Geneva
Switzerland

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Design and typeset in Optima by Frank Benno Junghanns
Printed in France by GPS

ISBN 978-2-9700897-9-7

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The Small Arms Survey

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The objectives of the Small Arms Survey are: to be the principal source of public information on all aspects of small arms and armed violence; to serve as a resource centre for governments, policy-makers, researchers, and activists; to monitor national and international initiatives (governmental and non-governmental) on small arms; to support efforts to address the effects of small arms proliferation and misuse; and to act as a clearinghouse for the sharing of information and the dissemination of best practices. The Survey also sponsors field research and information-gathering efforts, especially in affected states and regions. The project has an international staff with expertise in security studies, political science, law, economics, development studies, sociology, and criminology, and collaborates with a network of researchers, partner institutions, non-governmental organizations, and governments in more than 50 countries.

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Foreword

My country is acutely aware of the social and economic ramifications that poorly stored stockpiles of weapons and ammunition pose to a government's ability to provide security and ensure public safety. As the Small Arms Survey documents, Afghanistan has suffered on average almost one unplanned explosion per year over the past 30 years. Too many lives have been lost as a result, with many more survivors suffering permanent injuries.

The 2001 Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects (PoA) is replete with references to the need for adequate stockpile management and destruction of surplus small arms to successfully counter diversion thereof. Governments are encouraged to promote effective procedures at both the national and regional levels. The PoA also calls for states to work together through international and regional organizations to develop relevant legislation and training initiatives to these ends. Governments with the resources and expertise to assist other states to undertake such actions are encouraged to do so. The need to address the safe storage of munitions and their surplus destruction is not stated explicitly in the PoA. Implicitly, however, by tackling the illicit trade in small arms 'in all its aspects', one can make the case that a holistic approach to stockpile management is part and parcel of the PoA. Moreover, the UN International Ammunition Technical Guidelines (IATG), developed in 2011 at the request of the General Assembly outside the PoA framework, address these concerns head-on.

As this study ably points out, dozens of actors—governments, international and regional organizations, non-governmental organizations, and private companies—are making important progress towards establishing safer stockpiles. This Handbook, *Unplanned Explosions at Munitions Sites (UEMS): Excess Stockpiles as Liabilities rather than Assets,* documents, in impressive breadth and depth, the numerous initiatives under way to address the challenges of stockpile management and surplus destruction.

Afghanistan's situation is far from unique. As this Handbook records with authority, more than half of the UN member states have experienced an explosion at a munitions site in the past 35 years. All told, the Survey has documented more than 500 such events over this time span. A single incident can result in tens of deaths, hundreds of injuries, and the displacement of thousands of people. Given the lack of reporting, these numbers—troubling enough in themselves—in all likelihood under-represent the full geographical scope and human scale of the problem.

The Fifth Biennial Meeting of States (BMS5) within the PoA framework gives UN member states an opportunity to make further progress in improving the security and safety of stockpiles, and destroying surplus accumulations so that they do not accidentally explode or proliferate, finding their way to illicit markets. This Handbook deserves a wide readership and is likely to remain a valuable resource for policy-makers and practitioners for years to come.

— Ambassador Zahir Tanin

BMS5 Chair-designate
New York, April 2014

Preface

This study originated from an appreciation of the gravity of a particular problem, coupled with a concern that it was garnering relatively little attention: unplanned explosions at munitions sites (UEMS). At the time, this term did not yet exist. Some lists had been drawn up which enumerated detonations at more than 100 storage locations across several dozen countries. The media documented an increasing number of these incidents. Yet their focus was largely on the casualties suffered; few connections were made between these events and greater geopolitical concerns or to multilateral processes.

The Survey's work on the illicit proliferation of small arms led us to understand that many of these explosions were a symptom of a much broader issue. Too many governments view their excess stocks of weapons and munitions as assets rather than as potential liabilities. Control over these depots has often been lax, leaving them vulnerable to corruption or seizure by armed groups, and governments have not prioritized or invested in securing this materiel or safely destroying it.

In 2009 the Survey undertook a multi-year initiative to develop and expand upon the existing lists, which has led to the UEMS Database. Today we know much more about the scale, causes, and effects of these explosions, as well as the actors and initiatives working to address the challenge. This Handbook documents these events in considerable detail and explains how to help prevent them. It draws on records of 500-plus UEMS incidents that have taken place in 100 countries over the past 35 years.

This figure of 500 is certainly an undercount. There is still a great reluctance in many countries and regions to discuss the problem. Much remains unknown, and the information available on the incidents that are recorded is incomplete. More than one in ten of the explosions in our database contain no information on casualties. More than one-quarter are recorded with no causes.

As many of our numerous contributors and reviewers have commented, this initiative, which is long overdue, provides a strong foundation from which to stimulate dialogue and develop more rigorous information. It is in this spirit and with this hope that we present this book.

We have defined the problem, coined the term, developed a network of practitioners, trainers, and policy-makers, and collected and collated a tremendous amount of scattered data. We will now work to disseminate the Handbook and provide training, using the UEMS Incident Reporting Template (IRT) and other tools that we have developed. Our plans are to create an app for the IRT, to update the existing profiles of actors, to record new ones when appropriate, and to channel feedback into building up the UEMS Database. Observations about omissions, errors, and missed opportunities will make the instrument more effective, UEMS less prevalent and destructive, and illicit proliferation of small arms and ammunition less frequent and problematic.

— Eric G. Berman

Managing Director, Small Arms Survey
Geneva, April 2014

Acknowledgements

This Handbook came to fruition after two years of developing the UEMS Database and the UEMS Incident Reporting Template (IRT), to which many people contributed. Without their enthusiasm and expertise, this project would not have evolved as it has. So an initial appreciation is recorded to the Multinational Small Arms and Ammunition Group (MSAG) for setting aside time at two symposia to help develop these tools. Prasenjit Chaudhuri, Andy Gleeson, Stefan Gundlach, and Peter Moreton were especially supportive. Adrian Wilkinson stands out as having been engaged throughout the project's development, which included his attentive reading of the manuscript.

Drafts of the manuscript were shared with and benefited from input from all the points of contact (POCs) listed in Part III of the Handbook, and many of their colleagues: Cyriaque Agnekethom, Ioane Alama, Sabina Beber-Boštjančič, Richard Boulter, Maria Brandstetter, Carl Case, Vincent Choffat, Chad Clifton, Boet Coetzee, Ken Cross, Eveline Debruijn, Gilles Delecourt, Steiner Essén, Valeria Fabbroni, Kay Gamst, Mathew Geertsen, Andrea Gruber, Roger Hess, David Hewitson, Alberto Hidalgo González de Aledo, Theresa Hitchens, Richard Holmes, Philippe Houliat, Zafer Kilič, Colin King, Ferdinand Klinser, Benjamin Lark, Gustavo Laurie, Jean-Baptiste Le Bras, Jérôme Legrand, Chris Loughran, Richard MacCormac, Frederic Maio, Agnes Marcaillou, Lou Maresca, Simon Martyr, Tak Mashiko, Patrick Mc Carthy, Blaž Mihelič, Claus Nielsen, Helen Olafsdottir, Wolf-Christian Paes, Jasmin Porobic, Daniël Prins, Florencia Raskovan, John Rawson, Alexander Riebl, Bill Reid, Conrad Schetter, Himayu Shiotani, Thomas Stock, Gordon Storey, Thomas Taylor, Carolyn Thielking, Erik Tollefsen, Goran Tomasevic, Ben Truniger, Kenn Underwood, Kerstin Vignard, Peter Walsh, Nathalie Weizmann, Matt Wilson, Terah Yaroch, and Ivan Zverzhanovski. The study is more thorough as a result of their contributions of time and effort.

Dauren Aben, Anna Alvazzi del Frate, Olivier Bangarter, Steve Costner, William Godnick, Gillian Goh, Takhmina Karimova, Jasna Lazarevič, Sho Morimoto, Glenn McDonald, Ryan Murray, Fred Peugeot, Yeshua Moser-Puangsuwan, Sarah Parker, Irene Pavesi, Tony Rowe, John Schmitt, John Stevens, and Dorn Townsend also provided thoughtful and useful reflections or contributed research to support parts of the manuscript.

James Bevan and Mike Groves merit special mention for having read and provided helpful comments on the entire text. Pierre Gobinet and Benjamin King not only wrote parts of the book, but reviewed others.

The PSSM Best-practice Cards that are provided in English in Annexe D were funded by the US Department of State's Office for Weapons Removal and Abatement, with significant input on the content from the Defense Threat Reduction Agency of the US Department of Defense. They were enhanced by contributions of additional photographs from the North Atlantic Treaty Organization's Support Agency (NSPA, formerly NAMSA) and the Swiss Verification Unit. Each of these four bodies also made beneficial suggestions on how to improve the text. With the support of the Spanish Verification Agency, the Organization for Security and Co-operation in Europe (OSCE), and the South Eastern and Eastern

Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC), these cards are available in other languages, including Albanian; Bosnian, Croatian, Montenegrin, and Serbian (BCMS); Russian; and Spanish.

A database with more than 500 records and up to 50 fields per event to fill in takes time, energy, and dedication to develop, revise, and update. We benefited from the efforts of Miguel Araque, Perparim Arriku, Matthias Barczak, Laurens Bynens, Peter Bouckaert, Andrei Camerzan, Natacha Cornaz, Olivia Denonville, Eric Deschambault, Marlene Dupouy, Alexander Filyuta, Radu Giurgiu, Abigail Hartley, Bledar Horanlliu, Gordan Ivanovic, Krunoslav Katič, Habib Khan, Vasly Lytvynchuk, Daniel Mack, Michelle Mackovjak, Slobadan Malbasic, Anton Martyniuk, Aleksandrina Mavrodieva, Marko Milosevic, Fernando Narvaez, Nikolay Nikolov, Mark Norton, Matjaz Patric, Erwan Roche, Ndricim Sallaku, Andrei Sarban, Alex Sayelyev, Mohammad Sediq Rashid, Jordan Shepherd, Claudius Ternes, David Towndrow, Kristen Visakay, Mackenzie Wislar, and George Zahaczewsky.

David Gertiser was especially instrumental in helping to ensure that the database is as complete and accurate as possible.

Some people who assisted us asked not to be acknowledged publicly. And we may have forgotten to list some who would like to have been acknowledged. If you provided assistance and your name does not appear we hope you are satisfied or will accept our sincere apologies and appreciation.

The Survey's Handbook series owes many of its innovative design features to the creative instincts of the Survey's Martin Field, and this one is no exception. Catherine Robinson and Stephanie Huitson carried out thoughtful copy-editing and proofreading, respectively, and designers Rick Jones and Frank Benno Junghanns, and cartographer Jillian Luff, once again were a pleasure to work with. A special note of gratitude goes to Estelle Jobson, who did a yeoman job on a complex and multi-author manuscript. These Acknowledgements would not have been drafted until many months from now without her diligence and pleasant demeanour.

— Eric G. Berman and Pilar Reina

Geneva, April 2014

Note to readers

Names for countries and territories that appear in this Handbook comply with the Small Arms Survey's style guide. There will be differences between our usage and those of the United Nations, regional organizations, and civil-society organizations profiled in this study. When this publication refers to 'countries', they include the 193 UN member states and the two UN permanent observer states. The Survey relies on a UN body to determine sub-regional groupings.

For the purposes of this study and the UEMS Database, the Survey attributes UEMS as having taken place in countries and territories according to their *present-day* borders. When incidents have occurred in territories or countries that have since changed name, status, or geographical delineation, those incidents are attributed to states, as they are currently recognized by the United Nations. See Annexe E.

Accordingly, ownership and responsibility is not an overriding criterion for labelling a UEMS as having occurred in a particular country or territory: location is.

The Survey intends neither to embarrass nor to protect a country or a territory. A country in which more UEMS incidents occur is not 'bad'. Likewise, a territory with fewer incidents is not 'good'. Some countries may simply be more transparent; others less so.

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List of abbreviations and acronyms

AOAV	Action on Armed Violence
APB	ammunition-processing building
APEC	Asia-Pacific Economic Cooperation
ASA	Ammunition Storage Area
ASM	ammunition-safety management
AXO	abandoned explosive ordnance
BBC	British Broadcasting Corporation
BCMS	Bosnian-Croatian-Montenegrin-Serbian
BCPR	Bureau of Crisis Prevention and Recovery (UNDP)
BICC	Bonn International Center for Conversion
BMS5	Fifth Biennial Meeting of States on the PoA (UN)
CAR	Central African Republic
CASA	Coordinating Action on Small Arms (UN)
CASAC	Central American Programme on Small Arms Control
CBRNe	Chemical, Biological, Radiological, Nuclear, and explosives
CCM	Convention on Cluster Munitions
CCW	Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (Convention on Certain Conventional Weapons [UN])
CICS	Centre for International Cooperation and Security
CWD	Conventional Weapons Destruction (US)
DCA	DanChurchAid
DDESB	Department of Defense Explosive Safety Board (US)
DDG	Danish Demining Group
DDR	disarmament, demobilization, and reintegration
DfD	'design for demil'
DI	DynCorp International
DoD	Department of Defense (US)
DoS	Department of State (US)
DRC	Democratic Republic of the Congo
DTRA	Defense Threat Reduction Agency (US)
EAPC	Euro-Atlantic Partnership Council
EBP	explosion and ballistic protection
ECOWAS	Economic Community of West African States
ELL	Explosives Limit License
EOD	explosive ordnance disposal
EODS	EOD Solutions
ERW	explosive remnant(s) of war
ESA	explosive storage area
EU	European Union
EUExcert	European Explosives Certification
EUR	Euro
ExCap	Explosive Capabilities
FAC	Congolese Armed Forces
FARC	Fuerzas Armadas Revolucionarias de Colombia

FAS	Federation of American Scientists
FSD	Swiss Foundation for Mine Action
GGE	Group of Governmental Experts (UN)
GICHD	Geneva International Center for Humanitarian Demining
GRIP	Groupe de recherche et d'information sur la paix et la sécurité
HI	Handicap International
IATG	International Ammunition Technical Guidelines (UNODA)
ICBL	International Campaign to Ban Landmines
ICRC	International Committee of the Red Cross
IED	improvised explosive device
IExpE	Institute of Explosives Engineers
IMAS	International Mine Action Standards
IMCSE	Institute of Munitions Clearance & Search Engineers
IRT	Incident Reporting Template
ISACS	International Small Arms Control Standards
ISO	International Organization for Standardization
ITF	ITF Enhancing Human Security
ITI	International Tracing Instrument
LRA	Lord's Resistance Army
MAG	Mines Advisory Group
MANPADS	man-portable air-defence system(s)
MGE	Meeting of Governmental Experts
MME	monitoring, mentoring, and evaluation
MoD	Ministry of Defence
MSAG	Multinational Small Arms and Ammunition Group
MSIAC	Munitions Safety Information Analysis Center (NATO)
NASDU	National Association of Security Dog Users (UK)
NATO	North Atlantic Treaty Organization
NGO	non-governmental organization
NPA	Norwegian People's Aid
NSPA	NATO Support Agency
OAS	Organization of American States
OB/OD	open burning and open detonation
OSCE	Organization for Security and Co-operation in Europe
PIF	Pacific Islands Forum
PoA	Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects (UN)
PoC	Point of Contact
PM/WRA	Bureau of Political–Military Affairs, Office of Weapons Removal and Abatement (US)
PSSM	physical security and stockpile management
RACVIAC	Regional Arms Control Verification and Implementation Assistance Centre—Centre for Security Cooperation
RASR	Regional Approach to Stockpile Reduction
RCC	Regional Cooperation Council
RE	risk education

RECSA	Regional Centre on Small Arms in the Great Lakes Region, the Horn of Africa and Bordering States
RENAMO	Resistência Nacional Moçambicana
RMDS/G	Regional Micro-disarmament Standards and Guidelines
RRPL	Risk Reduction Process Levels
RSMF	Risk & Security Management Forum (UK)
SALW	small arms and light weapons
SAS	Small Arms Survey
SEE	South-East Europe
SEECP	South-East European Cooperation Process
SEESAC	South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons
SGO	Sterling Global Operations
SHADOW	Self-Help Ammunition Destruction Options Worldwide
SOPs	Standard Operating Procedures
SPLA	Sudan People's Liberation Army
TNT	trinitrotoluene
TRADS	Transportable Ammunition Destruction System(s)
UEMS	unplanned explosion(s) at munitions site(s)
UK	United Kingdom
UN	United Nations
UNDAC	United Nations Disaster Assessment and Coordination
UNDP	United Nations Development Programme
UNIDIR	United Nations Institute for Disarmament Research
UNGA	United Nations General Assembly
UNLIREC	United Nations Regional Centre for Peace, Disarmament and Development in Latin America and the Caribbean
UNMAS	United Nations Mine Action Service
UNODA	United Nations Office for Disarmament Affairs
UNSD	United Nations Statistical Division
UNSMIL	United Nations Support Mission in Libya
US	United States
USD	US dollar
UXO	unexploded ordnance
WB	World Bank
WRA	Weapons Removal and Abatement (US)

Introduction

Overview

Unplanned explosions at munitions sites (UEMS) are a significant safety concern for governments and a major security challenge for the international community. The Small Arms Survey, hereafter referred to as the Survey, has documented more than 500 such incidents over the 35-year period from 1979 to 2013. Explosions of this nature have occurred in 100 countries. They have resulted in thousands of deaths, tens of thousands of injuries, hundreds of thousands of people being displaced, tens of millions of dollars of clean-up costs, and possibly hundreds of millions of dollars spent on replacement stocks. Such resources could have been invested more productively. In some cases, the explosions have even resulted in the arrest and removal of government ministers, civilian officials, and military officers.

The Survey defines UEMS as the accidental explosions of abandoned, damaged, improperly stored, or properly stored stockpiles of ammunition and explosives at munitions sites (see Box 1). Munitions sites may be temporary or permanent. To qualify for inclusion in the database, an explosion must occur at a static location. Munitions that are in the process of *being* transported by air, rail, road, and sea are not covered in this Handbook, although they have also caused catastrophic explosions[1] and warrant further examination. Similarly, munitions that once *were being* transported and are now submerged (as a result of either an accident or an attack, see Box 2) are not covered in the UEMS Database. UEMS may be associated with various activities, including production, demilitarization, and explosive-ordnance disposal (EOD). The common qualifying factor is the *storage* of munitions at fixed locations. (See Box 3 for examples of what does, and does not, meet these criteria.)

UEMS result from improper storage and handling as well as inadequate record keeping, reporting, investigation, and oversight. A dearth of expertise and resources is also a contributing factor. Explosives may deteriorate over time and can become unstable.[2] Explosives storehouses (ESHs) designed in keeping with international best practices allow for safer storage by including proper physical properties (ventilation, temperature control, construction, and sufficient space between structures) in their design, as well as routine and effective surveillance and monitoring (King and Diaz, 2011, pp. 20–22).

UEMS speak to a larger problem than the damage generated by a single conflagration. The incidents indicate a troubling mindset of many policy-makers concerning appropriate levels of stocks and dangerous quantities of surplus. These events occur in large part because too many states view their stockpiles of munitions as assets rather than liabilities, regardless of the materiel's age or its storage conditions. Identifying and destroying surplus stock should be a planned and integral stage of the life cycle of munitions management (see Figure 1). When munitions are stored with no regard for their quantities, quality, or safe-keeping, oversight suffers. Such conditions lend themselves to possibly questionable transfers and unintentional or unauthorized diversion (see Bevan, 2008, pp. 145–53). Governments

Box 1. UEMS: unpacking the definition

UEMS are accidents[a] *that result in an explosion*[b] *of abandoned,*[c] *damaged,*[d] *improperly stored,*[e] *or properly stored stockpiles of munitions*[f] *at a munitions site.*[g]

[a] 'Accident' is defined as 'an undesired event that results in harm' (UNODA, 2011, para. 3.5, p. 2). 'Harm' is defined as 'physical injury or damage to the health of the people' (UNODA, 2011, para. 3.120, p. 14).

[b] 'Explosion' is defined as 'a sudden release of energy producing a blast effect with the possible projection of fragments. The term explosion encompasses fast combustion, deflagration and detonation' (UNODA, 2011, para. 3.95, p. 11).

[c] 'Abandoned' refers to abandoned explosive ordnance (AXO) and is defined as 'explosive ordnance that has not been used during an armed conflict, that has been left behind or dumped by a party to an armed conflict, and which is no longer under control of the party that left it behind or dumped it. [AXO] may or may not have been primed, fuzed, armed or otherwise prepared for use' (UNODA, 2011, para. 3.1, p. 1).

[d] 'Damaged' refers to damaged munitions and the physical or chemical deterioration of ammunition and explosives.

[e] 'Improperly stored' refers to munitions stored in a manner which does not generally follow accepted multilateral norms or guidelines, or existing national legislation and controls.

[f] 'Munitions' refers to weapons, ammunition, explosives, and components. (Some armed forces and ammunition specialists, however, use the term 'munitions' to refer solely to complete rounds of ammunition (Bevan and Wilkinson, 2008, p. xxvi).)

[g] 'Munitions site' refers to either an explosive storage area (ESA), 'an area used for the storage of explosives and within which authorized ammunition or missile preparation, inspection and rectification operations may also be carried out' (UNODA, 2011, para. 3.108, p. 12), or an ammunition-processing site, defined as 'a building or area that contains or is intended to contain one or more of the following activities: maintenance, preparation, inspection, breakdown, renovation, test or repair of ammunition and explosives' (UNODA, 2011, para. 3.12, p. 2). A site may be permanent or temporary.

will determine their requirements and therefore their surpluses differently (see Bevan and Karp, 2008, pp. 103–10; Karp, 2010). Generally speaking, while some improperly stored and managed materiel may meet the needs of a government, much does not.

This Handbook has been published to serve three primary purposes. First, it strives to support best practice by explaining the scale and scope of the challenge that policy-makers face, and it aims to encourage states to manage their stockpiles effectively (see Part I). To this end, it is designed to help generate better data capturing and record keeping (see Part II; Annexe A). Second, the study is intended to serve as a reference tool. Detailed profiles review more than 30 actors undertaking UEMS-related activities (see Part III). An annotated bibliography lists and summarizes useful guides and studies, as well as reviews of web-based materials such as tools with which to calculate quantity–distance principles to promote safety (see Part IV). Annexes B and C document UEMS incidents (by date and country within regions, respectively) and summarize data that the Survey continues to collate. And third, the book serves as a training tool. The UEMS Incident Reporting Template (IRT) presented in Annexe A is provided to promote accurate record keeping and the sharing of systematized data (see Part II). Short explanations indicate why the information sought is of value. Annexe D provides the content of the Survey's best practice on PSSM (for 'physical security and stockpile management') in the form of playing cards containing useful guidance and photographs. Both the IRT and the Best-practice Cards are available in languages other than English from the Survey's website:

www.smallarmssurvey.org/?UEMS-tools

Box 2. Submerged munitions: how big a problem are they?

Military conflicts across the globe over the past hundred years have resulted in large quantities of munitions and explosives from thousands of sunken cargo ships and military vessels being strewn across sea beds and ocean floors. Governments, multinational corporations (particularly those active in the telecommunications, oil, and gas sectors), and maritime companies know where most of these wrecks are located. (Some, like the SS Richard Montgomery, a US cargo ship loaded with munitions and explosives on its way from the Delaware to Cherbourg in 1944, are also well known to the general public: see Hamer, 2004.[3] The ship sank in the Thames estuary—about 60 km east of central London—and its masts are still visible from land, their fate recently coming into sharper focus due to discussions about a proposed airport project (see BBC, 2013).)

Efforts are made to limit contact with these sites, and when they are engaged it is understood that there is little incentive—and few, if any, requirements—to share information on any explosions or casualties incurred.[4]

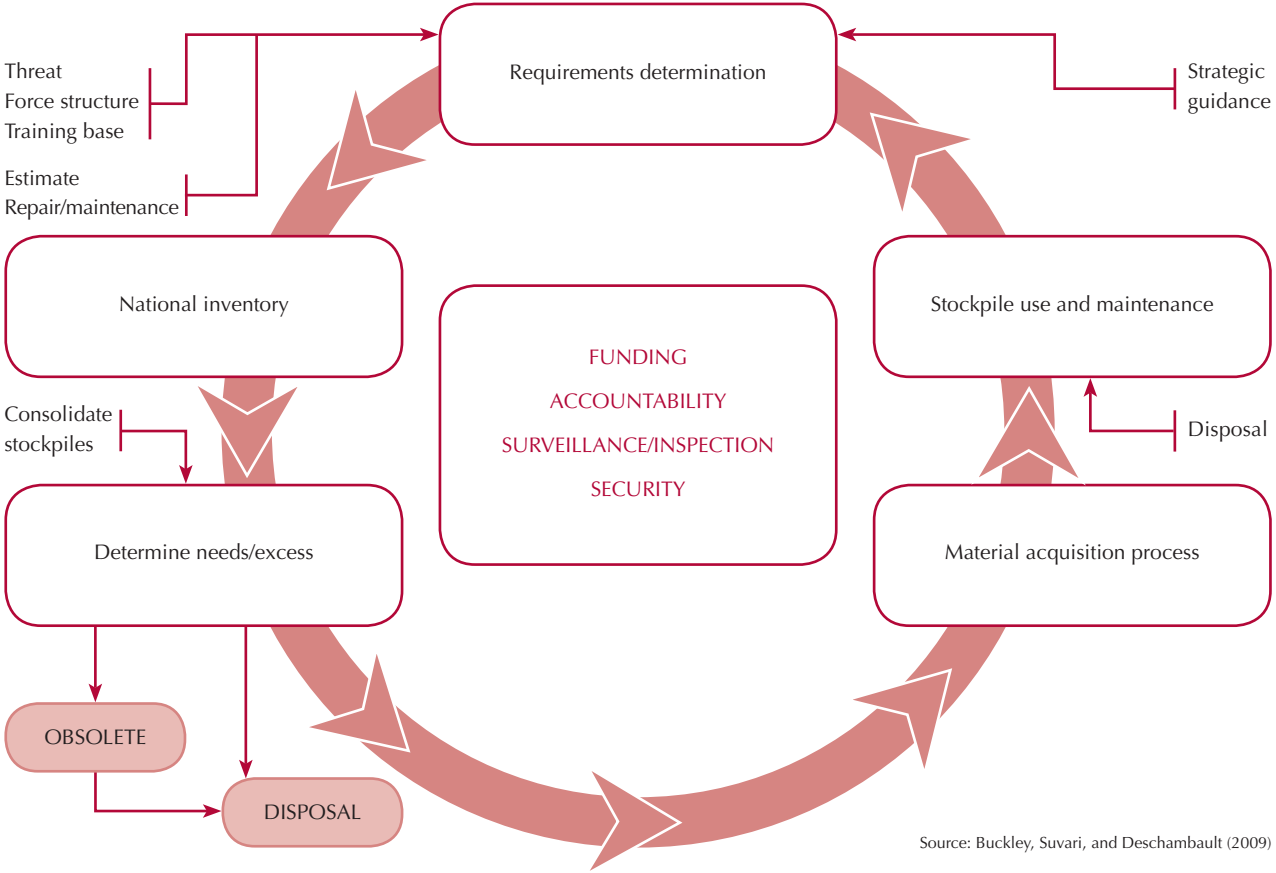
More stringent environmental regulations, counter-terrorism considerations, and emerging new technologies (such as wind energy and the construction of wind farms that require turbines to be cemented and secured off-shore) may require governments to re-examine the manner in which they manage and secure these sites.

Long-established state practices of disposing of munitions at sea and in other bodies of water warrant review, but are not addressed in this Handbook.

Box 3. Is it a UEMS incident or not? Some examples

- Accidental explosions *during* manufacturing are not included. But accidental explosions at manufacturing sites for post-production *stored* munitions are.
- Unplanned explosions occurring *during* industrial dismantling or demilitarization (i.e. during processing) are not included. Explosive events that occur within the storage facilities of these sites are.
- Explosions that occur during transportation *within* the storage or processing site are included. Explosions that occur in transit *outside* storage or processing sites are not.
- Incidents of unexploded ordnance (UXO) that detonates during mishandling during scavenging or clearance operations (by civilians or EOD experts) are not included; explosions of UXO held in storage or being processed are included.
- Munitions that misfire and explode during military or training operations are not included. But explosions of munitions used for military or training operations that occur during storage are.
- Acts of sabotage that proper standard operating procedures should have prevented are included. Explosions that occur due to aerial attack or artillery bombardment by hostile forces are not (as physical security and stockpile management (PSSM) best practices are not intended to address these threats).
- Explosions that occur at underwater munitions sites formed by disposal programmes are not included, nor are those that occur at underwater sites of shipwrecks or downed aircraft.
- Explosives, including fireworks and commercial-grade explosives, which are not affiliated with munitions, are not included.

Figure 1. Munitions life-cycle management



Source: Buckley, Suvari, and Deschambault (2009)

Observations

The effects of unplanned explosions are numerous and often long-lasting. The media tend to focus on the immediate direct effects of such an incident, namely casualties incurred from the initial explosion. This focus on casualties is both understandable and a valuable indicator of the human costs of UEMS, and why it is important to work towards preventing them. Only if we look at their longer-term socio-economic and politico-military effects, however, is it possible to understand the full costs of UEMS and to appreciate why countering them should be prioritized on national, regional, and international agendas.

Although this Handbook documents the longer-term costs related to UEMS in considerable detail, information on individual events is often sparse. Governments can better share their findings in the wake of explosions. The UEMS IRT—which the Survey developed in consultation with national verification centres, EOD experts, United Nations officials, and stockpile-management and surplus-destruction practitioners—serves to facilitate the collection and collation of data and to improve on current practices. If used as intended, the IRT can collate substantially better information and analysis, which can then assist the international community to stop UEMS from occurring in the first place.

Preventing UEMS incidents calls for strategies that can be expensive to implement and may require external assistance; the international community is starting to address these challenges. Some sites will certainly need to be closed and their ordnance transported to another location, at significant expense. New facilities, incorporating quantity–distance principles and security features, may need to be constructed from scratch.

Many measures, however, can be undertaken unilaterally and with modest investment. As depicted in the Survey's PSSM Best-practice Cards (Annexe D), states can achieve positive results without investing in major infrastructure projects. They can do so by installing proper doors and locks, using adequate fences and barriers, posting warning signs and labels, organizing the stockpile into stacks or aisles free of obstruction, cutting the grass, and sorting, storing, and working on munitions appropriately. (For concrete examples of 'phased programming' which differentiates among activities that are short-term/low-cost, medium-term/medium-cost, and long-term/high-cost, see King and Diaz, 2011, pp. 26–30.) The adage that 28 grams of forestalling are equivalent to 0.454 kg of remedy—'an ounce of prevention is worth a pound of cure'—was never more apt than for stockpile management.

Besides investment in physical infrastructure and equipment, more expenditure is required to develop human capital. Governments must invest in education, training, management, and oversight of the personnel responsible for storing, securing, and disposing of munitions. Training currently provided is often of insufficient duration and of limited value, as it focuses on best practice and not on how to improve safety from first principles using a risk-based approach. Moreover, too often training, when it is provided, is not given to the people who need it. And when those who do

need it are properly trained, they sometimes get reassigned to other duties in which they do not apply their new skills.

There is still much to do. Given the significant investments made in peace operations and disarmament, demobilization, and reintegration (DDR) programmes, stockpile management and surplus destruction of munitions (and firearms) warrant more attention. The fact that RENAMO (Resistência Nacional Moçambicana), a former rebel group which participated in a DDR process brokered by the United Nations (UN), is still in control of stocks of arms and munitions 20 years after a UN peacekeeping operation, largely deemed successful[5]—and the fact that one of its sites subsequently suffered an explosion—suggests that current practice is wanting.

And solutions themselves can generate new challenges. For example, several explosions at demilitarization plants have called into question the efficacy of existing national controls, oversight, and related coordination with commercial contractors. The Biennial Meetings of States (BMS) and Meetings of Governmental Experts (MGEs) within the framework of the UN Programme of Action on Small Arms (PoA) will give the international community important opportunities to take stock of progress and to consider ways to improve current practice. Those regional organizations that long ago developed best-practice guidelines are encouraged to review them in light of new international measures, such as the International Ammunition Technical Guidelines (IATG). Other organizations may wish to draw on their considerable hard work and expertise.

It is hoped that this Handbook will support these institutions and processes.

Endnotes

1 The largest such incident occurred off the coast of Canada in December 1917, when a cargo ship carrying explosives on its way from the United States to Europe collided with another boat in Halifax harbour. The shockwave damaged homes over a 25 km-radius, with windows broken as far as 80 km from the epicentre. The blast and subsequent tsunami resulted in more than 1,900 deaths, the largest loss of life recorded from a single man-made conflagration until 6 August 1945. The event is still commemorated annually in Nova Scotia (Walker, 2011, pp. 48–52, 102–103).

2 By contrast, the chemical compound trinitrotoluene (TNT), for example, is an explosive material that is extremely stable.

3 After the ship ran aground, the UK government was able to unload much of the SS Richard Montgomery's dangerous cargo before it broke apart. Submerged munitions include 13,700 explosive devices amounting to 1,400 tonnes of TNT (Hamer, 2004).

4 Author interview with David Hewitson, director, Fenix Insight, 19 September 2013, Geneva.

5 Disarmament, which at first had been the prerequisite to holding elections (which were held peacefully in October 1994), eventually became a secondary consideration. Former combatants surrendered relatively few of their weapons and small amounts of munitions; and of the material surrendered, less still was destroyed (see Berman, 1996).

PART I

Scale and Scope

Overview

Part I addresses the primary concern of the Handbook: to establish the scale and scope of the challenge posed by unplanned explosions at munitions sites (UEMS). The first section of this part provides an overview of the number of incidents, describes their distribution, and notes trends when possible. The causes of explosions are the subject of the second section. These are classified as (1) lack of surveillance leading to ammunition deterioration; (2) inappropriate storage systems and infrastructure; (3) handling errors and inappropriate working practices; (4) failure to take into account external, environmental influences and events; (5) poor security; and (6) a cause that is currently undetermined or unrecorded. The third section considers the effects of unplanned explosions. It explores direct effects (including casualties and displacement) and indirect effects (including reduced access to health care and schooling). The fourth section introduces some of the actors and initiatives working towards making UEMS incidents less likely and reducing the damage that they cause.

Incidents

UEMS are a persistent and growing problem. The Small Arms Survey has documented more than 500 unplanned explosions between 1979 and 2013. With the exception of 1979, not a single year has passed without a UEMS having been recorded (see Figure 2). In the past 20 years, the average annual number of such incidents has exceeded 20. The greatest number of incidents was registered in 2011, accounting for 37 events.[1] It may be that the normal degradation of propellants and primers largely explains the growing number of UEMS. There may also be a reporting bias (see Box 4). Almost 60 per cent of the events recorded in the Survey's UEMS Database for the period under review occurred between 2003 and 2013. Greater political will and commitment to manage stockpiles and destroy surplus munitions, together with the involvement of more actors with access to information on UEMS, may have resulted in higher rates of reporting.

UEMS are a global problem. In the past 35 years, explosions have occurred on every continent, except Antarctica. They have taken place in both developed and developing countries. Of the world's 22 sub-regions (as designated by a UN body), at least one UEMS has been recorded in all but three (see Figure 3).[2] One hundred countries—*comprising more than half* of the United Nations' member states—have been directly affected[3] (see Map 1).

Box 4. Possible reporting bias favouring more recent UEMS

Skilled manufacturing, transport procedures, and stockpile management practices will prolong the shelf-life and effectiveness of munitions. But some munitions become progressively unstable over time. Preventing these munitions from becoming dangerously unstable requires constant testing and surveillance. If production, procurement, use, and storage practices are consistent or improving, how can the increasing incidence of UEMS over the past 15 years be explained? Countries may be more willing to acknowledge UEMS, or less able to prevent reports of their occurrence from being made public.

First, three international arms control measures since 1997 have focused attention on the importance of stockpile management and the destruction of surplus stocks, and have led to greater transparency of state practice towards these ends. The Ottawa Treaty banning anti-personnel landmines, signed in 1997 (which entered into force in 1999), provided a conducive environment for the creation of additional companies (many profiled in Part III of this Handbook) to help destroy these munitions, and established transparency measures which enabled civil society to monitor implementation of the treaty by states parties. The political commitments in the UN Programme of Action on Small Arms, launched in 2001, explicitly noted the importance of proper stockpile management to counter the illicit proliferation of small arms and called for states to report regularly on both their needs and their progress towards meeting agreed objectives. And the Convention on Cluster Munitions, concluded in 2008 (in effect since 2010), banned an entire type of weapon. These three initiatives have all contributed to greater access to countries' munitions stores and numerous destruction programmes.

Second, the terrorist attacks of 11 September 2001 in the United States and 28 November 2002 in Kenya triggered profound changes to the arms control agenda. These two series of attacks resulted in numerous national, regional, and international efforts to control, recover, and destroy man-portable air-defence systems (MANPADS), also known as shoulder-launched anti-aircraft missiles. Significant resources were made available to enhance the management of national stockpiles.

And third, the development of social-media tools must also be taken into account. The creation of YouTube in 2005, for example, meant that anyone with a cell phone and Internet access—and in visual proximity to an explosion—could report or document an incident. Many have done so.

The incidents are not, however, distributed evenly. Just as increased political will and access to information may favour more complete reporting of recent events, some governments hesitate to report UEMS events on their territory. In some countries traditional media or social media may be less inclined to report or broadcast such incidents. This said, the large and disproportionate numbers of UEMS that have occurred in Eastern Europe, Southern Europe (especially South-east Europe), Southern Asia, and Western Asia (see Figure 3) are conspicuous. Four countries alone account for more than one-quarter of all the UEMS reported during the 35-year period under review: Russian Federation, Afghanistan, Albania, and India (see Table 1).

Geo-political and socio-economic factors seem to influence a country's vulnerability to UEMS. UEMS events have been reported

in 10 of the 15 current UN member states that were part of the former Soviet Union; and all but one of the former non-Soviet members of the Warsaw Pact have experienced a UEMS (see Map 2). All of these countries and territories had large armed forces or significant munitions stores after the Second World War, without corresponding investments in education, training, and stockpile management and destruction.

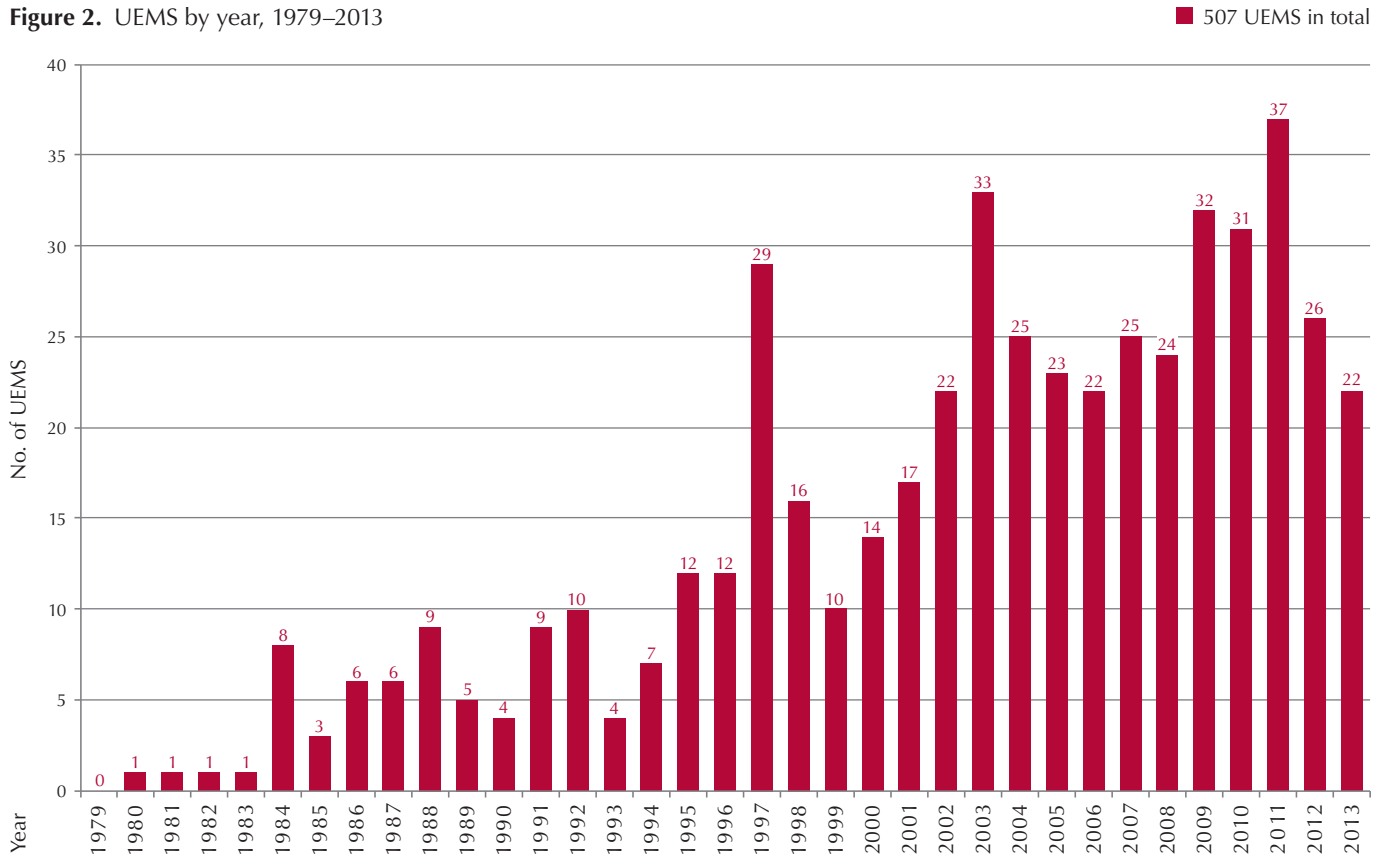
Indeed, the Soviet Union had no procedures in place to eliminate surplus material systematically (Polyakov, 2005, p. 8). A former Ukrainian Ministry of Defence official described the legacy of post-Soviet munitions storage as 'a nightmare of hundreds and hundreds of thousands of shells [lying around] in the grass and in the bushes for decades'. He added: 'No one has dared approach them, as everything has long been rotten. Everything has been stored in huge heaps like beets' (BBC, 2004).

In contrast, ten of the 16 states that were members of the North Atlantic Treaty Organization (NATO) at the time of the dissolution of the Soviet Union experienced UEMS between 1979 and 2013. NATO has long had very detailed guidelines for the storage and handling of munitions (see NATO profile, Part III). All except three (France, Turkey, and the United States) have experienced only one or two UEMS. Five of the ten former Soviet Republics have had three or more UEMS events. (Moreover, of the five UEMS incidents recorded in unified Germany, four occurred in what was East Germany.)

Not all UEMS take place at facilities under government control. More than 15 per cent of the events recorded in the UEMS Database have occurred at sites that are not directly run by the government or state security services. Most of these incidents have involved depots of non-state armed groups (see Table 2). There have been 40 incidents over the past 35 years at depots of more than a dozen armed groups. Three groups, which have been active for many years and possess particularly large arsenals, account for more than a third of these events: Hezbollah, the Sudan People's Liberation Army (SPLA), and the Taliban. Indeed, so many have occurred in Hezbollah sites that the group has even fabricated an incident to cover losses of its men engaged in other, more politically sensitive, activities.[4]

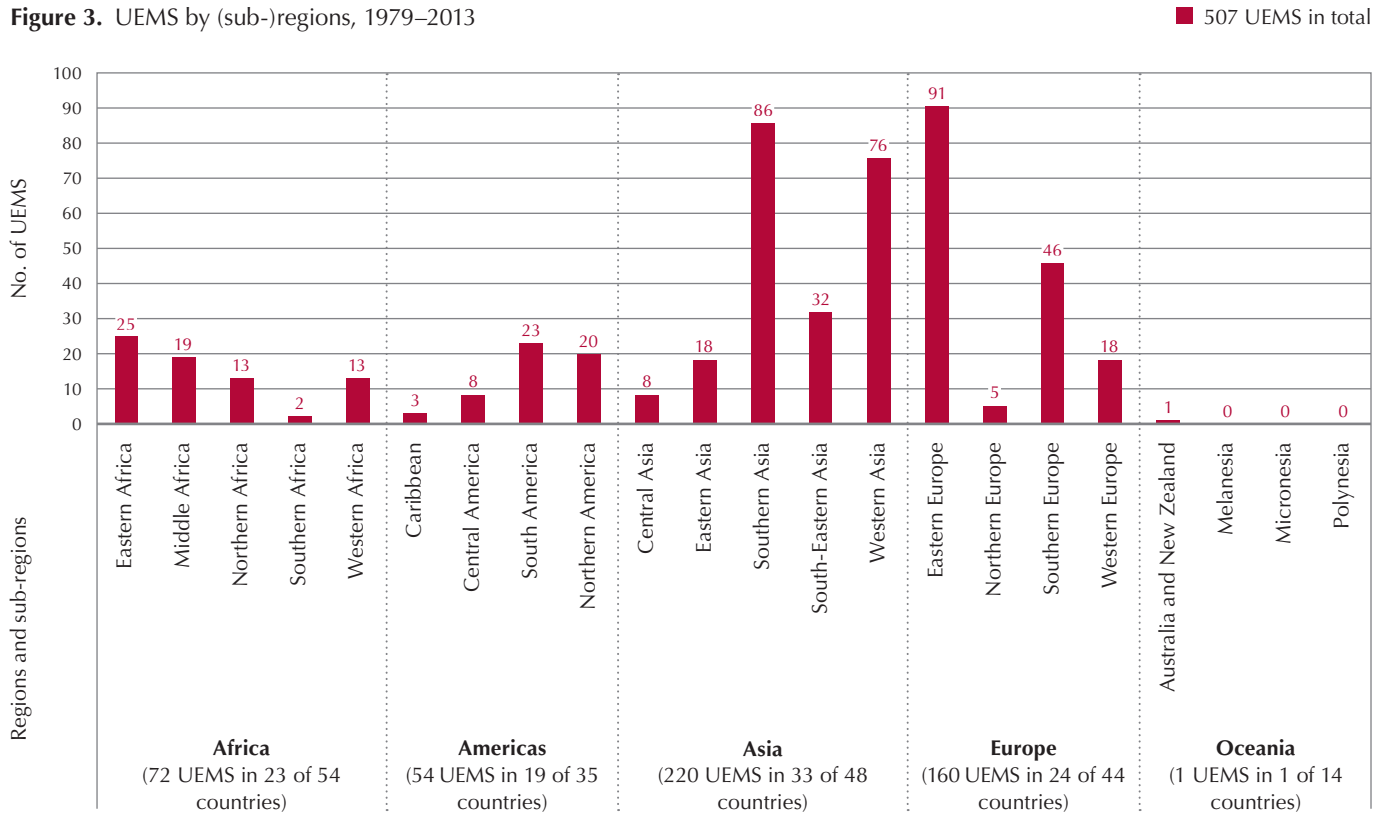
The May 2009 explosion of munitions held by the Mozambican National Resistance (Resistência Nacional Moçambicana, or RENAMO; Tracey, 2011, pp. 1–3, 7–10) shows that these munitions can pose a risk many years after a conflict has formally ended.[5] The stockpile management practices of armed groups often fall short of best practice. A lot has been written about these groups' procurement, possession, and use of firearms and ammunition (see, for example, Bangerter, 2012; Florquin, Bongard, and Richard, 2010). In recent years, the physical security and stockpile management (PSSM) practices of armed groups has received greater attention (see, for example, McQuinn, 2012; Schroeder, 2013; Box 5). A potentially interesting development concerns the international community's effort in Libya—working with the government—to engage a non-state (or perhaps more accurately 'quasi-state') group to secure its munitions. The medium- and long-term effects of this initiative are not yet clear, however, nor are their plans to replicate the effort elsewhere.[6]

Figure 2. UEMS by year, 1979–2013



Source: Small Arms Survey UEMS Database (2014)

Figure 3. UEMS by (sub-)regions, 1979–2013



Note: Regions and sub-regions (22 in total) are defined with reference to UNSD (2013). They include all 193 UN member states and the two UN permanent observer states.

Source: Small Arms Survey UEMS Database (2014)

Table 1. UEMS by incident: top 25 countries, 1979–2013

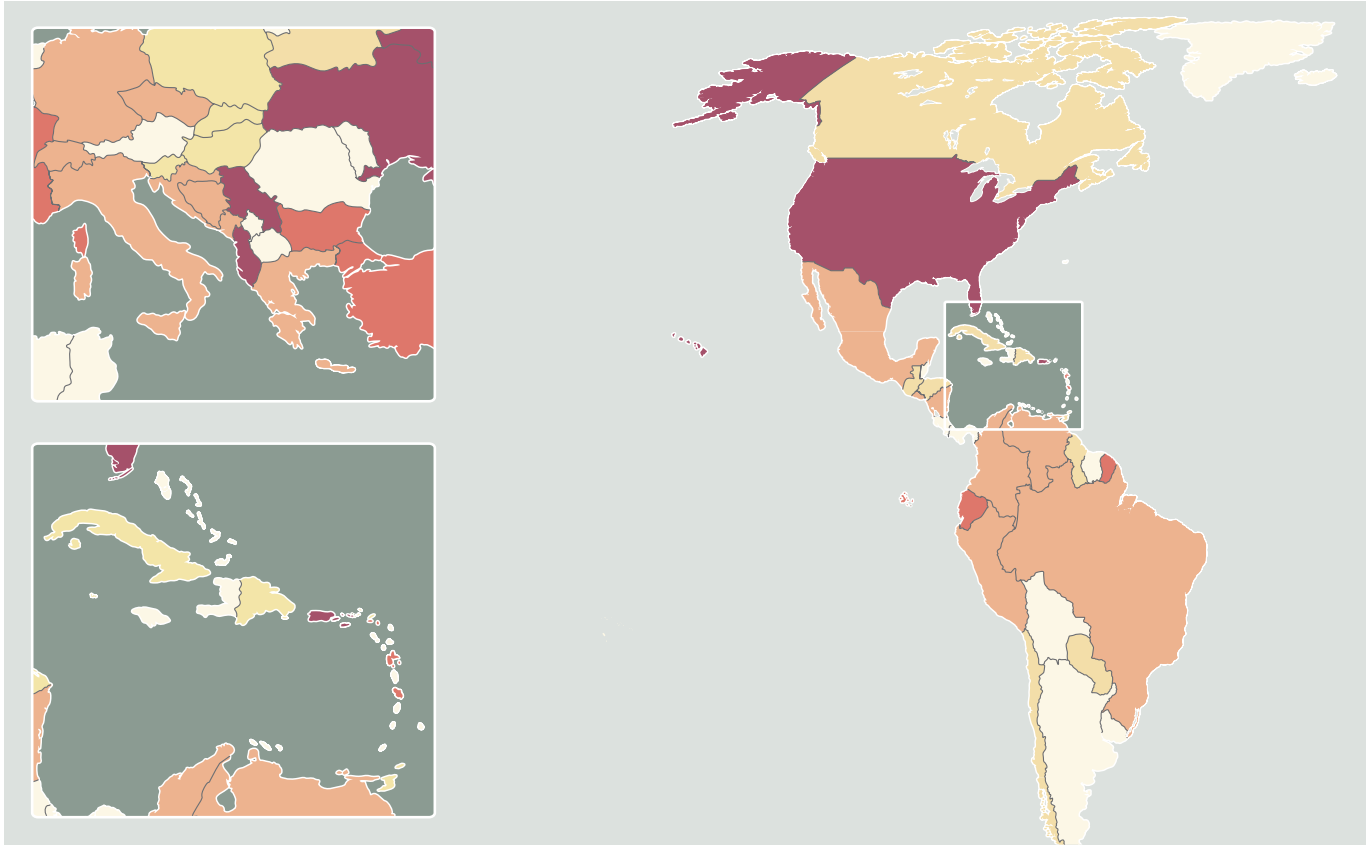
Rank	# of UEMS	Country	Notes
1	66	Russian Federation	UEMS recorded in 25 of 35 years under review. 21 incidents recorded in 2009–2013 period.
2	28	Afghanistan	More than half (15) were recorded between 2001 and 2005. Only four were recorded between 2006 and 2013.
3	24	Albania	18 incidents occurred in 1997 during a period of considerable social unrest in response to a Ponzi scheme.
4	23	India	There has been an average of more than one UEMS event per year over the past 20 years.
T5	19	Iraq	15 incidents were recorded in 2003 and 2004 alone. The 19 reported incidents resulted in at least 300 casualties.
T5	19	United States	Deaths and injuries (six in total) have been reported in only two events (with casualty information missing for four events).
T7	15	China	Ten incidents occurred in Taiwan. (The UN recognized Taiwan as a Chinese province in 1971.)
T7	15	Yemen	At least six of the recorded UEMS are at sites outside direct government control.
T9	11	Pakistan	The 1988 incident in Rawalpindi claimed more than 1,000 casualties, including 90 deaths.
T9	11	Sri Lanka	This includes an explosion of dynamite (reportedly for construction purposes) at a police station in Karadiyanaru in 2010.
T9	11	Thailand	Two UEMS incidents each resulted in more than 100 casualties: in 1980 in Bangkok; and in 2001 in Korat.
T9	11	Turkey	The 2012 Afyonkarahisar explosion resulted in more than 30 casualties (including 25 deaths).
T13	10	Iran	Seven UEMS have been recorded since 2007. The 2011 Bigadneh incident resulted in more than 40 casualties.
T13	10	Lebanon	Nine incidents occurred at sites belonging to Hezbollah. The other belonged to UN peacekeeping forces.
T13	10	Mozambique	In 2009, a depot belonging to RENAMO (Resistência Nacional Moçambicana) exploded.
T13	10	Serbia	Seven of these events have occurred since 2006, of which four involved sites managed or owned by private companies.
T13	10	Ukraine	Current demilitarization capacity means 50+ years are required to destroy million-plus tonnes of surplus munitions.
T18	9	Bulgaria	Six UEMS occurred at privately owned or privately managed companies contracted to store and dispose of munitions.
T18	9	France	The last recorded UEMS in France occurred in 2007, with seven reported between 2002 and 2007.
T20	8	DRC	The 2000 event in Kinshasa resulted in 300 casualties.
T20	8	Libya	All recorded events have occurred since 2011.
T22	7	Ecuador	Two incidents each resulted in well over 100 casualties.
T22	7	Syria	Six events have been recorded since 2012.
T22	7	Vietnam	Since 1997 there has been an explosion at least every four years.
T25	5	Angola	Only one UEMS was recorded (in 2003) since end of civil war in 2002.
T25	5	Brazil	The 1995 Ilha do Boqueirão explosion is still under investigation.
T25	5	Congo	The 2002 event in Brazzaville caused more than 3,500 casualties.
T25	5	Germany	Four of the events occurred in what was East Germany.
T25	5	Kazakhstan	An incident in 2009 involved a site run by a private company.
T25	5	Philippines	The 2005 Taguig explosion injured more than 100 people.
T25	5	South Sudan	The 2005 explosion in Juba resulted in more than 100 casualties.

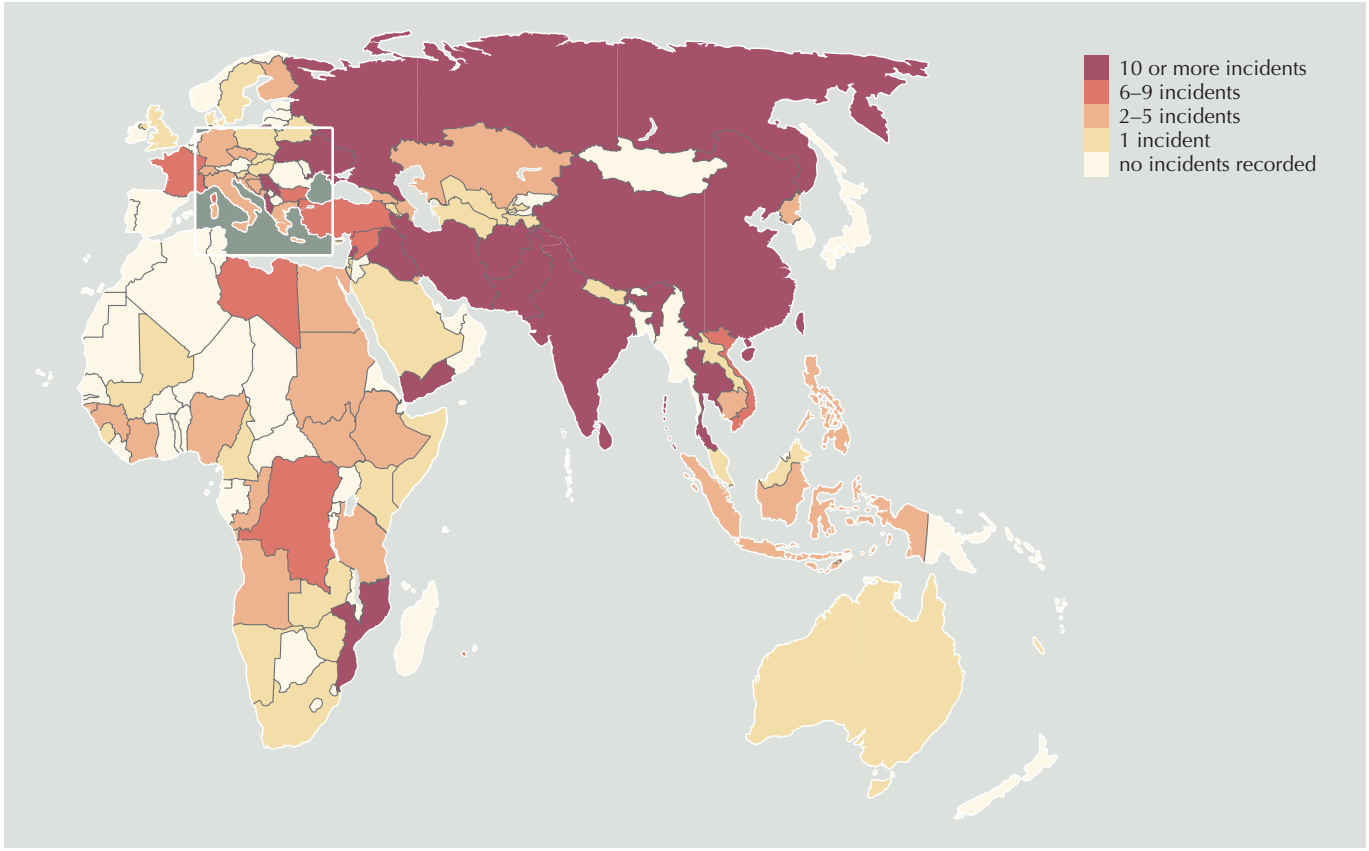
Notes: T in the first column indicates a tie.

Before 1990, UEMS events occurring in the former Soviet Union are registered in the UEMS Database as having taken place in the present-day country where the unplanned explosion occurred. For more details, see Annexe E.

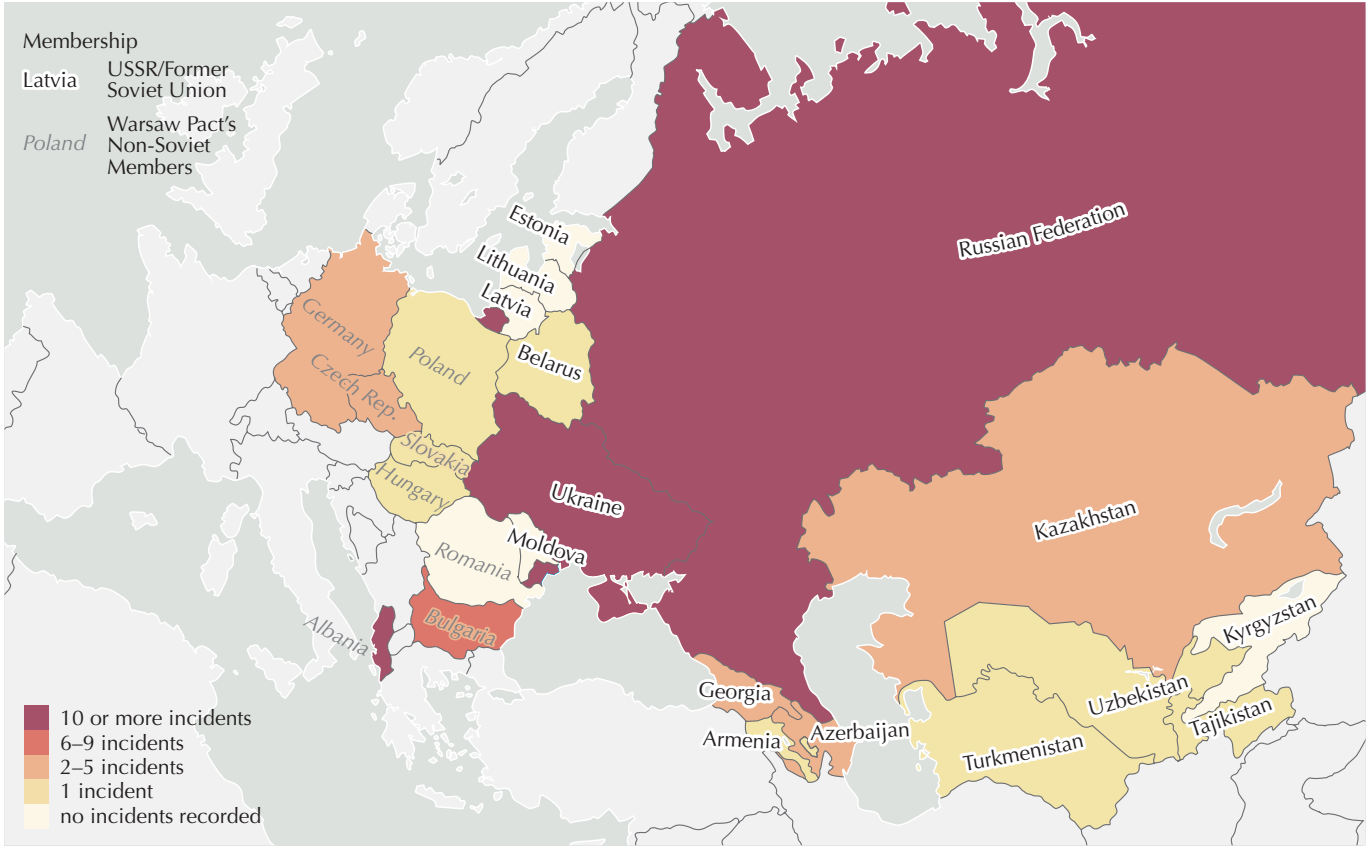
Source: Small Arms Survey UEMS Database (2014)

Map 1. UEMS incidents by country, 1979–2013




10 or more incidents
6–9 incidents
2–5 incidents
1 incident
no incidents recorded

Map 2. UEMS incidents in countries formerly part of the Soviet Union and the Warsaw Pact, 1979–2013



Box 5. PSSM practices of armed non-state actors

Securing stockpiles of munitions and preventing unplanned explosions are particularly challenging tasks for armed groups. An in-depth assessment of the PSSM practices adopted by three large, comparatively well-resourced groups—the Misrata Brigades in Libya, the Revolutionary Armed Forces of Colombia (or FARC: *Fuerzas Armadas Revolucionarias de Colombia*), and the Sudan People's Liberation Army (SPLA)—reveals numerous, significant barriers to implementing international best practices for PSSM, including a lack of technical expertise and under-developed public infrastructure in the regions in which stockpiles were located. The biggest barriers were strategic and doctrinal, however. Since armed groups rarely have uncontested control over the territory in which they operate, they are under constant threat of attack by government forces. As a result, these groups rely on stealth and mobility, tending to disperse their assets, including munitions, in small caches to minimize losses resulting from government raids. Centralized storage of munitions in large, purpose-built weapons-storage facilities, as recommended in international PSSM guidelines, is anathema to this modus operandi and would render the group's weapons—which the FARC reportedly viewed as more valuable than its members—extremely vulnerable to government seizure or destruction.

Instead, the groups studied stored their weapons in a wide array of residential and civilian structures, ranging from commercial warehouses to mud huts. Urban militias associated with the FARC stored weapons, ammunition, and explosives in their homes, often in closets or behind fake ceilings. In some cases, weapons were not stored in structures at all. FARC units operating in rural areas often buried their weapons and ammunition underground in plastic bins, or placed them in caves, hollow trees, or under 'table-like arrangements of vegetation'. Similarly, the SPLA sometimes stored munitions in plastic-lined pits or under tarpaulins hung between trees. While some steps were taken to reduce the risk of unplanned explosions, the caches lacked most of the physical security measures used by governments to mitigate the risk and effects of such explosions. The FARC's practice of limiting the production of explosives to the exact amount needed for a given operation, storing explosives and igniters separately, and, in rural regions, storing arms in sparsely populated areas undoubtedly helped to reduce the threat.

Interviews with former FARC members suggest that the group also attempted to control, at least to some degree, the storage conditions (e.g. temperature and humidity levels) of certain weapons, including explosives. Yet the interviews also reveal practices that are problematic, including the storage of ammunition and explosives in residential buildings located in densely populated urban areas. Incomplete data precludes a full assessment of the risks posed by these and other stockpiles held by armed groups, but the growing list of unplanned explosions at armed groups' depots underscores the potential threat from munitions that are beyond government control.

Source: Schroeder, 2013

Table 2. UEMS by non-state entity: incidents involving depots of armed groups, 1979–2013

Armed group	Date (dd.mm.yyyy)	Location	
		Country	Site
Ahmar family	26.05.2011	Yemen	Sana'a
Akbar Khan Bugti	07.02.2006	Pakistan	Dera Bugti
Al-Nasr Front	08.12.2012	Syria	Saraqeb
Bajgaye militia	02.05.2005	Afghanistan	Bajgah
Forces Nouvelles	05.01.2011	Côte d'Ivoire	Séguéla
Gen. Ali Mohsin al Ahmar	18.10.2012	Yemen	Sana'a
Gul Agha Shirzai	27.06.2002	Afghanistan	Spin Boldak
Hamas	20.10.2010	Palestinian Territories	Rafah
Hezbollah	13.02.2005	Lebanon	Majadel
Hezbollah	01.04.2005	Lebanon	Majadel
Hezbollah	14.07.2009	Lebanon	Khirbit Selm
Hezbollah	11.10.2009	Lebanon	Tayr Fils
Hezbollah	03.09.2010	Lebanon	Shehabiyya
Hezbollah	23.11.2011	Lebanon	Siddiqine
Hezbollah	03.10.2012	Lebanon	Baalbek
Hezbollah	17.12.2012	Lebanon	Tairharfa
Junbish-e-Milli	03.08.2003	Afghanistan	Aqcha
Mahdi Army	28.04.2004	Iraq	Kirkuk
Moqtada al-Sadr militia	08.06.2004	Iraq	Kufa
National Islamic Front	05.04.1993	Afghanistan	Kabul

Armed group	Date (dd.mm.yyyy)	Location	
		Country	Site
RENAMO	27.05.2009	Mozambique	Maringue
Sadeq al-Ahmar	26.05.2011	Yemen	Sana'a
Sehiya Swehli qatiba	01.03.2012	Libya	Dafniya
Sirte Revolutionary Brigade	25.05.2012	Libya	Sirte
Somaliland Armed Forces	25.08.2005	Somalia	Daraweye
SPLA	24.02.2005	South Sudan	Juba
SPLA	—.03.2008	South Sudan	Kegulu
Taliban	19.03.1997	Afghanistan	Jalalabad
Taliban	15.02.1999	Afghanistan	Kabul
Taliban	05.05.1999	Afghanistan	Kabul
Taliban	09.10.1999	Afghanistan	Mazar-e Sharif
Taliban	26.05.2000	Afghanistan	Kabul
n/a	19.09.2003	Afghanistan	Mehtar Lam
n/a (Afghani guerrilla group)	15.11.1989	Pakistan	Garam-Chasma
n/a (Al-Mustaqbal Movement suspected)	10.02.2012	Lebanon	Tripoli
n/a (anti-Gaddafi Rebels)	29.06.2011	Libya	Benghazi
n/a (Chechen or Pakistani militants)	11.07.2001	Afghanistan	Darulaman
n/a (pro-Assad forces)	01.08.2013	Syria	Homs
n/a (rebel group)	04.03.2011	Libya	Al-Rajma
n/a (Syrian rebel supporters)	03.09.2013	Turkey	Hacipasa

Notes: This table includes actors the United Nations does not recognize as representing a UN member state or a permanent observer state. The Taliban, for example, effectively controlled most of Afghanistan's territory from September 1996 to November 2001, but the UN General Assembly did not recognize it, this despite the fact that three UN member states (Pakistan, Saudi Arabia, and United Arab Emirates) did recognize the Taliban as the legitimate Afghan government. This table also lists actors that may be part of a government, but that act independently of either the executive branch or the armed forces of that government. Examples would include Hamas, Hezbollah, and RENAMO.

Source: Small Arms Survey UEMS Database (2014)

Explosions have also taken place at sites run by private and semi-private companies. According to the UEMS Database, more than 30 UEMS have occurred at such facilities across almost 20 countries (see Table 3). In some instances, government bodies have indicated that they are confused about the ownership of certain sites that were formerly but are no longer operated by Ministries of Defence but may still be owned by the state, wholly or partly (Gobinet, 2012, p. 27). These UEMS have occurred at demilitarization sites, production sites, and storage sites. At many of these sites, government oversight is often lax. Indeed, there is currently no common international or European standard, legislation, or compliance mechanism which addresses ammunition demilitarization by commercial contractors (Gobinet, 2013a, p. 200).

Table 3. UEMS by non-state entity: incidents involving depots of companies (private and semi-private), 1979–2013

Company or processing plant	Principal activity	Date (dd.mm.yyyy)	Location	
			Country	Site
Accurate Energetic System LLC	Manufacturing/Production	16.05.2007	United States	Milan, TN
Accurate Energetic System LLC	Manufacturing/Production	10.05.2010	United States	Milan, TN
Afghan Construction and Logistics Unit	Manufacturing/Production	10.08.2002	Afghanistan	Jalalabad
Alb Demil	Demilitarization/Destruction	15.03.2008	Albania	Gërdec
Arsenal J.S. Co.	Manufacturing/Production	10.08.2008	Bulgaria	Kazanlak
Arsenal J.S. Co.	Manufacturing/Production	11.09.2012	Bulgaria	Kazanlak
Bereta Trading Company	Demilitarization/Destruction	05.06.2012	Bulgaria	Straldzha
Booster	Manufacturing/Production	08.07.2006	Montenegro	Vir
Booster	Manufacturing/Production	07.03.2010	Montenegro	Niksic
Compañia Anónima Venezolana de Industrias Militares (CAVIM)	Manufacturing/Production	30.01.2011	Venezuela	Maracay
Entsorgungs-Betriebsgesellschaft mbH (EBV)	Demilitarization/Destruction	17.09.2002	Germany	Torgau
EMCO Ltd.	Demilitarization/Destruction	12.11.2011	Bulgaria	Lovnidol
Explo System	Demilitarization/Destruction	15.10.2012	United States	Doyline, LA
Goex Inc.	Manufacturing/Production	15.07.2006	United States	Doyline, LA
Greek Powder and Cartridge Company (PYRKAL)	Manufacturing/Production	02.08.1991	Greece	Dervenohoria
Israel Military Industries (IMI)	Manufacturing/Production	18.05.2007	Israel	not available

Company or processing plant	Principal activity	Date (dd.mm.yyyy)	Location	
			Country	Site
Kazarsenal	Demilitarization/Destruction	19.03.2009	Kazakhstan	Arys, SOK
Krusik Holding Corporation	Manufacturing/Production	10.05.2010	Serbia	Valjevo
Logan Iron and Metal	Manufacturing/Production	—.—.1997	Canada	Winnipeg
Makina ve Kimya Endüstrisi Kurumu (MKEK)	Manufacturing/Production	20.08.2013	Turkey	Hasandede
Manhurin Défense	Manufacturing/Production	14.06.2006	France	Bellerive-sur-Allier
Maxam Bulgaria	Demilitarization/Destruction	11.01.2012	Bulgaria	Charkovo
Mecar Sprl	Manufacturing/Production	07.09.2010	Belgium	Seneffe
Mohamed Jarman (private stockpile)	Manufacturing/Production	30.11.2012	Yemen	Sana'a
One Shot Ammunition Manufacturing Inc.	Manufacturing/Production	24.05.2009	United States	Owensville, OH
Prva Iskra Namenska (Prva Iskra Military Industry)	Manufacturing/Production	21.06.1996	Serbia	Barik
Prva Partizan Užice	Manufacturing/Production	03.09.2009	Serbia	Užice
Sloboda Munitions Factory	Manufacturing/Production	27.12.2010	Serbia	Čačak
Sloboda Munitions Factory	Manufacturing/Production	16.12.2013	Serbia	Čačak
Spreewerk Lübben GmbH	Demilitarization/Destruction	12.11.2002	Germany	Lübben
Talon Manufacturing Co.	Manufacturing/Production	05.07.2006	United States	Herndon, WV
Ukroboronservice Enterprise	Manufacturing/Production	13.03.2010	Ukraine	Hruzevystsya, region 68
VIDEX JSC—Midzhur Ammunition Factory	Manufacturing/Production	03.02.2010	Bulgaria	Gorni Lom
VOP Novaky	Demilitarization/Destruction	02.03.2007	Slovakia	Novaky
West Virginia Ordnance High Performance Ammunition	Manufacturing/Production	17.05.2012	United States	Point Pleasant, WV
Widener's Reloading and Shooting Supply	Manufacturing/Production	01.09.2010	United States	Johnson City, TN
n/a (scrap yard)	Demilitarization/Destruction	04.09.2013	Syria	Azmarin
n/a	Manufacturing/Production	24.05.2009	United States	Owensville, OH
n/a	Manufacturing/Production	20.05.2001	Yemen	Al-Bayda

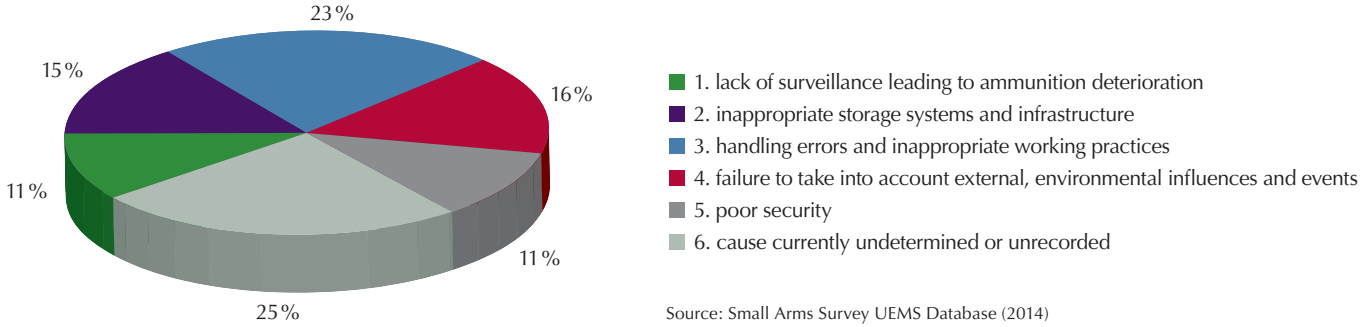
Source: Small Arms Survey UEMS Database (2014)

Causes

Behind each UEMS event is a weakness in the stockpile's management system that created the conditions permitting the event to occur. It is this structural weakness, combined with an initial trigger (such as a lightning strike, fire, etc.), that causes most UEMS. The trigger itself usually should not be enough, in and of itself, to cause a larger site explosion. The Survey defines these structural weaknesses as **root causes**, and classifies them into five broad categories: (1) *lack of surveillance leading to ammunition deterioration*; (2) *inappropriate storage systems and infrastructure*; (3) *handling errors and inappropriate working practices*; (4) *failure to take into account external, environmental influences and events*; and (5) *poor security*. **Root causes** refer to the underlying structural conditions that permit UEMS to occur (for more information on causes, see Part II).

Those incidents without an attributed cause fall under category (6): *cause currently undetermined or unrecorded*. The number of events in category (6) is significantly larger than the number of events that fall under any of the other individual categories of root cause. Fully 25 per cent of the more than 500 UEMS entered in the Survey's database for the period 1979 to 2013 are classified as *cause currently undetermined or unrecorded* (see Figure 4), an observation which emphasizes the need for proper and responsible reporting of incidents, investigation, and record keeping.

Figure 4. UEMS by cause: distribution of root causes, including data on 'causes currently undetermined or unrecorded', 1979–2013



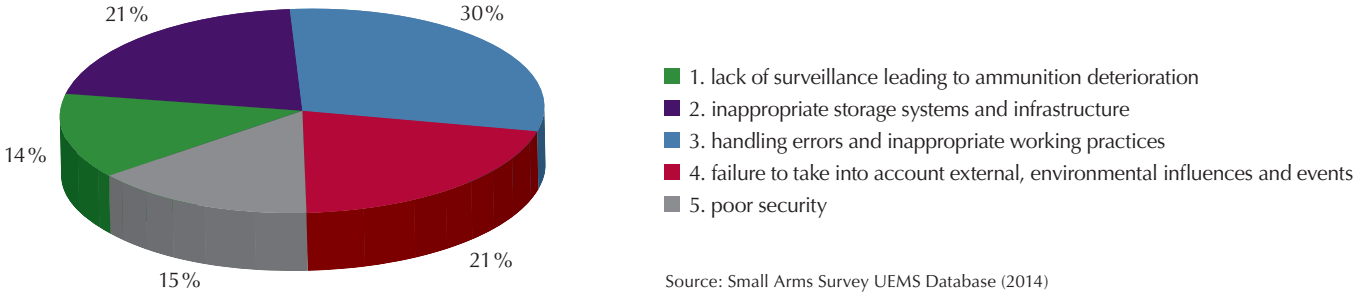
Source: Small Arms Survey UEMS Database (2014)

Information on causes might be omitted from incident reports for many reasons. Causal evidence may have been lost in the event. Even when investigations are conducted, they may take years to complete. Governments are also often reluctant or unable to provide details explaining why explosions occur accidentally at their munitions sites. Authorities usually consider that information which emerges during the investigation cannot be made public without compromising the case.[7]

National security considerations may often also cause governments to be reluctant to divulge information, and this reticence may then be compounded by a distrust of the accuracy and efficacy of media reporting. Governments may also have concerns about how such events may affect their standing and reputation within the international community. In some cases, governments simply possess no information. This is particularly the case when explosions occur at sites that are not under government control and oversight. When governments do provide explanations, they may be lacking in detail or inaccurate, and at times these explanations may be biased towards political expediency rather than accountability. Governments may choose to lay blame elsewhere, rather than take responsibility themselves. It is easier to blame bad weather (such as lightning) than to admit to years of poor storage, for example.

In order to understand what the information in the database reveals about actual causes of UEMS, it is necessary to focus our analysis on data available on causes that have been identified. Figure 5 presents a breakdown of the evidence, excluding undetermined causes. Despite the limitations of the data, available information indicates that the greatest number of UEMS events for which a cause has been recorded and identified results

Figure 5. UEMS by cause: distribution of root causes, excluding data on 'causes currently undetermined or unrecorded', 1979–2013



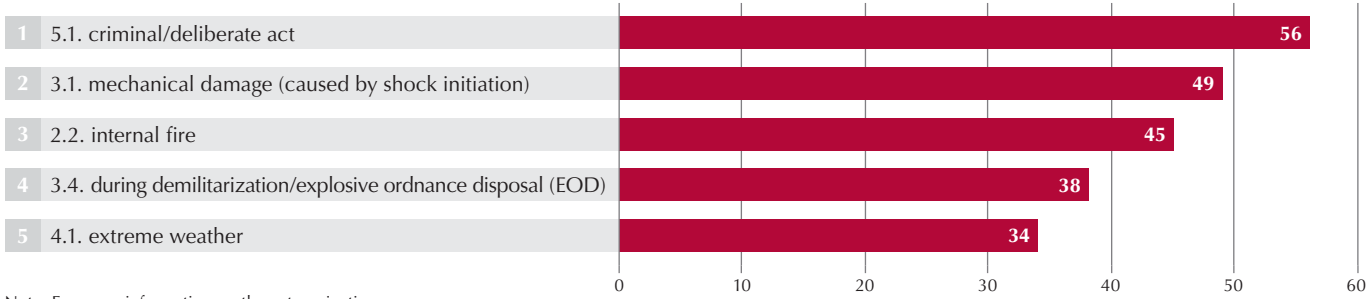
Source: Small Arms Survey UEMS Database (2014)

from cause (3): *handling errors and inappropriate working practices*.

Such handling errors may often be attributed to inadequate staff training and expertise. Personnel who handle munitions inappropriately pose severe hazards and put themselves at risk of injury or death. Indeed, these explosions are often reported to be a result of rough handling, munitions being dropped, or the on-site use of prohibited items such as cigarettes. Proper technical training and education, adherence to operating manuals, and attentive supervision are therefore seen as crucial means of improving stockpile safety. That said, even when properly trained and expert staff deal with ammunition and explosives, hazards and risks can never be completely eliminated (UNODA, 2011, para. 11.10, p. iv). For example, despite the likely allocation of greater resources and expertise to demilitarization facilities, which may entail the commissioning of private contractors, it is found that accidents during demilitarization and explosive-ordnance disposal work account for one of the top five **primary causes** for UEMS events.[8] **Primary causes** refer to the specific triggers for explosions within each of the five broader root causes. These top five primary causes for UEMS events are illustrated in Figure 6.

The database suggests that the second most common root cause is (2): *inappropriate storage systems and infrastructure*. This draws attention to possible defects in the design of the storage area and the munitions processing site. It includes explosions that, for example, are triggered by munitions falling to the ground as a result of weak internal storage infrastructure or unsafe stacking. It may also include those caused by inadequate internal

Figure 6. UEMS by primary cause: the top five known primary causes, as recorded, 1979–2013



Note: For more information on the categorization of primary causes, see Table 8, in Part II.

Source: Small Arms Survey UEMS Database (2014)

power supply systems (electrical faults), which then cause internal fires. Indeed, internal fires are one of the top five primary causes recorded (see Figure 6).[9]

Cause (4), *failure to take into account external, environmental influences and events*, is a recurring reason for UEMS explosions. This may refer to extreme weather conditions such as lightning, high temperatures, or external fires near the storage facilities. Preliminary data shows that extreme weather is responsible for almost half of the reported causes for UEMS in this category, and one of the top five of all primary causes recorded (see Figure 6).

'Stockpile security' refers to the protection of ammunition, weapons, and explosives against malevolent actions, including theft, sabotage, damage, or tampering (Ashkenazi, 2008, p. 67). Cause (5), *poor security*, pertains to the threat posed by non-state armed actors, including rebel groups, warlords, or unauthorized personnel. Criminal acts committed by such individuals or groups are the most common of all primary causes recorded (see Figure 6).

Cause (1), *lack of surveillance leading to ammunition deterioration*, is the least common **root cause** recorded. In this category, the specific cause 'auto-initiation of propellant' (spontaneous combustion) is the most frequently recorded **primary cause** for UEMS incidents. Nevertheless, there is reason to believe that numbers for cause (1), *lack of surveillance leading to ammunition deterioration*, are artificially low, owing to inaccurate investigation or reporting. For storage areas or processing sites, *internal fires* may be given as the **primary cause** for these incidents triggered by faulty structural design of the facilities—thereby also inflating the numbers for associated **root cause** (2): *inappropriate storage systems and infrastructure*; these internal fires are in fact often the *result* rather than the *cause* (Wilkinson, 2011, p. 17). In fact, one expert said that of the incidents involving *internal fires* that are properly investigated, propellant deterioration is the main cause. This observation further emphasizes the need for accurate and impartial investigation and reporting.

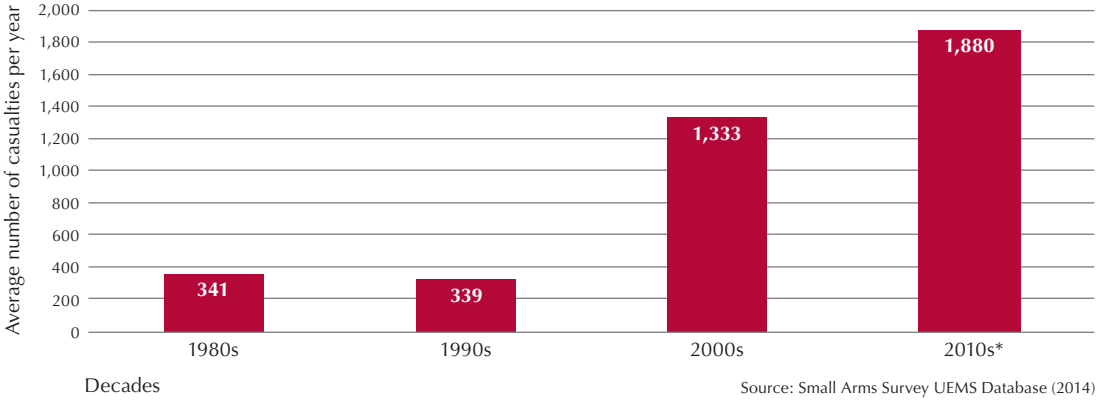
Overall, a proper analysis of the causes of UEMS is an important tool to determine how storage conditions and management practices can be improved in order to prevent such events from occurring in the future. Monitoring the safety performance of activities involving explosives and ammunition may identify areas and processes that require special attention and which in turn require appropriate levels of investment. Furthermore, if the causes of events are investigated and recorded more systematically, this will contribute to more robust data, which in turn may inform concrete improvement in practices. By understanding and identifying characteristics of local contexts in which munitions depots are located, more appropriate standards for storage may ultimately be created.

Effects

The casualties resulting from an explosion are a key focus of reporting on UEMS incidents. The Survey has recorded an average of more than 800 such casualties per year, over 35 years (from 1979 to 2013). There is a significant increase in the number of deaths and injuries attributed to UEMS over the reporting period (see Figure 7). The largest recorded casualty figures linked to a single explosion were reported in Nigeria in 2002. In the aftermath of an explosion at a military depot in Lagos (the country's most populous city), more than 1,000 people perished[10] and many more suffered injuries, but survived. Numerous other incidents have resulted in hundreds of casualties (see Table 4).

A clear link appears to exist between a country's relative wealth and the casualties that result from an unintended explosion. The United States, for example, has experienced 19 UEMS in the past 35 years, but suffered only 36 casualties as a result—well below the global average. One explanation is that munitions depots are never built close to civilian-populated areas; another is that strict working practices reduce the risk to individuals to the minimum achievable—as is the practice elsewhere (see Figure 8).

Figure 7. UEMS by casualties: yearly averages by decade, 1979–2013



Source: Small Arms Survey UEMS Database (2014)

Notes:

Although research for 1979 was carried out, no incidents were recorded. Therefore, as no data on the 1970s is available, this decade has been excluded from this figure.

* 2010 to 2013 only

Table 4. UEMS by casualties: top 25 incidents, 1979–2013

Rank	Year (dd.mm.yyyy)	Country	Location	Casualties		
				Dead	Injured	Total
1	27.01.2002	Nigeria	Lagos	1,500	5,000	6,500
2	04.03.2012	Congo	Brazzaville	500	3,277	3,777
3	07.07.2011	Turkmenistan	Abadan	100	1,328	1,428
4	10.04.1988	Pakistan	Rawalpindi	93	1,100	1,193
5	04.06.1998	Russian Federation	Arzamas, NIZ	91	1,000	1,091
6	21.12.1987	Egypt	Alexandria	6	1,000	1,006
7	—.02.2004	North Korea	Seonggang	1,000	n/a	1,000
8	29.04.2009	Tanzania	Dar es Salaam	26	700	726
9	22.03.2007	Mozambique	Malhazine	107	515	622
10	20.11.2002	Ecuador	Riobamba	10	538	548
11	16.02.2011	Tanzania	Gongo la Mboto	27	500	527
12	17.05.1984	Russian Federation	Severomorsk, MUR	250	200	450
13	16.11.1980	Thailand	Bangkok	54	353	407
14	22.06.2005	China	Taiyuan	—	336	336
15	15.03.2008	Albania	Gërdec	26	300	326
16	03.11.1995	Argentina	Cordoba	7	300	307
17	14.04.2000	DRC	Kinshasa	101	200	301
18	27.03.2011	Yemen	Jaar	150	150	300
19	29.10.1984	Indonesia	Jakarta	15	200	215
20	04.07.1997	Ecuador	Amaguaña	3	185	188
21	15.02.1996	Afghanistan	Kabul	60	125	185
22	04.06.1991	Ethiopia	Addis Ababa	100	80	180
23	01.08.2013	Syria	Homs	40	120	160
24	19.03.1997	Afghanistan	Jalalabad	30	128	158
25	11.05.2010	Tanzania	Mbagala	3	150	153

Notes: n/a indicates data is not available.
This table reflects open-source information on fatalities and injuries and makes no effort to account for missing data. Figure 10 takes missing data into account.

Source: Small Arms Survey UEMS Database (2014)

Figure 8. Population surrounding a military depot in Bukavu, Democratic Republic of the Congo

These casualty figures certainly under-report the problem. Governments may be reluctant to report on casualties or may minimize them, fearing adverse public opinion (see, for example, Ferghana, 2009). Official statistics may not capture all fatalities and injuries when record keeping is inadequate. Seriously injured people may subsequently succumb to their wounds and die after the initial reporting period. That said, it is clear from what is known about UEMS-related casualties that the number of dead or injured resulting from unplanned explosions at munitions sites is often larger than presumed. In recent years, the number of casualties from UEMS incidents is roughly comparable to those sustained from anti-personnel landmines (see Figure 10).

(Note that statistics generated by the International Campaign to Ban Landmines (ICBL), which are well respected and also almost certainly represent an underestimate of the problem for reasons similar to those noted above, include casualties that result from injuries and deaths induced by explosive remnants of war (ERW) when the victim initiates the incident—by tampering with or accidentally encountering abandoned explosive ordnance (AXO) and unexploded ordnance (UXO). Some of the AXO and UXO in question may have resulted from UEMS.)

The effects of UEMS are wide-ranging and lasting. Casualties, instances of people who die or have been injured, often severely, may accrue for months and even years after the explosion. (These numbers are normally not included in the database, which tends to record only those casualties listed within days of an explosion.) People may encounter unexploded ordnance from the explosion accidentally, or they may seek out UXO deliberately, to harvest explosives or metals for either commercial[11] or nefarious purposes. The loss of life and injuries sustained from UEMS represent social, economic, political, and military costs. Families lose wage earners. Communities lose schools and clinics.[12] Governments lose political support and legitimacy. The military loses skilled men and women. But this is the tip of the iceberg. To understand the full costs of UEMS, one must delve deeper.

Social costs include displacement of the population. A single incident can displace tens of thousands of people (see Box 6, Figure 9, and Table 5).[13] It can take months for sites to be declared safe for families to return to their homes nearby. Even when they do return, they may be no longer productive or able to provide for their families. The explosion that occurred in Chelopechene, Bulgaria, in July 2008 resulted in ordnance and explosives being flung out across more than 3,000 hectares of farmland. Farmers in the vicinity could not harvest or plant crops safely for three years (Lazarevič, 2012, p. 49).

Moreover, munitions from sites that have exploded can fuel and exacerbate social unrest. Armed groups sometimes use UXO and ERW scavenged from munitions sites to make improvised explosive devices (IEDs). For example, Afghanis are reported to salvage unexploded Soviet-era artillery shells and market them to insurgents for use in IEDs against Western targets (Binnie and Wright, 2013, p. 234).

Box 6. Very high costs of UEMS incidents: case of the explosion in Congo

The multiple depot explosions that occurred within the military barracks of Brazzaville's Mpila area on 4 March 2012 resulted in damage and loss totalling more than USD 670 million, according to partial estimates made by the World Bank in mid-2012. Much remains unknown about the explosion, including the primary cause, the total number of casualties, and the amount of ordnance that was originally stored at the site. The total is much more than the 200 dead and 1,500 injured who made headlines shortly after the tragic event.

Just after the blasts, the UN Office for the Coordination of Humanitarian Affairs (OCHA) and the Congolese Ministry of Social Affairs estimated the human toll of the explosions at 232 deceased and over 2,500 people injured. These figures were later revised and increased. Estimates of the number of injured came in at more than 3,200. The number of reported deaths increased to more than 290. Yet even the latter estimate remains an underestimate since the MoD did not report numerous military casualties, which occurred during the second explosion, while military personnel were assisting an officer after the initial deflagration.

Clearance teams destroyed more than 200 tonnes of UXO—representing more than 39 tonnes in net explosive content—during the subsequent clearance efforts between March 2012 and April 2013. Munitions cleared included a mix of pyrotechnics, small arms ammunition, grenades, mines, large-calibre projectiles, rockets, missiles, and aircraft bombs. Munitions were flung out and scattered randomly, saturating a heavily populated area over a radius of 1 km from the blast zone. Rockets and missiles were recovered 3–5 km from the affected depots.

More than 520,000 people who were living in the districts suffered the brunt of the damage. More than 17,000 homes were partly or completely destroyed, resulting in more than 120,000 people being displaced. Numerous schools were damaged or levelled, which affected some 20,000 students.

Source: Gobinet (2014)

Figure 9. The morning after: 'ground zero' at Mpila District © WRA

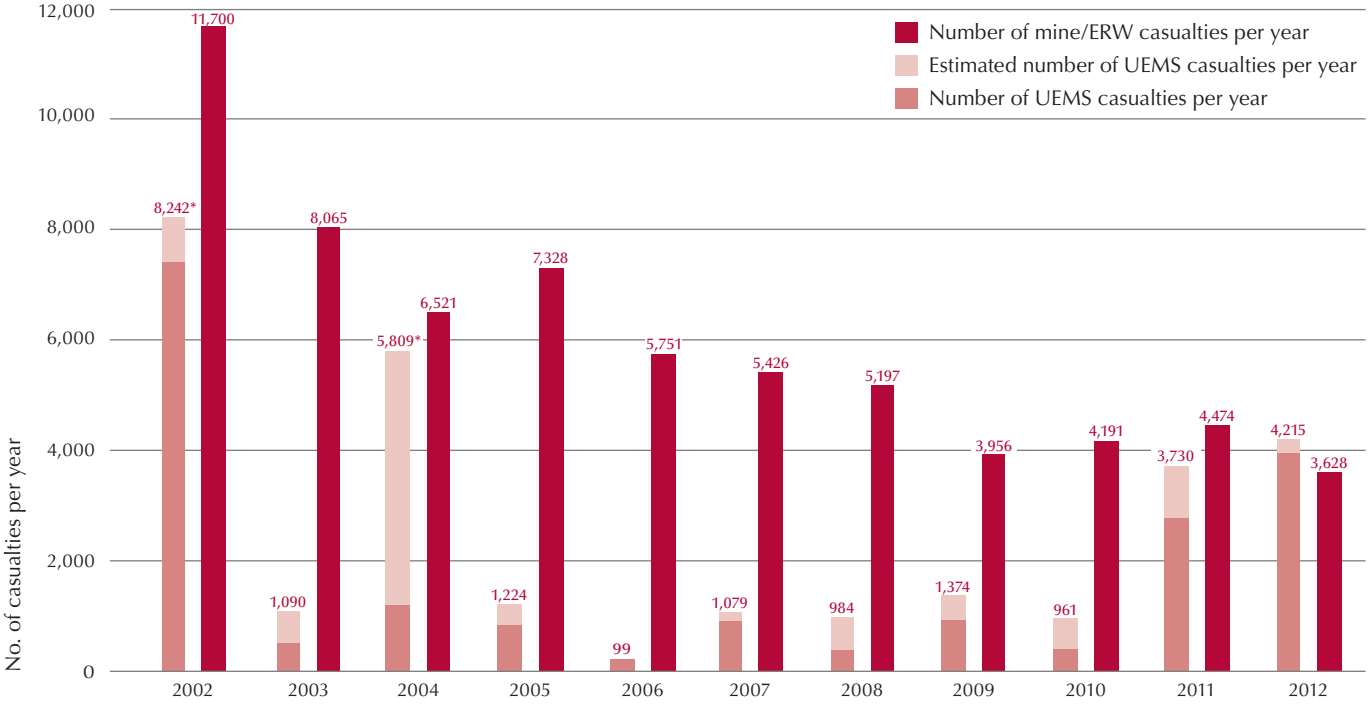
Table 5. UEMS by displacement: top 25 incidents, 1979–2013

Rank	Date	Country	Location	Total no. of people displaced
1	08.04.1992	Armenia	Yerevan	300,000
2	04.03.2012	Congo	Brazzaville	120,000
3	09.07.2008	Uzbekistan	Kagan	60,000
T4	07.07.2011	Turkmenistan	Abadan	50,000
T4	14.05.1992	Russian Federation	Vladivostok, PRI	50,000
T6	04.07.2011	Russian Federation	Pugachevo, UDM	28,000
T6	02.06.2011	Russian Federation	Pugachevo, UDM	28,000
T8	27.01.2002	Nigeria	Lagos	20,000
T8	21.09.1989	Russian Federation	Yurga, KEM	20,000
10	03.11.1995	Argentina	Cordoba	19,000
11	27.08.2008	Ukraine	Lozovaya, region 63	18,000
T12	25.10.2001	Thailand	Korat	10,000
T12	11.07.2001	Thailand	Pak Chong	10,000
T12	30.01.2011	Venezuela	Maracay	10,000
T12	28.04.2000	India	Bharatpur	10,000
T12	22.06.2001	Russian Federation	Nerchinsk, CHI	10,000
T12	28.07.1995	Turkey	Pamukova	10,000
18	30.09.2005	Russian Federation	Yuzhnaya Koriakiya, KAM	7,500
T19	06.05.2004	Ukraine	Novobogdanovka, region 23	7,000
T19	26.05.2011	Russian Federation	Urman, BAS	7,000
21	18.06.2013	Russian Federation	Chapayevsk, SAM	6,000
22	19.08.2006	Ukraine	Novobogdanovka, region 23	5,500
23	26.08.2004	India	Chowdar	5,000
24	04.07.1997	Ecuador	Amaguaña	4,800
25	27.04.1997	Russian Federation	Bira, JEW	4,500

Note: This table reflects open-source information on fatalities and injuries and makes no effort to account for missing data.
T in the first column indicates a tie.

Source: Small Arms Survey UEMS Database (2014)

Figure 10. Casualties from UEMS and anti-personnel mines, 2000–2012



Notes: The anti-personnel landmine statistics include casualties resulting from ERW-induced injuries and deaths when the victim initiates the incident (by tampering with or accidentally encountering AXO and UXO—which may have resulted from UEMS). For details on the methodology used to calculate these casualties, see online Annexe F.

*Peaks in UEMS casualties (e.g. 2002 and 2004) typically result from a single catastrophic event. The difference between recorded and estimated casualties in 2004 is attributable to one event in North Korea in which 1,000 deaths were reported, but no injuries.

Source: Small Arms Survey UEMS Database (2014); ICBL (2012, 2013)

Economic costs also include allocating scarce resources to address post-explosion necessities, diverting them from arguably more productive purposes. Clean-up costs can run to millions of dollars. New depots may have to be built. New munitions may have to be procured. The costs and damages (for example, from lost tourism revenue) can run to billions of dollars (see Box 7).

When the careers of government officials are cut short due to UEMS incidents, this constitutes a political cost. Unplanned explosions have resulted in junior government employees receiving fines or demotions (see Demetrieva, 2012, 2013). They have also led to senior officials being subjected to more severe sanctions. Many have lost their livelihoods; some have lost their lives. This list includes ministers of defence and even a former head of state (see Table 6). The 2011 explosion in Cyprus is perhaps the best-documented case. The blast, which claimed 13 lives and knocked out an important national power grid (see Box 7), led to convictions and jail terms for the former defence minister and three fire-service officials (BBC, 2013).[15]

Box 7. Very high costs of UEMS incidents: case of the explosion in Cyprus

On 13 February 2009 the Monchegorsk, a Russian cargo ship (flying Cypriot flags), was docked in Mari,[14] Cyprus, roughly mid-way between Limassol and Larnaca Nicosia. Responding to a United Nations embargo against Iranian arms exports, Cypriot officials detained the ship, which was carrying 98 containers of Iranian arms, munitions, and explosives destined for Syria. The crates were offloaded at the Evangelos Florakis Naval Base, where they were inadequately stored in containers until they exploded more than two years later on 11 July 2011. The explosion resulted in 13 deaths and 62 people being injured.

Officials at the site warned repeatedly that the containers were unsafe. But no action was taken. A week before the explosion, one of the containers had expanded, due to gases leaking from deteriorating explosives. The pressure forced the container door open, creating a 'safety valve' and averting a catastrophe, on the day in question. The incident was duly noted, but no further action was taken.

In addition to a general disregard for well-established safety protocols (such as quantity–distance principles), a further concern went unheeded: the naval base was near the Vassilikos power plant. That facility, the largest of its kind in the country, provided 60 per cent of the island's energy needs.

Before the explosion, the power centre had a capacity to produce 1,400 MegaWatts (MW). This was sufficient to meet Cyprus's normal needs, even during the hottest months of the year. The government lost half its power-generating capacity during the explosion. Emergency supplies from Greece and from the northern part of the island were insufficient to meet demand, and power cuts ensued. The country's water desalination plants had to close operations temporarily. More than 700 homes and businesses incurred damage.

Credit Suisse reportedly indicated that the estimated costs of the explosion to the Cypriot government were EUR 2.4 billion, more than 13 per cent of the country's gross domestic product. The biggest outlay was expected to be the cost of rebuilding the destroyed power plant. The calculation incorporated estimated losses from tourism (as hotels had experienced power outages, and media coverage of the blast was extensive) and the costs of more expensive energy, among other considerations.

Source: Berman (2013)

Table 6. Senior government officials' careers shortened by UEMS, 1979–2013

Title	Government official	Country	Impact of UEMS on career	Additional information
Minister of Defence	Mukhtar Altynbayev	Kazakhstan	Reprimanded	Reprimanded after March 2009 UEMS in Arys, SOK
	Charles Zacharie Bowao	Congo	Dismissed	Dismissed in the wake of March 2012 UEMS in Brazzaville
	Oscar Camilión	Argentina	Convicted (5.5 years)	Sentenced in June 2013 in connection with November 1995 UEMS in Córdoba
	Tobias Dai	Mozambique	Resigned	Resigned a year after March 2007 UEMS in Malhazine, in response to mounting pressure
	Beguentch Geoundogdyev	Turkmenistan	Fired	Fired after July 2011 UEMS in Abadan
	Frantisek Kasicky	Slovakia	Resigned	Resigned shortly after March 2004 UEMS in Novaky
	Yevhen Marchuk	Ukraine	Resigned	Resigned some four months after May 2004 UEMS in Novobogdanovka [region no. 23]
	Fatmir Mediu	Albania	Resigned	Resigned shortly after March 2008 UEMS in Gërdec
	Costas Papacostas	Cyprus	Convicted (5 years)	Resigned shortly after July 2011 UEMS in Mari
Other senior officials	Savvas Argyrou	Cyprus	Serving jail term	Deputy Commander of army [at time of 2011 Mari UEMS]
	Col. Germain Ikonga Akindou	Congo	Convicted (5 years)	Chief Quartermaster of Armed Forces [at time of 2012 Brazzaville UEMS]
	Lt-Gen. Yuriy P. Balkhovitin	Russian Fed.	Fired	Head of Engineering Troops of Armed Forces [at time of 2009 Ulyanovsk, ULY UEMS]
	Col. Aleksandr A. Bobrakov	Russian Fed.	Fired	Acting Head of Engineer Troops of Volga-Urals Military District [at time of 2009 Ulyanovsk, ULY UEMS]
	Maj-Gen. Oleg Chikirev	Russian Fed.	Fired	Head, Rocket and Artillery Directorate, Ministry of Defence [at time of 2009 Ulyanovsk, ULY UEMS]
	Capt. Andreas Ioannides	Cyprus	Killed in blast	Navy Commander [in 2011 Mari UEMS]
	Col. Manuel Cornejo Torino	Argentina	Convicted (4.5 years)	Director-General of Fabricaciones Militares [at time of 1995 Córdoba UEMS]
	Maj-Gen. Vyacheslav Khalitov	Russian Fed.	Fired	Acting Head of Armaments and Deputy Troop Commander of Volga-Urals Military District for Armaments [at time of 2009 Ulyanovsk, ULY UEMS]
	Markos Kyprianou	Cyprus	Resigned	Minister of Foreign Affairs [at time of 2011 Mari UEMS]
	Lt-Cmdr Lambros Lambrou	Cyprus	Killed in blast	Commanded Evangelos Florakis base [site of 2011 Mari UEMS]
	Carlos Menem	Argentina	Convicted (5.5 years)	President [at time of 1995 Córdoba UEMS] is serving house arrest pending resolution of his possible parliamentary immunity
	Brig-Gen. Hassan Moghaddam	Iran	Killed in blast	A top commander in Islamic Revolutionary Guards Corp [at time of 2011 Bidganeh UEMS]
	Gen. Petros Tsalikidis	Cyprus	Resigned	Commander of National Guard [at time of 2011 Mari UEMS]
	Lt-Gen. Rumen Tsokov	Bulgaria	Resigned	Deputy Chief of Staff for Army Resources [at time of 2008 Chelopechene UEMS]
	Col. Marcel Tsourou	Congo	Convicted (5 years)	Deputy Secretary-General of National Security Council [at time of 2012 Brazzaville UEMS]

Note: These examples all come from open-source documents.

Source: Berman (2014)

Table 7. UEMS by materiel lost: top 25 incidents, 1979–2013

No.	Country	Location	Date (dd.mm.yyyy)	Loss of munitions/materiel (in tonnes)
1	Ukraine	Lozovaya, region 63	27.08.2008	95,000
2	Ukraine	Novobogdanovka, region 23	06.05.2004	90,000
3	Kazakhstan	Balkhash, KAR	08.08.2001	80,000
4	Russian Federation	Nerchinsk, CHI	22.06.2001	64,000
5	Afghanistan	Kabul	26.08.1986	50,000
6	Ukraine	Novobogdanovka, region 23	19.08.2006	35,000
7	Russian Federation	Elk, SVE	19.06.1998	30,000
8	Turkmenistan	Abadan	07.07.2011	22,500
9	India	Bharatpur	28.04.2000	12,111
T10	Russian Federation	Pugachevo, UDM	02.06.2011	10,000
T10	Russian Federation	Taly, KOM	30.03.1995	10,000
12	India	Suratgarh	24.05.2001	8,000
13	Russian Federation	Donguz, ORE	09.10.2012	4,000
14	Mozambique	Beira	24.10.2002	3,655
15	Zimbabwe	Harare	16.08.1981	3,500
16	Serbia	Paracin	24.08.2007	2,800
17	Bulgaria	Sofia	17.05.2010	2,500
18	Russian Federation	Vladivostok, PRI	31.03.1995	2,200
T19	Cyprus	Mari	11.07.2011	2,000
T19	Albania	Qafe Shtame	28.02.1997	2,000
21	Bulgaria	Chelopechene	03.07.2008	1,500
22	Slovakia	Novaky	02.03.2007	1,200
23	India	Ganganar-Bikaner	11.01.2002	1,000
24	Albania	Gjeroven	—.03.1997	915
25	North Korea	Pyongyang	31.10.1991	900

Note: T in the first column indicates a tie.

Source: Small Arms Survey UEMS Database (2014)

Military costs include military preparedness. Munitions represent strategic assets, and their loss may not be easily replaced. Munitions lost due to unplanned explosions are sometimes recorded in tonnage, other times still in rounds, and also by monetary value (see Table 7).

UEMS incidents frequently result from the poor management of stockpiles. Even in the absence of an explosion, state-owned weapons and ammunition can be diverted to recipients for whom they were not intended. Inaccurate record keeping inhibits accountability and facilitates corruption: for example, security forces may rent out or sell their weapons and ammunition. Poor storage practices provide fertile ground for such misconduct and make it difficult to track inventories, as is the case when recovered items—such as weapons, ammunition, or explosives used in training or confiscated from the public—are haphazardly tossed on to piles or into open or loose crates.

Figure 11 shows a 'depot' in Equatoria province, formerly southern Sudan, under the control of the Sudan People's Liberation Army (SPLA). The armoury was unlocked, lightly guarded, and surrounded by similar earthen structures—known as *tukuls*—in which inhabitants of the village of Yei lived. The Lord's Resistance Army (LRA), another non-state armed group, was also active in the area.

Figure 11. Typical SPLA munitions sites (*tukuls*): interior and exterior views

Photos: © Sean Sutton/MAG

Initiatives

Before discussing the various initiatives undertaken to address UEMS, it is important to clarify those activities that merit inclusion. Certainly, clean-up activities are most closely associated with addressing unplanned explosions. Many organizations that focus on landmine clearance do excellent work in securing affected areas and making the surrounding residents aware of the dangers of handling UXO. Such organizations dispose safely of UXO themselves, work referred to among practitioners as 'post-explosion clearance and remediation'. Although important, this area of work is already relatively well documented and understood and is consequently not covered herein. (See Part IV for some case studies.) This Handbook focuses rather on *preventing* UEMS. Accordingly, it addresses eight broad commitments, products, and activities (see Figure 12):

- Agenda-setting
- Standard-making
- Funding and tendering
- Technical assessment
- Education and training
- On-site munitions management
- Loading and transport
- Disposal and destruction

Figure 12. Icons of UEMS-related commitments and services provided: short text

Icon	Short description	Fuller description
	**Agenda-setting**	The actor helps to engage decision-makers and practitioners to focus on addressing stockpile management, and surplus identification, disposal, and destruction.
	**Standard-making**	The actor is instrumental in developing and providing guidelines and best practices for the implementation of commitments or objectives.
	**Funding and tendering**	The actor is active in fund-raising, funding, or coordinating international assistance and cooperation to undertake UEMS-related work.
	**Technical assessment**	The actor oversees the physical inspection of munitions sites to help ensure adherence to best practice regarding storage. Physical inspection includes the chemical testing of munitions' explosives and stabilizers.
	**Education and training**	The actor offers classroom- or field-based instruction on UEMS-related best practices.
	**On-site munitions management**	The actor assists in the planning, design, construction, or refurbishment of sites for the safe storage of munitions, and conducts audits of sites.
	**Loading and transport**	The actor undertakes the movement of munitions within locations in accordance with the proper management, disposal, or destruction of munitions.
	**Disposal and destruction**	The actor implements either (1) the responsible removal, transfer, or destruction of munitions, or (2) the design, development, and production of demilitarization processes.

Only with adequate political will can UEMS incidents be prevented (see 'Agenda-setting'). Governments' commitments may appear helpful, but are often hollow, not policed, lacking in concrete guidelines, and inadequately based on best practices (see 'Standard-making'). Governments often need help to link 'needs' with 'resources', either directly through financial assistance or indirectly through assessing the expertise of bidders (see 'Funding and tendering'). Sites and the stock housed there need to be comprehensively evaluated, to ensure that best practices are adhered to or shortcomings clearly understood (see 'Technical assessment'). Technicians and policy-makers lacking education and specialized expertise and knowledge may benefit from access to know-how (see 'Education and training'). Often storage sites need to be refurbished or constructed, and accounting techniques implemented (see 'On-site munitions management'). Much materiel will need to be removed from a site and transported away safely (see 'Loading and transport'). And often munitions may need to be disassembled or otherwise rendered harmless, so as to reduce the threat of explosion (see 'Disposal and destruction').

This Handbook profiles more than 30 actors that are especially active in helping to prevent unplanned explosions and which work in countries other than where they are based. These write-ups comprise Part III of the study. The actors come primarily from the UN system, or regional organizations,[16] or non-government organizations (many of which are also active in humanitarian demining). Certain for-profit commercial enterprises have also been included. For the most part, companies undertaking industrial demilitarization of munitions primarily on their own territories have been excluded, even though several of them possess high-capacity, automated processing technology (see Box 8). This Handbook features actors who offer their experts, expertise, and equipment to help countries address their needs in situ, in particular those countries with limited or non-existent demilitarization capacities. With one exception, the entities profiled in the Handbook are all engaged in three or more of the eight activities identified.

The Handbook does not include profiles of individual governments. Besides managing, securing, and destroying their own national stockpiles, many governments provide expertise and funding to assist others. They may so do, for example, through active engagement at the multilateral level through various UN forums, or via the regional organizations of which they are members. They may act bilaterally. And they may fund NGOs. Those that do engage NGOs tend to promote organizations with headquarters based in their own countries. Examples include, but are not limited to, Denmark (supporting the Danish Demining Group); Switzerland (Swiss Foundation for Mine Action); the United Kingdom (Mines Advisory Group and HALO Trust); and the United States (Golden West Humanitarian Foundation, and Sterling Global). The 37 profiles in Part III capture much of this activity. Washington distinguishes itself, however, in that it also provides expertise and substantial financing to many non-US-based actors (see Box 9).

Many actors not included in Part III of this Handbook nevertheless undertake important initiatives to combat UEMS. The Asia-Pacific Economic Cooperation (APEC) organization, for example, promoted an agenda through which its 21 members

Box 8. Major industrial demilitarization companies

Governments tend to procure more munitions than they use. Some excess munitions are used for training. Some are sold or given away. Yet others remain as stock that is best dealt with through demilitarization: a process by which ammunition is safely dismantled or destroyed, ideally while recovering valuable materials for recycling.

Many countries routinely undertake surveillance and testing of their munitions' components. The components degrade over time and, left unmonitored, can pose significant and unacceptable risks. Some governments demilitarize their munitions by drawing on the skills of state-owned companies, whereas others rely on the private sector. Still others have no in-country facilities or capacities whatsoever. They must either export their surplus to be demilitarized or bring in the experts and equipment needed to assist them.

Dozens of companies embark on large-scale industrial demilitarization, or construct 'turnkey' equipment for others to use elsewhere, rather than undertaking demilitarization activities themselves. Most are located in the United States and Western Europe. Their number has grown as a result of the end of the cold war, German unification, more stringent environmental restrictions on disposal, and the conclusion of the Convention on Cluster Munitions.

The Survey has identified the following 32 companies, subsidiaries, and processing plants in 17 countries which are particularly active:[17]

- AKANA Engineering (Turkey)
- Alsetex (France)
- Dynasafe Demil Sytems (Sweden)
- DynCorp International (USA)
- El Dorado Engineering (USA)
- EOD Solutions (UK)
- Esplodenti Sabino (Italy)
- EST Energetics (Germany)
- Expal (Spain)
- Expal Bulgaria (Bulgaria)
- General Atomics (USA)
- General Dynamics (USA)
- Gradient Technology (USA)
- JAKUSZ (Poland)
- KONŠTRUKTA Industry (Slovakia)
- MBDA (France)
- Mesko (Poland)
- MKEK (Turkey)
- NAMMO (Norway)
- NAMMO Buck (Germany)
- NAMMO Vingåkersverken (Sweden)
- QinetiQ (UK)
- Red Wings (Israel)
- ROKESTAN (Turkey)
- SAB Nord (Germany)
- sonUtec (Germany)
- Soukos Robots (Greece)
- Spreewerk Lübben (Germany)
- TRZ Kragujevac (Serbia)
- ULP Mjekes (Albania)
- U.S. Demil (USA)
- UXB International (USA)

Source: Gobinet (2013a)

Box 9. US governmental actors promoting stockpile management and surplus destruction

The US government has three principal bodies which develop and promote stockpile management best practices. Two are part of the Department of Defense (DoD): the Department of Defense Explosive Safety Board (DDESB) and the Defense Threat Reduction Agency (DTRA). The third is part of the Department of State: the Office of Weapons Removal and Abatement (WRA) within the Bureau of Political-Military Affairs.

Within the US armed forces, DDESB provides oversight of the development, manufacture, testing, maintenance, demilitarization, handling, transportation, and storage of explosives, including chemical agents, on DoD facilities worldwide. The Board's origins date back to 1928, when the US Congress established the Armed Forces Explosive Safety Board in the wake of a major unplanned explosion at a naval ammunition depot two years earlier. The DDESB mission is to provide objective advice to the Secretary of Defense and Service Secretaries on matters concerning explosives safety and to prevent conditions hazardous to life and property, on and off DoD installations, resulting from the explosives and environmental effects of DoD-titled munitions. It also provides its expertise to NATO countries.

DTRA, established in 1998, is the DoD's official agency to counter the proliferation of weapons of mass destruction and their delivery systems. DTRA's counter-proliferation activities also aim to assist foreign governments to improve the security and the management of state-controlled stockpiles of MANPADS, small arms and light weapons, and conventional ammunition. Since 2001, DTRA has provided PSSM assistance to more than 70 countries and has engaged with many more countries' officials through regional workshops and conferences. DTRA teams conduct approximately 50 missions annually.

WRA works to curb the illicit proliferation of conventional weapons of war (such as light automatic weapons and rocket-propelled grenades) and also to remove and destroy such material (including landmines and abandoned stocks of munitions) that pose hazards after the cessation of armed conflict. The Office develops, implements, and monitors policy, programmes, and public-engagement efforts which contribute to the prevention and mitigation of conflict, as well as promoting post-conflict social and economic recovery. The focus is threefold: to curb the illicit trafficking, availability, and indiscriminate use of conventional weapons of war which fuel regional and internal instability; to pursue and help manage post-conflict clean-up of such weapons in areas needed for civilian use; and to engage civil society to broaden support for its efforts. WRA currently supports projects in nearly 50 countries.

Box 10. The RASR Initiative

The Regional Approach to Stockpile Reduction (RASR) Initiative was launched in May 2009 at a workshop in Zagreb, Croatia. At that meeting seven governments from South-east Europe (SEE)—Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Serbia, and Slovenia—acknowledged the challenges they faced, given the legacy of armed conflict and the end of the cold war, which resulted in hundreds of thousands of tonnes of surplus munitions. Much of this material was stored in sub-optimal conditions at hundreds of depots across the region. Macedonia and Romania, which had been invited to attend this workshop but were unable to attend, subsequently joined the Initiative.

The RASR Initiative seeks to improve stockpile management and security and reduce surpluses through greater co-operation, transparency, and adherence to best practices. Participants identified five priority factors that would be essential for the attainment of these goals: (i) appropriate national and regional policies; (ii) improvement of infrastructure (e.g. refurbishing depots and demilitarization plants); (iii) training, education, and capacity building; (iv) sharing information and best practices; and (v) standardization (to meet international guidelines).

A Steering Committee was created to support this effort. It comprises international and regional organizations as well as a civil society organization: ITF Enhancing Human Security (ITF); NATO Support Agency (NSPA); RACVIAC Centre for Security Cooperation; the Small Arms Survey; and South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC). The Steering Committee meets twice a year. A representative of the Office of Weapons Removal and Abatement (WRA) of the US Department of State, which funds the Initiative, also contributes to the process.

As of December 2013, five additional workshops had been convened: in Budva, Montenegro (2009); Sarajevo, Bosnia and Herzegovina (2010); Ljubljana, Slovenia (2011); Durrës, Albania (2012); and Bled, Slovenia (2013). The seventh RASR Workshop is set to be held in Sofia, Bulgaria in 2014.

In addition to the information provided by participating governments on their achievements and needs in meeting objectives, the Small Arms Survey, with support from the RASR Steering Committee and regional governments, has published numerous studies and materials. Many papers focus on challenges and practices designed for a South-east European audience (e.g. SEE policies regarding surplus stockpiles and destruction; SEE demilitarization capacities and capabilities; SEE quantities of surplus munitions and weapons; and SEE experiences of socio-economic costs of unplanned explosions at munitions sites). Other outputs focusing on stockpile management and surplus destruction are not limited to the region (e.g. PSSM Best-practice Cards [available in numerous languages]; incorporating demilitarization costs into ammunition procurement; and an overview of mobile industrial demilitarization equipment).

(For more information see www.rasrinitiative.org)

agreed to manage their man-portable air defence systems (MANPADS) in ways that promoted best practice in terms of storage and oversight. Their members reported on their progress towards meeting the objectives set forth (Berman and Maze, 2012, pp. 78–79).[18] The Regional Centre on Small Arms in the Great Lakes Region, the Horn of Africa and Bordering States (RECSA), which now has 15 members, supports the implementation of the Nairobi Protocol, a legally binding document which includes provisions to control and account for state-owned munitions (Article 6) and to 'identify and adopt effective programmes for the collection, safe-storage, destruction and responsible disposal of [munitions] rendered surplus, redundant or obsolete…' (Article 8).[19]

Not all noteworthy undertakings can be covered through a review of actors. The Regional Approach to Stockpile Reduction (RASR) Initiative is one such example, which deserves special merit. RASR is an ad hoc coalition of nine countries from South-east Europe that have agreed to share information on their surplus stockpiles and demilitarization capacities to achieve economies of scale and to generate international support (see Box 10). Another initiative worthy of mention is the Meeting of Experts of Protocol V of the Convention on Certain Conventional Weapons (CCW).[20] Protocol V addresses explosive remnants of war. The Chair of that Meeting of Experts has used the annual forum to promote responsible stockpile management, broadly speaking, with particular attention to countering UEMS.

Endnotes

1 The Survey is constantly seeking new and more accurate information for its database on UEMS. Since findings based on the database's entries were first reported in 2011, additional research and an ongoing peer review process have resulted in data being added or deleted from the database. Accordingly, annual totals are adjusted. Additional changes to Table 3 (and other supporting materials based on an analysis of the data) may occur as countries provide fuller accounts of their UEMS incidents.

2 The sub-regions and their UN member states used in this study and in Figure 3 are taken from the UN Statistical Division (see UNSD, 2013). UNSD groups the 193 UN member states into **22 sub-regions**.

In Africa, 54 UN member states are listed in five sub-regions: **Eastern Africa** (18—Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe); **Middle Africa** (9—Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, and São Tomé and Príncipe); **Northern Africa** (6—Algeria, Egypt, Libya, Morocco, Sudan, and Tunisia); **Southern Africa** (5—Botswana, Lesotho, Namibia, South Africa, and Swaziland), and **Western Africa** (16—Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo).

In the Americas, 35 UN member states are listed in four sub-regions: **Caribbean** (13—Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago); **Central America** (8—Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama); **Northern America** (2—Canada and the United States); and **South America** (12—Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela).

In Asia, 47 UN member states are listed in five sub-regions: **Central Asia** (5—Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan); **Eastern Asia** (5—China, Japan, Mongolia, North Korea, and South Korea); **Southern** (9—Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka);

South-Eastern Asia (11—Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, and Vietnam); and **Western Asia** (17—Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen).

In Europe, 43 UN member states are listed in four sub-regions: **Eastern Europe** (10—Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Poland, Romania, Russian Federation, Slovakia, and Ukraine); **Northern Europe** (10—Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and the United Kingdom); **Southern Europe** (14—Albania, Andorra, Bosnia and Herzegovina, Croatia, Greece, Italy, Macedonia, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, and Spain); and **Western Europe** (9—Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, the Netherlands, and Switzerland).

And in Oceania, 14 UN member states are listed in four sub-regions: **Australia and New Zealand** (2—Australia and New Zealand); **Melanesia** (4—Fiji, Papua New Guinea, Solomon Islands, and Vanuatu); **Micronesia** (5—Kiribati, Marshall Islands, Micronesia, Nauru, and Palau); and **Polynesia** (3—Samoa, Tonga, and Tuvalu).

The two permanent observer states are included: the Holy See (in Southern Europe); and Palestinian Territories (in Western Asia).

3 Please see Annexe E for explanations of how UEMS are counted and attributed to countries. Countries analysed in this Handbook include 193 UN member states and two permanent observer states. All analysis prioritizes the territory in which the event occurred over any former or current political oversight or control.

4 Hezbollah, for example, claimed that it had lost fighters due to an explosion at one of its depots, when in fact the men had died in Syria, fighting in support of the regime of President Bashar al-Assad (see Filkins, 2013, pp. 49–57).

5 The civil war in Mozambique, pitting RENAMO against the government, concluded in 1992. RENAMO transformed itself into a political party.

6 The UN Mine Action Service, with Swiss financial support, constructed an ammunition-storage facility for former revolutionary forces based in Misrata to store some of their materiel. The facility, completed only in 2013, has a capacity to safely store up to 400 tonnes of munitions and explosives (see UNSMIL, n.d.).

7 One such example concerns a UEMS event in Bratislava, Slovakia, for which investigation and adjudication took seven years. The incident occurred in March 2007, and a formal presentation of the results of the investigation was made by officials of the Slovakian government in April 2013. See Reina and Taylor (2013).

8 For further information on the classification of causes used in the UEMS database, see '*Why* did the UEMS incident occur?' in Part II.

9 To claim 'fire' as the cause is an easy excuse for governments, to conceal the fact that the cause was actually ammunition deterioration.

10 The United Nations reported that some 800 people died from drowning or being trampled in their attempts to escape the explosions, and approximately 300 people died within the blast area itself. More than a week after the explosion, bodies were still being pulled from the canals near the ammunition depot or were believed to be stuck in the mud at the bottom of the canal. Locals, it reported, estimated the death toll at up to 2,000 (UNDAC, 2002, para. 19).

11 Commercial purposes include quarrying, construction, and fishing. In Cambodia, for example, a scrap-collecting operation had salvaged thousands of artillery shells and mortar bombs from an underwater stockpile (Tan, 2013, p. 32).

12 The explosion in Paraćin, Serbia, in October 2006 resulted in the destruction of some 600 buildings, including a dozen schools (Lazarevič, 2012, p. 53).

13 The Survey treats information on 'evacuation' and 'displacement' similarly, as it is not possible to discern from most reports whether the relocation or dislocation was planned or spontaneous. We assume that social upheaval will be similar. It should also be noted that information on displacement is very hard to obtain.

14 Various sources indicate that the site and subsequent explosion occurred in Zygi, a town adjacent to Mari. The naval base was formerly called the Mari Naval Base, before it was renamed in memory of the head of the Cypriot National Guard, who died in a helicopter accident.

15 The Cypriot foreign minister at the time, who resigned shortly after the explosion, was also charged with manslaughter. He was found not guilty (BBC, 2013).

16 For the purposes of this study, regional organizations are defined as bodies that 'comprise governments that join together formally to support common economic, political, or security concerns in a geographically defined area and whose members are expected to contribute regularly towards the body's operating costs and towards implementing its mandate' (see Berman and Maze, 2012, p. 4).

17 This listing is intended as indicative and in no way comprehensive. In Ukraine (which is not one of the 17 countries identified) alone, for example, one might add the companies Donetsk Plant for Chemical Products, Pavlograd Chemical Plant, and Ukroboronservice. (Written correspondence with Fred Peugeot, project manager, NATO Trust Fund, NATO Supply Agency, 16 December 2013.)

18 APEC is interesting in that it engages 'economies' and not 'states' *per se*. That Hong Kong is a member of APEC is not particularly relevant for the purposes of stockpile management and the promotion of best practice. Taiwan, however, is an APEC 'member economy' and is engaged, which is significant.

19 To date, most of RECSA members' efforts have centred on the recovery and destruction of civilian small arms and ammunition.

20 The CCW's full title is Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects. It was concluded in 1980 and entered into force in 1983. Protocol V was adopted in 2003.

PART II

UEMS Incident Reporting Template (IRT)

Overview

Better and more complete information on each UEMS incident is needed in order to improve prevention efforts. Analysing global accident data can be useful in two respects. First, increased awareness of the frequency of these events may reduce the stigma associated with them and, consequently, should encourage authorities to improve their own practices in terms of physical security and stockpile management (PSSM). Secondly, analysis of global data can reveal trends or patterns in UEMS which may make it easier to identify the conditions that increase their occurrence. Such analysis provides a greater understanding of the ways in which certain variables may threaten the stability of stockpiles. Access to international donor funding, and programmes and policies designed to prevent or mitigate these threats, could therefore benefit from data-driven analysis.

Better reporting will make it possible to generate more useful information and analysis of UEMS incidents. Over the past 35 years, the bulk of UEMS media coverage has failed to address several key issues, and reports which are more investigative in nature are rarely released to the public. Media reports, the most prevalent source of information, may provide timely details about these events, typically focusing on numbers of casualties and damage to property or infrastructure, and providing some initial observations and speculation on the causes. More in-depth assessments are usually found only in official post-incident investigative reports, often presenting more substantive and technical information which addresses questions such as: What caused the accident? Why did it happen? And how did authorities respond to it (USDA, 2013, p. 2)? Although many states have utilized established investigative procedures, and similar such procedures are promoted within international guidelines, these investigative reports are rarely made public (UNODA, 2011, para. 11.10; NATO, 2010, ch. 8).

States are typically reluctant to circulate investigative reports and, to justify this, may cite legal constraints or security concerns that prevent the release of strategic information related to munitions holdings. Similarly, when UEMS incidents are perceived as a political embarrassment, the country concerned may be disinclined to accept the findings of investigations. While a state's need to preserve the security of its stockpiles may be legitimate, saving face is no excuse for secrecy, withholding information, or inaction. Challenging this state reticence could prove extremely worthwhile.

The UEMS Incident Reporting Template (IRT), provided as Annexe A, has been designed to standardize and encourage the collating of essential information on such events and to make it available to the public. Its standardized format should alleviate some official concerns, but should also improve the public reporting of particular UEMS incidents by non-specialists. The specific categories and fields included in the template should enable reporting to be consistent and comprehensive. As an added benefit, the template enables official authorities and representatives to submit comprehensive summaries of an incident,

without necessarily releasing related investigative reports in their entirety.

This part of the Handbook is organized according to six key questions relevant to a UEMS event: the *when*, *where*, *who*, *why*, *what*, and *how* (see Box 11). Reports that capture answers to these questions increase our understanding of UEMS events and facilitate data-based analysis.

Box 11. Six key questions for reporting on UEMS incidents

When reporting on a UEMS incident, it is useful to answer six key questions: addressing the when, where, who, why, what, and how. Reports that capture answers to these questions increase our understanding of UEMS events and facilitate data-based analysis.

The questions to address are:

1. *When* did the UEMS incident occur?
2. *Where* did the UEMS incident occur?
3. *Who* owns or manages the site and its contents? (To ascertain the type of facility housing the munitions, and the munitions that were stored there.)
4. *Why* did the UEMS incident occur?
5. *What* happened as a result of the explosion? (To ascertain the size of the explosion, the identities of those affected, and the infrastructure that was damaged or destroyed.)
6. And *how* did the state and international community respond?

1. *When* did the UEMS incident occur?

The date and time of a UEMS incident constitute basic, essential data. The daily and weekly patterns of a community, such as the hours or days when people tend to commute, go to work or attend school, conduct business, play sport, or attend places of worship, can significantly affect the impact of a UEMS explosion. For instance, if an event occurred on a week day, the casualties sustained at a school situated too close to a storage facility could be significantly higher in number than if it had occurred at the weekend. Broader contextual or historical factors may warrant reporting. Variables that may prove relevant to subsequent analysis could include the security situation, the occurrence of a natural disaster, or extreme weather. See Question 1.

1. *When?* **(When did the UEMS incident occur?)**	
Date (yyyy/mm/dd)	/ /
Hour (hh:mm) [using 24-hour clock]	:
Weather conditions (e.g. temperature °C, light, wind, rain, lightning)	

2. *Where* did the UEMS incident occur?

Three levels of location can be recorded under Question 2: country, city (or nearest town), and name of the site. Much of the data documented in this Handbook relates to country-level analysis, to which precise information about the geographical features of the location of a UEMS can add value. Factors of place, as well as time, may provide essential contextual information. For instance, the proximity of the storage facilities to civilian populations may explain the number of casualties. The local geography—such as the presence of mountains, hills, nearby water bodies, or other natural features—may also affect the explosion. When coupled with satellite imagery, such as that available from Google Earth, the specific location reference can provide a powerful informative and illustrative tool and improve our understanding of how events transpire. See Question 2.

2. *Where?* (Where did the UEMS incident occur?)
Country
City or town
Site/location name

3. *Who* owns or manages the site and the contents on it?

It is important to identify who owned or managed the storage facility, what type of facility housed the munitions, and what type of explosive material or munitions were stored inside.

Not all munitions and military explosives are owned or managed solely by official armed forces. Munitions sites can be owned or managed by state or non-state parties. For example, law enforcement agencies also operate armories of their own which, in some countries, contain highly explosive materials. At times, private companies are involved in munitions manufacturing, processing, stockpile management, and demilitarization activities, and while they may not explicitly own the material they handle, they remain responsible for safe practices. Non-state armed groups may also maintain a wide range of caches (Schroeder, 2013) and criminal groups or individuals can store sufficient ammunition and explosives to cause severe damage to the surrounding area. Because actors store ammunition for a variety of purposes, under significantly varying conditions, attempts to analyse UEMS events call for distinct categories of ownership to be recorded. Storage sites can contain ammunition associated with: aircraft, armour and artillery, naval, and/or small arms and light weapons. Cluster munitions and landmines are distinct because of their legal status under international law. Explosives and pyrotechnics can also be recorded under a designated heading. See Question 3.1.

What type of facility housed the munitions?

The type of storage facility is also an important factor. Munitions storage facilities vary considerably in design and function. Available resources, levels of technical expertise, and purpose of storage are among the many variables that affect the safety of the facility. There is a great range of storage facilities. At one extreme are purpose-built sites, specifically engineered to maintain consistent storage conditions over a long period of time, and designed to direct the energy of a potential blast resulting from an unplanned explosion towards a safer direction (NATO, 2010). Generally, such facilities are state-owned, given the considerable investment required to construct them. At the other extreme are open-air dumping areas, which call for no investment. Between those extremes lies a range of non-purpose-built storage facilities (buildings not specifically engineered for storing explosive material) and other spaces. Information indicating which of these three types was implicated in the UEMS event can be entered under Question 3.2.3.

It is important also to record the status of a storage area. Facilities can serve as long-term (permanent) storage sites or temporary storage sites, accommodating explosive materials for a short period. Storage, processing, and loading procedures may vary according to the site status.

Note that explosions that occur during transportation are counted only if they occurred during the loading and unloading of munitions onto a vehicle. Information on the type of facility and the type of activity conducted there can be entered under Question 3.2.

States are encouraged to demand high standards from their armed forces, security sector, and hired contractors. The ways in which non-state entities store items and the impact of such storage practices have been less well documented. Private companies

3. *Who?* (Who owns or manages the site and the contents on it?)

3.1. Who owns or manages the site?				**3.2. What type of facility housed the munitions?**		
Owner	☐ **state**		☐ **non-state**	**3.2.1. Status of storage site?**	☐ permanent	☐ temporary
			manager (if different)	**3.2.2. What types of activity took place there?**	☐ storage	
Details (e.g. type)	☐ police	☐ military	☐ private company		☐ processing	
	☐ foreign (e.g. peacekeeping force)		☐ armed group		☐ loading/unloading	
	☐ other (e.g. state companies), specify:		☐ other (e.g. criminal gang), specify:	**3.2.3. What was the design of the storage facility?**	☐ purpose-built storage	
					☐ non-purpose-built storage	
					☐ dump	
					☐ unknown	

(such as demilitarization contractors) usually operate under government regulations. However, such regulations are not subject to universal standards, and their status is sometimes unclear (Gobinet, 2013, p. 200). It is assumed that the standards of stockpiles not regulated by governments are much lower than those of official facilities. Insurgent groups are known to use ad hoc or clandestine means of storing ammunition, as large or permanent facilities are difficult to defend and are not sufficiently mobile for guerrilla warfare (Schroeder, 2013). Circumstances vary, however, and such stereotypes do not apply to all actors.

What munitions were stored there?

Technical investigations of UEMS incidents assess the ammunition and explosives held in the storage facility. NATO recommends collecting information on the type, quantity, and location within the storage unit (NATO, 2010, p. I-8-1). This information gives ammunition experts the data that they need to calculate Net Explosive Quantity (NEQ) and to examine the explosive compatibilities, each of which is necessary to an understanding of the resulting explosion. For general policy purposes, however, this level of detail is rarely needed. A general categorization of the types of ammunition or explosive involved, plus a quantity marker of the items destroyed, is enough to effectively illustrate the scale of an incident. See Question 3.3.

4. *Why* did the UEMS incident occur?

Munitions and the depots that store them are susceptible to a number of threats which could, if certain conditions are met, lead to a UEMS incident. Explosions can be triggered by lightning striking, material being handled roughly, electrical faults, or simply by the auto-ignition or auto-initiation of propellant (spontaneous combustion). When they lead to explosions, these triggers are referred to as **primary causes**. A primary cause is a specific event or condition that causes the ammunition to ignite. Behind each of these primary causes lie broader underlying structural conditions, known as **root causes** (see Table 8), which, in combination with a primary cause, lead to the explosion.

For instance, lightning striking a facility (a primary cause) should not necessarily result in a magazine exploding. The adequate design of storage facilities should protect against the hazards of unplanned explosions caused by extreme weather and other triggers (primary causes) (UNODA, 2011, para. 5.20, p. 14).[1] Consequently, if lightning striking a given facility does result in a UEMS incident, one can assume that its lightning-protection fea-

3.3. What munitions were stored there?	**Type of material or munitions**		**Quantity/measurement** (total estimate, providing any data available)	
Comments (e.g. age, origin, type, and condition of munitions)	☐ aircraft	☐ armour and artillery	☐ quantity (in number)	
	☐ cluster	☐ explosives and pyrotechnics	☐ weight (in tonnes)	
	☐ mines	☐ naval	☐ value (indicate currency)	
	☐ SALW*	☐ unknown		

tures were inadequate (this being a root cause). In another example, the auto-initiation of propellant typically indicates inadequate conditions of storage and surveillance of the munitions or explosives (Bevan, 2008, p. 62). In recording the causal data of a UEMS incident, it is important to provide sufficiently detailed information so that both the primary cause (the event that triggered the explosion) and the root, or underlying, cause (the structural conditions that facilitated the explosion) emerge clearly from the description. See Question 4.

In accordance with conventional practice and theory of ammunition management, the most common **root causes** can be grouped into five main categories: (1) lack of surveillance, leading to ammunition degradation; (2) inappropriate storage systems and infrastructure; (3) handling errors and inappropriate working practices; (4) failure to take into account external, environmental influences and events; and (5) poor security (see Table 8). Each category reflects principles of the life-cycle management of ammunition, including surveillance, proper storage, competent personnel, and secure and structurally sound facilities (UNODA, 2011; Marius, 2012; Bevan, 2008).

After a UEMS incident, plans for short-term and long-term solutions, including the levels of investment required, will differ according to the causes identified. Full information on the primary and root causes of a UEMS incident is thus essential. Access to such information can prevent similar types of explosion from happening in future. A thorough investigation into safety conditions at the storage site may be needed to identify the causes of a UEMS incident. For example, when an explosion occurs because the chemical properties of the munitions have deteriorated, it is often assumed that storage conditions were sub-standard. Yet the chemical deterioration of munitions can also be caused by poor working practices, specifically a lack of systematic monitoring of the condition of the munitions.

Despite the difficulties inherent in complete and rapid reporting on the causes of a UEMS incident, significant improvements are possible. This section presents a classification system developed by the Small Arms Survey in consultation with a group of experts (as illustrated in Table 8).[2] It enables users to record both the root cause and the primary cause—including sub-classifications of primary causes. The system presented in Table 8 also allows users to input a full range of information, depending on the availability of specific data, in order to identify PSSM factors in need of attention.

4. *Why?* (Why did the UEMS incident occur?)**

(e.g. degradation of ammunition; poor storage or poor infrastructure; material being mishandled or dropped; external, environmental events (such as floods or fires); poor security; poor working conditions)

Table 8. UEMS: classification of causes

Root cause	Primary cause	Sub-classification of primary causes[a]	IATG reference code for primary causes[b]
1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation (auto-catalysation)		n/a
	1.2. mechanical deterioration	1.2.1. sensitization, typically due to corrosion	7A, 8A
		1.2.2. exudation (e.g. white phosphorus and nitro-based chemicals)	8A, 9A, 9B
		1.2.3. compatibility problems between chemical compounds	7A
	1.3. chemical deterioration	1.3.1. formation of volatile compounds (e.g. copper azide)	8A, 9A, 9B
		1.3.2. depletion of propellant stabilizer	7A
		1.3.3 component ageing (metallurgical)	n/a
		1.3.4. component ageing (electronics)	8A, 9A, 9B
	1.4. suspected		8A, 9A, 9B
2. inappropriate storage systems and infrastructure	2.1. falling objects	2.1.1. weak internal storage infrastructure	n/a
		2.1.2. unsafe ammunition stacking	2M, 2P
	2.2. internal fire	2.2.1. electrical fault	n/a
		2.2.2. incompatible structural material	n/a
		2.2.3. hot surfaces	n/a
	2.3. suspected		n/a
3. handling errors and inappropriate working practices	3.1. mechanical damage (caused by shock initiation)	3.1.1. rough handling (including transporting within depot)	2A, 2B, 2C, 2D, 2M, 2P
		3.1.2. munitions being dropped	2A, 2C, 2M, 2P
		3.1.3. vibration	2A, 2B, 9F
	3.2. inappropriate work practices	3.2.1. unauthorized activities and items (e.g. smoking)	n/a
		3.2.2. work involving the use of heat (e.g. welding)	n/a
		3.2.3. storage of incompatible materials	n/a
		3.2.4. horseplay (foolish and irresponsible behaviour)	n/a

Root cause	Primary cause	Sub-classification of primary causes[a]	IATG reference code for primary causes[b]
3. handling errors and inappropriate working practices	3.3. tampering	3.3.1. tampering (deliberate)	4A–4D, 4G, 4H
		3.3.2. tampering (accidental)	4E, 4F
	3.4. during demilitarization/explosive ordnance disposal (EOD)	3.4.1. inadvertent initiation of UXO	n/a
		3.4.2. inappropriate disposal	n/a
	3.5. suspected		n/a
4. Failure to take into account external, environmental influences and events	4.1. extreme weather	4.1.1. lightning	9A
		4.1.2. extreme climatic heat	9A
		4.1.3. extreme climatic humidity	9A
		4.1.4. extreme fluctuations (e.g. of humidity or temperature, such as freezing and thawing)	9A
	4.2. external fire	4.2.1. vegetation fire	n/a
		4.2.2. vehicle fire	n/a
		4.2.3. building fire	n/a
	4.3. other		
	4.4. suspected		n/a
5. Poor security	5.1. criminal/deliberate act	5.1.1. deliberate explosion	n/a
		5.1.2. deliberate fire	n/a
		5.1.3. during theft (e.g. illegal salvaging)	n/a
		5.1.4. failure to withstand external attack (excluding aerial bombing)	n/a
	5.2. suspected		n/a
6. Cause currently undetermined or unrecorded			n/a

Notes: a Primary sub-causes are based on 'Surveillance and in-service proof' (UNODA, 2011, para. 7.20; see also NATO, 2010).
b These codes are developed from 'Example cause and closure codes' (UNODA, 2011, Annex D, para. 11.20).

5. *What* happened as a result of the explosion?

Many factors determine the consequences of an explosion. Key factors include the proximity to populated areas, the quantity of ammunition and explosives housed at the storage site, the existing emergency-response plan, if one is already in place, and the presence of blast-restraining structures (UNODA, 2011, para. 5.20, p. 5). Impacts may be direct or indirect, with both immediate and long-term consequences. Direct and immediate impacts are easier to account for, as they are usually visible and easily quantified. Indirect and long-term impacts are less obvious, however, as they are often more difficult to recognize (Lazarevič, 2012, p. 36). Only with adequate information on these various effects is it possible to fully understand and illustrate the risk that the improper management of munitions poses to public safety.

How large was the affected area?

The radius of the zone affected by a blast usually differs from the area contaminated by the spread of UXO. Both pieces of information are fundamental to identifying the personnel and equipment essential for conducting clearance work. Such information is needed in order to identify trends in the costs related to repair and reconstruction, such as replacing damaged or destroyed military or facility assets, or allocating civilian compensation. Sound data on the costs of reparation, substitution, and

5. *What?* (What happened as a result of the explosion?)		
5.1 How large was the affected area?	**5.2. Who was affected by the explosion?**	**5.3. What infrastructure was damaged or destroyed in the explosion?**
Blast radius (km) (distance of pressure expanding outwards from explosion)	**Fatalities** (total) ☐ yes ☐ no ☐ unknown If yes, no. of facility fatalities no. of civilian, non-staff fatalities	**Type of infrastructure damaged** (selecting all that apply) ☐ schools ☐ housing ☐ health services ☐ transport hub ☐ other, specify:
Fragmentation radius (km) (distance contaminated by munitions, explosives, weapons, and debris, posing a continuing risk)	**Injuries** (total) ☐ yes ☐ no ☐ unknown If yes, no. of facility staff injuries no. of civilian, non-staff injuries	**Total cost of damages** (indicate currency)
Comments		

reconstruction should constitute a solid argument to encourage responsible management of conventional ammunition stocks. See Question 5.1.

Who was affected by the explosion?

Unplanned explosions have a direct, indiscriminate potential to kill and injure. A single incident can result in hundreds of deaths and thousands of injuries, involving both facility personnel and civilians. Usually, the first and most severely affected by an explosion are front-line workers present at the moment of the blast—who also may have been inadvertently responsible for the explosion itself. However, when explosions occur near populated civilian areas, higher numbers of civilian casualties may result. Only with an adequate record of casualties, including the distinction between facility and civilian casualties, is it possible to understand who bears the burden and unintended consequences of such explosions. See Question 5.2.

What infrastructure was damaged or destroyed in the explosion?

Although the infrastructure first and foremost directly affected by a blast is the munitions storage facility itself, other public and civilian infrastructure is susceptible to destruction too. Nearby schools, housing, health services, transport hubs, businesses, roads, or other public structures are frequently damaged. A record of the total cost of damages can provide evidence of significant financial losses which may occur as a result of the blast. This information can also serve as the basis of subsequent estimates of the costs of rehabilitation, reconstruction, or relocation. See Question 5.3.

What are the other consequences of a UEMS?

Unplanned explosions can result in many consequences beyond the immediate impact of the blast; these consequences may be political, economic, environmental, or social. The IRT enables data to be collected on two of the indirect consequences of UEMS, with a specific section for the recording of political repercussions and another section for the recording of compensation payments. See Question 5.4.

Although culpability often goes undetermined or unpunished, the political repercussions of some incidents may mean that high-ranking officials do, at times, face sanctions for their role in a UEMS incident. As described in Part I, this political fall-out can be a significant consequence, increasing the total impact of an

5.4. What are the other consequences of a UEMS?		
Government response ☐ safety investigation ☐ legal investigation	**Compensation** ☐ yes ☐ no ☐ n/a* If yes, how many families received compensation?	**Total cost of compensation** (indicate currency)
Political impact (e.g. senior officials being reprimanded, demoted, convicted, or jailed)	**Other impacts** (e.g. environmental, economic, social, or health)	

incident. Although the political impact may become apparent relatively quickly, information about the underlying criminal and/or political responsibility is not likely to emerge until the investigation is complete.[3] Investigation of UEMS incidents is completed when both safety-related and legal investigations are finalized. Regardless of the ownership of the munitions depot where the UEMS occurred, public authorities are responsible for ensuring the due and impartial process of these investigations. Information on whether these investigations were actually conducted is important, to enable follow-up work to be done at a later date. Such follow-up may have to wait until the authorities concerned consider that the relevant information is no longer sensitive.

Indirect repercussions of UEMS include the economic costs of compensation payments. When explosions occur in populated areas, private property—such as homes, cars, and other possessions—may be destroyed or severely damaged. Local businesses and small industries may require remuneration for loss of income. Indeed, tourism and other commercial activities may be negatively affected if local facilities are destroyed or access to them becomes too dangerous, due to the spread of UXO and debris. Regardless of who is responsible for the explosion, those directly affected by it may successfully claim compensation in cash or in kind. Accurate records of the economic repercussions of UEMS may act as a catalyst for political action to prevent such events from occurring in the future.

6. *How* did the state and the international community respond?

Contingency plans help to reduce the direct and indirect consequences of an explosion. As with earthquakes and other disasters, the emergency response to a UEMS incident should be planned well in advance. When proper disaster-management plans are non-existent, casualties and indirect consequences are likely to occur unnecessarily. Emergency preparedness may include evacuating those nearby—both military or facility personnel and civilians. If explosive ordnance experts or demilitarization contractors are already present on site, they may assist in the post-blast response. Depending on the severity of the incident, evacuation could turn into longer-term displacement; and the longer the displacement lasts, the more resources are required. Analysis of how the emergency response affected the

6. *How?* (How did the state and international community respond?)

Was an emergency-plan response implemented? ☐ yes ☐ no ☐ n/a	**Prior presence of EOD** expertise on-site?** ☐ yes ☐ no ☐ unknown	**Relocation of displaced people** ☐ yes ☐ no ☐ n/a — If yes, how many?
Evacuated people ☐ yes ☐ no ☐ n/a		**UXO removal** ☐ yes ☐ no ☐ n/a
If yes, how many?	If yes, was displacement ☐ temporary or ☐ permanent?	Details (e.g. quantity or weight in tonnes)
Comments (e.g. names of actors assisting, including local, national, or international)		

direct and long-term impacts of an incident may help to improve emergency planning and response (or develop it when it is not in place) at the international and national levels. Such data may also be useful for developing risk mitigation and education frameworks. See Question 6.

Endnotes

1 The design of facilities should be taken into account when identifying type of storages required, according to UNODA (2011, paras. 5.10, 5.20). The IATG also provide information regarding other minimum standards for munitions storage sites that should be incorporated into the design of the facilities. These include that permit easy cleaning and maintenance (para. 6.70), adequate ventilation (para. 6.50), space for the free movement of personnel (para. 6.20), easy access to stacks of munitions (para. 6.30), and the easy transfer of munitions from place to place (ch. 8, para. 8.10). For more information on considerations pertaining to design, see UNODA (2011).

2 In October 2011 the Survey held a workshop, attended by international technical experts from relevant international organizations involved in PSSM activities, for the purposes of improving and validating the classification of reported causes of UEMS. See Small Arms Survey (2011).

3 Different forms of information disclosure may apply, depending on the type of information and the audience. For example, families of victims and survivors directly affected by the explosion should have the right to know that parties found responsible for the explosions are subject to internal disciplinary action or criminally prosecuted.

PART III

Actors

Overview

This section profiles 37 actors who undertake activities or provide services with a goal of securing munitions safely or identifying and destroying surplus munitions. The focus is on bodies and organizations that make their expertise available to, or seek to influence agendas of, beneficiaries across the globe. The actors selected to be profiled are particularly involved in preventing UEMS events, although some of the actors also conduct post-explosion clearance and remediation activities. With only one exception, for an actor to be profiled it must address at least three of the following eight activities:

- Agenda-setting
- Standard-making
- Funding and tendering
- Technical assessment
- Education and training
- On-site munitions management
- Loading and transport
- Disposal and destruction

(See Figure 13 for a fuller description of what these activities entail and exclude.)

As noted in Part I, the actors come primarily from the United Nations system (5); regional organizations (8); non-governmental organizations (many of which are also active in humanitarian demining) and private companies (23); and 'other' (1), which includes an informal intergovernmental 'platform' initiative. Certain for-profit commercial enterprises have also been included. For the most part, however, companies undertaking industrial demilitarization of munitions primarily on their own territories have been excluded. Rather this Handbook features actors who offer their experts, expertise, and equipment to help countries address their needs in situ, in particular countries with limited or non-existent demilitarization capacities.

Part III is intended to highlight activities, rather than evaluate them (see Figure 14). Indeed, each profile is largely based on self-assessment, although all have benefited from the process of peer review. Those actors who participate in more activities are not necessarily better than those participating in fewer. And many actors who are not profiled here do valuable, related work.

Figure 13. Icons of UEMS-related commitments and services provided: expanded text

Icon	Short description	Fuller description, examples, and notes
	**Agenda-setting**	The actor helps to engage decision-makers and practitioners to focus on addressing stockpile management, and surplus identification, disposal, and destruction. **Examples**: International-level engagement would include supporting these specific concerns within the UN PoA framework. Regional-level engagement would include supporting the ECOWAS Convention, the Nairobi Protocol, or the RASR Initiative. National-level engagement would include working with governments to address and develop their own national standards on these issues. **Notes**: Although ISACS do not explicitly address munitions, work on ISACS modules that address stockpile management and destruction are deemed UEMS-relevant. Support for developing, promoting, and implementing IMAS is 'creditworthy', given the numerous standards that address stockpile handling, management, and destruction. However, marking, tracing, and record-keeping initiatives, while important components of stockpile management, are not included here.
	**Standard-making**	The actor is instrumental in developing and providing guidelines and best practices for the implementation of commitments or objectives. **Examples**: International-level best practices would include the International Ammunition Technical Guidelines (IATG). Regional-level best practices would include the *Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives* and the *OSCE Handbook of Best Practices on Conventional Ammunition*. National-level engagement would include working with governments to develop their own national standards and best practices. **Notes**: Some profiles include references to environmental and management standards (e.g. ISO 14000 and ISO 9000). These accomplishments, however, do not garner credit for the activity of standard-making.

Icon	Short description	Fuller description, examples, and notes
	**Funding and tendering**	The actor is active in fund-raising, funding, or coordinating international assistance and cooperation to undertake UEMS-related work. **Examples**: Too many to mention. **Notes**: When an actor funds an activity or service, or helps to secure service providers, or helps to choose—but does not engage itself in implementing—the activity or service, it receives credit for this activity, funding and tendering, but not elsewhere.
	**Technical assessment**	The actor oversees the physical inspection of munitions sites to help ensure adherence to best practice regarding storage. Physical inspection includes the chemical testing of munitions' explosives and stabilizers.
	**Education and training**	The actor offers classroom- or field-based instruction on UEMS-related best practices.
	**On-site munitions management**	The actor assists in the planning, design, construction, or refurbishment of sites for the safe storage of munitions, and conducts audits of sites.
	**Loading and transport**	The actor undertakes the movement of munitions within locations in accordance with the proper management, disposal, or destruction of munitions.
	**Disposal and destruction**	The actor implements either (1) the responsible removal, transfer, or destruction of munitions, or (2) the design, development, and production of demilitarization processes.

Profiles

Figure 14. Services provided and activities undertaken by selected actors

Actor		Service provided/Activity undertaken							
		TO DO	BEST PRACTICE						
UN System	UN Coordinating Action on Small Arms (CASA)	●	●	●		●			
	UN Development Programme (UNDP)	●	●	●		●			
	UN Institute for Disarmament Research (UNIDIR)	●	●			●			
	UN Mine Action Service (UNMAS)	●		●		●			
	UN Office for Disarmament Affairs (UNODA)	●	●	●		●			
Regional organizations	Economic Community of West African States (ECOWAS)	●	●	●					
	European Union (EU)	●	●	●	●	●	●	●	●
	North Atlantic Treaty Organization (NATO)	●	●	●	●	●	●		●
	Organization for Security and Co-operation in Europe (OSCE)	●	●	●					●
	Organization of American States (OAS)	●		●		●			
	Pacific Islands Forum (PIF)	●	●	●					
	RACVIAC – Centre for Security Cooperation (RACVIAC)	●				●			
	Regional Cooperation Council (RCC)	●	●	●		●	●		●
NGOs and private companies	Bonn International Center for Conversion (BICC)	●	●		●	●			
	DanChurchAid (DCA)	●	●			●	●		●
	DHA Global		●		●	●	●	●	●
	Dynasafe Demil Systems				●		●	●	●
	DynCorp International (DI)				●		●	●	●
	EOD Solutions (EODS)						●	●	●

Actor		Service provided/Activity undertaken							
									
Non-governmental organizations and private companies	Explosive Capabilities (ExCap)	●	●		●	●	●		●
	Fenix Insight	●	●		●	●	●		●
	Geneva International Centre for Humanitarian Demining (GICHD)	●	●		●		●		●
	Golden West Humanitarian Foundation (Golden West)	●	●		●	●	●	●	●
	The HALO Trust		●		●	●	●	●	●
	Handicap International (HI)	●	●	●	●	●	●		●
	Institute of Munitions Clearance & Search Engineers (IMCSE)	●	●		●				
	International Committee of the Red Cross (ICRC)	●	●		●		●	●	●
	ISSEE	●	●		●	●	●		●
	ITF Enhancing Human Security (ITF)	●		●	●		●		●
	Mines Advisory Group (MAG)	●	●		●	●	●		●
	Norwegian People's Aid (NPA)	●			●	●	●		●
	PICRITE	●	●				●		●
	SAFEX International	●	●			●			
	Small Arms Survey	●	●			●			
	Sterling Global Operations (SGO)	●	●	●	●	●	●		●
	Swiss Foundation for Mine Action (FSD)				●	●	●		●
Other	Multinational Small Arms and Ammunition Group (MSAG)		●	●	●	●	●		●

United Nations CASA
Coordinating Action on Small Arms

UN Coordinating Action on Small Arms (CASA)

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SHORT DESCRIPTION

Created in 1998, CASA is the UN internal coordination mechanism on small arms, the arms trade, and ammunition issues. It is chaired by UNODA.

UEMS-RELATED ACTIVITIES

UN CASA has facilitated the coordination of national needs and available resources as part of the PoA framework. Lately, in collaboration with partners from within the UN system and without, International Small Arms Control Standards (ISACS) were developed through UN CASA. ISACS provide clear, practical, and comprehensive guidance on the control of small arms and light weapons to policy makers and practitioners. The standards include modules on stockpile management and surplus destruction.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

Currently 23 UN entities participate in CASA, from the Counter-Terrorism Executive Directorate (CTED) to the World Health Organization (WHO). All these entities strive to adhere to and incorporate the ISACS guidelines in their implementation work. All 193 UN member states are eligible to receive assistance. As a result of UN CASA's efforts to match needs with resources, several states, particularly in Africa, have secured assistance for physical security and stockpile management (PSSM) and destruction of their surplus munitions.

PUBLICATIONS AND MATERIALS OF NOTE

- UN CASA. n.d. *International Small Arms Control Standards*. (Available at www.smallarmsstandards.org)

Information accurate as of 21 February 2014

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SHORT DESCRIPTION

UNDP, established in 1966, strives to reduce poverty, promote democratic governance, prevent crises, facilitate recovery, and support sustainable development. In so doing, it aims to help build nations that can withstand crisis, and drive and sustain the kind of growth that improves the quality of life for everyone.

UEMS-RELATED ACTIVITIES

UNDP mainly addresses small arms and munitions management issues in the work of its Bureau for Crisis Prevention and Recovery (BCPR), which was created in 2001. UNDP support of small arms and ammunition management forms part of its broader support to strengthen countries' capacities to address the challenges of small arms control and armed violence reduction. At national levels UNDP supports the development and implementation of national small arms and light weapons strategies. Activities covered include developing legislative frameworks, supporting the development of weapons registration systems, and improved stockpile management of state holdings, including munitions, such as the development of software to determine what is defined as surplus and to track it. UNDP also helped establish the South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC) in 2002 and the Central American Programme on Small Arms Control (CASAC) in 2007, and assisted in small arms control initiatives in the respective regions. UNDP has participated actively in the development of ISACS; it manages and finances the ISACS Secretariat, including the ISACS Project Coordinator position.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

UNDP has provided significant funding to SEESAC, which supports stockpile management and destruction efforts in South-east and Eastern Europe. Since 2006, UNDP has been supporting Bosnia and Herzegovina in the prevention of UEMS by destroying munitions (e.g. cluster munitions) and improving the infrastructure of munitions-storage sites. UNDP and the OSCE developed software to help Belarus manage its weapons and munitions stockpiles. The software is being made available to eight other OSCE member states initially and thereafter to other interested UN member states

PUBLICATIONS AND MATERIALS OF NOTE

- UNDP. 2008. *How to Guide: Small Arms and Light Weapons Legislation.*

UNIDIR
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SHORT DESCRIPTION

UNIDIR, established in 1980 by the UN General Assembly, is a voluntarily funded autonomous think tank within the United Nations. An impartial actor, the Institute assists the international community in developing the practical, innovative thinking needed to find solutions to the security challenges of today and tomorrow.

UEMS-RELATED ACTIVITIES

UNIDIR was one of the first entities in the UN system to focus on small arms in a systematic manner, conducting a series of studies in the mid-1990s in areas of arms management in peace processes. Since 2002 it has worked with the Small Arms Survey on a series of studies examining governments' reports as part of the UN Small Arms Programme of Action (PoA), which includes sections on stockpile management initiatives. UNIDIR created a tool to help states determine surpluses by more accurately costing management expenses of its munitions and firearms. Its project on identifying gaps and needs for assistance on small arms control measures also addressed stockpile management and surplus weapons. Most recently, UNIDIR, together with the Monterey Institute of International Studies (MIIS), has developed a self-assessment software tool to support the practical application of the International Small Arms Control Standards (ISACS), which includes a focus on stockpile management best practices.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

UNIDIR actively promotes the PoA, the International Tracing Instrument (ITI), and ISACS. It makes its publications available to UN Permanent Missions in New York and in Geneva, to UN information centres worldwide, and via an extensive mailing list sent to top policy-makers and academics, among others.

PUBLICATIONS AND MATERIALS OF NOTE

- Brehm. 2012. *Protecting Civilians from the Effects of Explosive Weapons: An Analysis of International Legal and Policy Standards.*
- Parker and Green. 2012. A *Decade of Implementing the United Nations Programme of Action on Small Arms and Light Weapons: Analysis of National Reports.*
- Turner. 2006. *Costs of Disarmament: Cost–Benefit Analysis of SALW Destruction versus Storage.*

Information accurate as of 28 November 2013

UNMAS

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SHORT DESCRIPTION

UNMAS, established in 1997, serves as the UN focal point for mine action. It collaborates with 12 UN entities to ensure an effective response to the challenges of landmines, explosive remnants of war (ERW), cluster munitions, unsafe ammunition stockpiles, small arms and light weapons, and improvised explosive devices.

UEMS-RELATED ACTIVITIES

UNMAS responds to requests from affected states for assistance in the safe and secure management of stockpiles and coordinates with national authorities, donors, and practitioners. This assistance includes technical assessments, training, infrastructure rehabilitation, temporary storage, disposal, and destruction. (UNMAS administers the UN Voluntary Trust Fund for Assistance in Mine Action, through which donor funding has supported rapid-response activities to clear away explosive remnants of war (ERW) after unplanned explosions.) UNMAS is responsible for the implementation of Security Council mandates related to the stockpile management of ammunition and small arms. UNMAS is the key UN technical expert and partner for the UN Office for Disarmament Affairs for the development and implementation of International Ammunition Technical Guidelines (IATG). The UN General Assembly has also recognized the technical expertise and full involvement of UNMAS in developing and supporting the implementation of the IATG and the UN *Safer*Guard knowledge-resource management programme. UNMAS promotes and supports the adherence to and compliance with relevant treaty obligations by states parties, including those relating to stockpile destruction, clearance, risk education, and assisting victims.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

UNMAS has managed the introduction and supported the implementation of IATG in several countries through training, assessments, refurbishment of infrastructure, disposal of unsafe ammunition, and the development of national guidelines. UNMAS has undertaken weapons- and ammunition-safety management programmes in Afghanistan, Central African Republic (CAR), Congo, Côte d'Ivoire, Democratic Republic of the Congo (DRC), Haiti, Liberia, Libya, Mali, and the Seychelles. UNMAS has raised funds and overseen the construction of secure depots for hundreds of tons of munitions in Côte d'Ivoire, DRC, Libya, and South Sudan.

PUBLICATIONS AND MATERIALS OF NOTE

- Earth Survey. n.d. *UNMAS Quantity Distance Tool for Google Earth.*
- United Nations. n.d. *The Strategy of the United Nations on Mine Action, 2013–2018.*

UNODA
United Nations Office for Disarmament Affairs

United Nations Office for Disarmament Affairs (UNODA)

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POC

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SHORT DESCRIPTION

UNODA, whose roots go back to 1992, works on nuclear disarmament and non-proliferation, on biological and chemical disarmament regimes, and on control measures to address conventional weapons, including small arms.

UEMS-RELATED ACTIVITIES

UNODA supports the work of member states and UN partners on small arms and ammunition control as part of the UN Secretariat. UNODA and its three regional centres in Kathmandu, Lima, and Lomé assist countries with their stockpile management and work with donors to hold technical training sessions in support of the PoA. UNODA chairs the UN internal coordination on small arms, the arms trade, and ammunition (see UN CASA profile). It took the lead in the development within the UN of the IATG to help secure ammunition stockpiles and oversees the UN Safer*G*uard programme in support of implementing the guidelines. Under this programme, UNODA hosts a quick-response mechanism that is able to rapidly deploy ammunition experts to provide assistance in high-risk and post-explosion situations. Its dedicated web pages include risk management tools, such as software to calculate safety distances, and other training tools (see below). Under CASA, UNODA and UNDP manage the development of the ISACS, which complement the IATG.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

All 193 UN member states are eligible to receive UNODA assistance to help improve the safety and security of their national stockpiles and to destroy their surplus munitions safely and securely. The three UNODA regional centres work with donors who strive to assist states in their stockpile management and surplus destruction.

PUBLICATIONS AND MATERIALS OF NOTE

- UN CASA. n.d. *International Small Arms Control Standards.* (Available at www.smallarmsstandards.org)
- UN Safer*G*uard. 2013. *IATG Implementation Support Toolkit.*
- UNODA. 2011. *International Ammunition Technical Guidelines.*
- UNODA. 2012. *Matching Needs and Resources 2012–2014: Assistance Proposals from Member States.*
- UNODA. n.d. *UN Trust Facility Supporting Cooperation on Arms Regulation.*

Information accurate as of 21 November 2013

Economic Community of West African States (ECOWAS)

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POC

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SHORT DESCRIPTION

The objective of ECOWAS, established in 1975, is to promote cooperation and integration, including economic and monetary union, in order to stimulate growth and development in West Africa. The 1993 Revised Treaty provides a mandate for ECOWAS to promote peace and security in the region.

UEMS-RELATED ACTIVITIES

The ECOWAS Convention (see below) requires that ECOWAS member states take appropriate steps to manage and secure government stocks of weapons and munitions, which includes identifying surplus and obsolete stocks for disposal (Article 16). Material deemed 'obsolete' is to be destroyed (Article 17). The Convention also includes provisions for marking of munitions (Article 18) to assist with tracing and record keeping. The ECOWAS Small Arms Unit participated actively in the development of ISACS, meetings within the UN Small Arms PoA, and the Arms Trade Treaty. In 2013, ECOWAS secured financial support from the EU through the Regional Indicative Programme/10th EDF to help implement key activities of the regional 'roadmap on stockpile management and security', which includes inventory of states arms and ammunition and destruction of obsolete ones. This programme is expected to start in 2014. It also includes training of the personnel in charge of arms and ammunition depots, physical security, and assessment of the security of the depots.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

All 15 ECOWAS member states (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo) are legally bound to adhere to the ECOWAS Convention which entered into force in 2009. The EU funding to be channelled toward PSSM and surplus destruction activities will be available to assist all 15 ECOWAS members.

PUBLICATIONS AND MATERIALS OF NOTE

- ECOWAS. 2006. *ECOWAS Convention on Small Arms and Light Weapons, Their Ammunition and Other Related Materials.*

European Union (EU)

HEADQUARTERS

Brussels, Belgium

WEBSITE

www.europa.eu
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POC

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SHORT DESCRIPTION

The EU, with its origins dating from 1958, is an economic and political partnership with the main objectives of promoting peace and the well-being of its people through common economic, foreign, security, and justice policies.

UEMS-RELATED ACTIVITIES

In the framework of its 2005 SALW Strategy, the EU assists third countries seeking to reduce their surplus stocks of small arms and their ammunition, and to prevent their diversion to the illegal trade. Particular attention has been paid to the enormous accumulations of small arms in Eastern and South-east Europe, but other regions also regularly receive assistance. The EU has also provided significant assistance to promote stockpile management and the destruction of surplus conventional weapons and munitions. To encourage proper oversight of munitions stockpiles the EU is also supporting the establishment of a global reporting mechanism on illicit small arms and light weapons and other illicit conventional weapons and ammunition ('iTrace') to reduce the risk of illicit trade (Council Decision 2013/698/CFSP).

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

All 28 EU members are expected to adhere to its guidelines and strategies. EU funding for third countries has recently been provided to support the safety and security of stockpile storage sites, stockpile management, and surplus destruction in, for instance, the Western Balkans (Council Decision 2010/179/CFSP, 2013/730/CFSP) or Bosnia and Herzegovina (Commission Decision C (2013) 1740 final), the OSCE region (Council Decision 2012/662/CFSP), as well as in Libya and its region (Council Decision 2013/320/CFSP).

The EU also provided funding for the development and implementation of the UN technical guidelines on ammunition stockpile management by supporting the work of the UN Office for Disarmament Affairs in this regard (Council Decision 2011/428/CFSP), covering, among other things, relevant activities in Latin America and the Caribbean as well as in Africa.

PUBLICATIONS AND MATERIALS OF NOTE

- EU. 2006. *EU Strategy to Combat the Illicit Accumulation and Trafficking of SALW and Their Ammunition.*

Information accurate as of 21 February 2014

North Atlantic Treaty Organization (NATO)

HEADQUARTERS

Brussels, Belgium

WEBSITE

www.nato.int; www.nspa.nato.int
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SHORT DESCRIPTION

NATO, created in 1949, is a political and military alliance. Its primary purpose is to safeguard the freedom and security of its members through political and security means.

UEMS-RELATED ACTIVITIES

NATO's Conference on National Armament Directors' Ammunition Safety Group (AC/326) has developed a manual on safety principles for storing munitions (see below). NATO has since posted this unclassified guideline on the Internet for public access. Munitions Safety Information Analysis Center (MSIAC) provides best-practice guidance on the transport and storage of munitions to all 28 NATO members and 41 partners. MSIAC also collects munitions-accidents data for the purposes of sharing lessons learned among those nations willing to contribute. Officials from these 69 countries can attend courses on PSSM and arms control and on non-proliferation, held at the NATO School. NATO Support Agency (NSPA) implements NATO Trust Fund projects that support PSSM initiatives across the globe, including depot construction and surplus destruction. NSPA also hosts an Ammunition Support Partnership, comprising 24 countries, which provides demilitarization and technical services, among other activities. NATO's Euro-Atlantic Partnership Council (EAPC) Ad Hoc Working Group on Small Arms and Light Weapons and Mine Action meets every four to six weeks. Principal concerns discussed at these meetings include the destruction of surplus weapons and the promotion of stockpile management.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

NATO's 28 members are expected to adhere to NATO guidelines on munitions management and safe transport. NATO makes numerous UEMS-related activities available to its members, plus 41 global partners. NATO has posted its manual on storing munitions safely online, making it freely available. As of November 2013, the NSPA-managed NATO Trust Fund had supported projects totalling EUR 75 million, conducted in 12 partner countries. (The vast majority of this funding has gone towards preventative measures to counter UEMS incidents, not to post-explosion clean-up.)

PUBLICATIONS AND MATERIALS OF NOTE

- NATO. 2010. *Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives*.

Organization for Security and Co-operation in Europe (OSCE)

HEADQUARTERS

Vienna, Austria

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POC

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SHORT DESCRIPTION

The OSCE, with its origins dating back to 1975, addresses a wide range of security-related concerns. These include arms control, confidence- and security-building measures, human rights, national minorities, democratization, policing strategies, counter-terrorism, and economic and environmental activities.

UEMS-RELATED ACTIVITIES

OSCE addresses UEMS with two approaches. On the one hand, it has adopted commitments and norms on stockpiles of conventional ammunition. The 2003 OSCE Document on Stockpiles of Conventional Ammunition serves three purposes: it outlines criteria for identifying surpluses; recognizes states' responsibility for their stockpiles; and identifies destruction as the preferred method of disposal. Subsequently, in 2008, OSCE supplemented this norm-setting agenda with its Handbook of Conventional Ammunition to help its members implement that which they had agreed upon. Both the Document and the Handbook consider ammunition, with a goal of reducing the hazards posed by surplus as well as outdated and unstable munitions. On the other hand, it has initiated an assistance mechanism to upgrade security and safety of storage or destruction of surpluses.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

OSCE's 57 participating states (which include 56 UN member states and the Holy See) are politically committed to achieving and implementing OSCE objectives. All OSCE participating states are eligible to receive assistance, which is provided on a voluntary basis. As of April 2013, OSCE had received more than 40 requests for assistance on small arms and light weapons and stockpiles of conventional ammunition and has raised more than EUR 20 million to this end. The OSCE has implemented projects in Central Asia, the Caucasus, South-east Europe, and Eastern Europe, including in Ukraine, across which it has eliminated more than 16,000 tonnes of mélange (a rocket fuel component).

PUBLICATIONS AND MATERIALS OF NOTE

- OSCE. 2003a. *OSCE Document on Stockpiles of Convention Ammunition.*
- OSCE. 2003b. *OSCE Handbook of Best Practices on Small Arms and Light Weapons.*
- OSCE. 2008. *OSCE Handbook of Best Practices on Conventional Ammunition.*
- OSCE. 2012. *OSCE Document on Small Arms and Light Weapons.*

Information accurate as of 10 December 2013

Organization of American States (OAS)

HEADQUARTERS

Washington, DC, United States

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SHORT DESCRIPTION

The OAS, created in 1948, has a broad mandate; its charter promotes peace and security, with an emphasis on representative democracy (with due respect for the principle of non-intervention).

UEMS-RELATED ACTIVITIES

The OAS Department of Public Security has provided assistance to many OAS member states through its Program of Assistance for Control of Arms and Munitions (PACAM) on stockpile management of munitions and identification and destruction of surplus munitions. The OAS has underscored the importance of stockpile management through various resolutions (see below) and accordingly has supported numerous relevant training initiatives. Examples include support for an annual course for EOD operators and supervisors at the Spanish Army Engineer Academy (with financial assistance from Spain and other donors); as well as OAS training in member states for personnel responsible for handling, transporting, storing, and destroying ammunition stockpiles. OAS has helped members evaluate the PSSM needs pertaining to their national munitions stores and has provided technical assistance in identifying and destroying surplus, expired, abandoned, and deteriorated explosives and ammunition. OAS also developed a mobile destruction unit called SEMAFORO (Sistema para la Eliminación de Municiones y Armas de Fuego – Regional; semaforo meaning 'traffic light' in Spanish). The SEMAFORO unit can process 300 weapons and more than 100,000 cartridges of ammunition (up to 12.5 mm) a day.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

All 34 active members of the OAS are committed to upholding OAS resolutions and implementing OAS guidelines. (Cuba, a founding member, had its membership suspended from 1962 to 2009 and remains inactive.) OAS has supported the safe disposal of more than 1,700 tons of munitions from national stockpiles of Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua during the period 2007–2011 (with financial assistance from Canada, Italy, Spain, and the United States).

PUBLICATIONS AND MATERIALS OF NOTE

- OAS. 2007. *Addressing Illicit Trafficking in Small Arms and Light Weapons: Stockpile Management and Security.*
- OAS. 2010. *Addressing Illicit Trafficking in Small Arms and Light Weapons: Stockpile Management and Security. Revision.*

Pacific Islands Forum (PIF)

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SHORT DESCRIPTION

PIF, a political grouping of 16 independent and self-governing states with origins dating from 1971, seeks to stimulate economic growth and enhance political governance and security for its members by providing policy advice and by strengthening regional cooperation and integration.

UEMS-RELATED ACTIVITIES

In 1987 PIF created its Forum Regional Security Committee (FRSC) to address law enforcement and security issues. In 1996 the FRSC was tasked to explore options to combat the proliferation of arms in the region, resulting in the adoption of a common set of principles to control firearms, ammunition, and explosives (known as the Nadi Framework) in 2000. In 2003 it adopted a PIFS Model Weapons Control Bill, which includes standards on safe secure storage. Since 2010 PIF has been paying special attention to the problem of abandoned explosive ordnance (AXO) and unexploded ordnance (UXO) from munitions sites, many dating back to the Second World War, which has resulted in a study and three regional meetings to help coordinate regional activities and develop national action plans and capacities (with Australian and US government support), several destruction projects, and the development of a regional UXO strategy. In 2011 PIF heads of state and government deemed ERW to be 'a human security problem … [a] threat to public health, safety and the environment … [and] a serious obstacle to development'. The PIF Secretariat has worked with development partners, government donors, civil-society organizations, military forces, and mine-action operators with explosive ordnance disposal (EOD) expertise to develop and undertake safe destruction projects of surplus AXO and UXO at munitions sites in five PIF members (see below). It has identified needs for similar projects in three additional member states: Micronesia, Nauru, and Vanuatu.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

The majority of PIF's 16 members have identified surplus munitions left over from the Second World War that need to be destroyed. Projects to destroy AXO and UXO and help manage munitions sites have been undertaken in Kiribati, Marshall Islands, Palau, Papua New Guinea, and the Solomon Islands (with financial support from the Australian and US governments).

PUBLICATIONS AND MATERIALS OF NOTE

- PIF Secretariat. 2000. *Towards a Common Approach to Weapons Control ('Nadi Framework')*.
- PIF Secretariat. 2011. *WWII Unexploded Ordnance Report: A Study of UXO in Four Pacific Island Countries*.
- PIF Secretariat. 2012. *Regional Unexploded Ordnance Strategy*.

RACVIAC – Centre for Security Cooperation

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SHORT DESCRIPTION

RACVIAC has been an independent regional organization since 2011; it was established in 2000 as part of the Regional Cooperation Council. It fosters dialogue and cooperation on security matters in South-east Europe, targeting three overarching themes: a cooperative security environment, with a focus on arms control; security sector reform; and international and regional cooperation with a focus on Euro–Atlantic integration.

UEMS-RELATED ACTIVITIES

Since RACVIAC's creation it has provided practical and theoretical knowledge to organizations, working groups, and political and administrative structures in all areas of arms control, as well as confidence- and security-building measures. Every year since 2010, RACVIAC has held a five-day management or technical-level course focusing on different aspects of PSSM. Additionally, in 2011 it organized a three-day conference, 'Towards a Sustainable Solution for Excess Weapons and Ammunition: Policy, Logistical and Financial Aspects of Excess Weapons and Ammunition Disposal'. As a result of the conference, a statement was issued, inviting political decision-makers to recognize the importance of the issue of excess weapons and ammunition disposal (see below). RACVIAC is also a founding Steering Committee member of the Regional Approach to Stockpile Reduction (RASR) Initiative and, accordingly, is active in setting a related agenda for its nine participating countries.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

RACVIAC responds to the needs and requests of its eight member states (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Romania, Serbia, and Turkey) and other stakeholders related to UEMS issues (RACVIAC has 14 associate member and observer states). RACVIAC has trained about 1,500 experts from the region in stockpile management and on best practices of surplus destruction.

PUBLICATIONS AND MATERIALS OF NOTE

- RACVIAC. 2010. *RACVIAC Agreement.*
- RACVIAC. 2011a. *RACVIAC Strategy.*
- RACVIAC. 2011b. *Statement from 'Towards a Sustainable Solution for Excess Weapons and Ammunition Conference'.*

Regional Cooperation Council (RCC)

HEADQUARTERS

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SHORT DESCRIPTION

The RCC, established in 2008, promotes mutual cooperation in the European and Euro–Atlantic integration of South-east Europe, focusing on economic and social development, infrastructure and justice and home affairs, and security cooperation, among other areas.

UEMS-RELATED ACTIVITIES

The RCC (successor to the Stability Pact for South Eastern Europe, founded in 1999), together with UNDP, oversees the execution by SEESAC of the Regional Implementation Plan to Combat the Proliferation and Impact of SALW (adopted in 2001 and revised in 2006). Having worked since 2002 under the joint mandate of the Stability Pact and UNDP, SEESAC has formulated a series of regional arms control standards, including many focusing on stockpile management and surplus destruction, as well as products supporting national arms control efforts (see below). SEESAC has assisted regional governments with managing and storing their SALW and munitions stockpiles better, with undertaking public awareness campaigns, with registering and tracking civilian weapons, and with surplus destruction. As a founding Steering Committee member of the RASR Initiative, SEESAC is active in setting an agenda for the nine participating countries. SEESAC is integral to the EU strategy to combat the illicit accumulation and trafficking of SALW and their munitions.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

The RCC has 46 members, of which 31 are UN member states (15 members are UN bodies, intergovernmental organizations, and development banks). The recipients of RCC and SEESAC assistance are five former Yugoslav republics (all but Slovenia), Albania, Bulgaria, and Moldova.

PUBLICATIONS AND MATERIALS OF NOTE

- SEESAC. 2006. *Revised Stability Pact Regional Implementation Plan for Combating the Proliferation of Small Arms and Light Weapons in South East Europe.*
- SEESAC. n.d.a. *Regional Micro-disarmament Standards and Guidelines*, including Accident Investigations, Ammunition Management, Ammunition Storage, Depot Explosions, Destruction, Destruction Planning, EOD Clearance of Ammunition, and EOD Support.
- SEESAC. n.d.b. *SEESAC's SALW Knowledge Base*—a collection of dozens of publications covering issues ranging from SALW Destruction and SALW Stockpile Management to SALW Legislation.
- SEESAC. n.d.c. *Software tools:* (1) SALW Collection and Destruction Accounting Software; (2) Arms Exports Control Report Template; (3) SALW Agreements—Reporting System Software; (4) Cost–Benefit Analysis Model for SALW Stockpile Management; (5) SALW Media Monitoring Software.

Bonn International Center for Conversion
B·I·C·C

Bonn International Center for Conversion (BICC)

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SHORT DESCRIPTION

BICC, established in 1994, is an independent, non-profit organization which undertakes a wide range of peace and conflict studies. It undertakes research, publishes reports, and works towards developing the capacities of civil society organizations and government bodies.

UEMS-RELATED ACTIVITIES

BICC has undertaken technical assessments of stockpile management practices. It has convened workshops and training sessions to inform and educate decision-makers on safe storage of munitions and on the identification and safe destruction of surplus munitions (in cooperation with the German Military Verification Center and the Small Arms Survey). It has participated actively in developing UN guidelines on small arms control measures, including stockpile management, and has shepherded a study on certain practical measures that governments can undertake which fall short of the highest international standards, but are nevertheless effective initial steps.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

BICC has employed an adviser on stockpile management in the Bureau of Community Security and Small Arms Control within the Ministry of the Interior of the Government of South Sudan since 2011. BICC also provides technical advice on the drafting of rules and regulations, and on setting up dedicated management systems for stockpile management within the organized forces of South Sudan. Since 2012 it has worked with the Government of Sudan with a team of two advisers, aiming to increase cross-border cooperation on stockpile management among Chad, Libya, and Sudan.

PUBLICATIONS AND MATERIALS OF NOTE

- Kahl. 2011. *The Challenge of Managing State-owned Small Arms and Light Weapons in South Sudan.*
- Kahl. 2012. *Starter Guide: Towards Strong Arms and Ammunition Management Practices.*
- Polyakov. 2005. *Aging Stocks of Ammunition and SALW in Ukraine: Risks and Challenges.*
- Ruddock, et al. 2006. *Management of SALW Weapons and Ammunition Destruction Programs.*

DanChurchAid (DCA)

HEADQUARTERS

Copenhagen, Denmark

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SHORT DESCRIPTION

DanChurchAid, with its origins dating from 1922, aims to strengthen the poorest people of the world in their struggle for a life of dignity. It is rooted in the Danish National Evangelical Lutheran Church, but is active wherever it finds dire need, regardless of religion, gender, political beliefs, race, national or ethnic origins, handicaps, or sexual orientation.

UEMS-RELATED ACTIVITIES

DCA has identified the right to protect people from the damaging effects of landmines, cluster munitions, and other explosive remnants of war as one of its five founding principles. For at least 15 years, it has worked on mine and UXO clearance in more than a dozen countries and has campaigned for the implementation of weapons-related treaties, internationally and in countries in which it operates. Its UEMS-related activity includes designing temporary storage sites to IATG standards, advising national and regional authorities, and weapons control and management (in particular small arms and light weapons). DCA has also provided physical storage measures designed to reduce weapons-related accidents in emergency response situations. More recently DCA has focused on training and capacity-building of national authorities (such as police and civil defence actors) in areas such as EOD and the safe storage of small arms. It has provided survey and clearance assistance in response to a series of smaller UEMS events and has conducted decontamination of bulk demolition sites.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

DCA and its operators are members of the Institution of Munitions Clearance and Search Engineers. DCA operates to IMAS standards for clearance and its work with national partners and authorities is geared towards the implementation of IATG standards. Accordingly, DCA uses and advocates for the Safer*G*uard and the IATG implementation support kit. The DCA commitment—to principles of community safety and well-being—and its management system are guided and supported by adherence to benchmarks within the ISO 9000-related Humanitarian Accountability Partnership. DCA has demolished munitions (predominantly grenades and mortars) at storage sites in countries such as Angola, DRC, and Sudan. It is working on establishing temporary storage areas to IATG standards in Libya.

PUBLICATIONS AND MATERIALS OF NOTE

- None

DHA GLOBAL
EXPLOSIVE SAFETY SOLUTIONS

DHA Global

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SHORT DESCRIPTION

DHA Global, which was incorporated in 2006, provides training, mentoring, and technical services in the ammunition and explosives sectors. Its considerable experience with sea, land, and air weapon systems incorporates training, testing, project management, safety management, compliance, maintenance, system processing, disposal, and modification.

UEMS-RELATED ACTIVITIES

DHA Global (originally known as David Hopps Associates Ltd.) provides a full range of services across the munitions and explosives safety-management sector, including environmental disposal. DHA Global also arranges and provides loading and transportation services for munitions and explosives. Its training services include a needs analysis at the tactical, operational, and strategic levels, and related instructions to the relevant parties. It offers a suite of safety management procedures, plans, and systems. DHA Global has the ability to dispose of all conventional munitions and explosives either on-site or at its specialized facility in Eastern Europe.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

DHA Global works with defence contractors (particularly in the United Kingdom), governments, and international aid agencies working on munitions and explosives management issues. It has established a long-term partnership with Dunarit Bulgaria to provide cost-effective munitions disposal services for the full range of conventional munitions, including white phosphorous and cluster bombs. DHA Global has also carried out work for British Aerospace in Romania and Saudi Arabia. In November 2013, DHA Global delivered a munitions stockpile management training course to senior military officers from Bosnia and Herzegovina, under contract to UNDP. The company is certified as compliant under ISO 9001, 14001, and OHSAS 18001 standards.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Dynasafe Demil Systems

HEADQUARTERS

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SHORT DESCRIPTION

Dynasafe, which was officially established in 2012 (but has its origins dating back to the early 1990s as Dynasafe under different names), specializes in the removal, management, and destruction of UXO, CBRNe (Chemical, Biological, Radiological, Nuclear, and explosives), munitions, and other hazardous materials.

UEMS-RELATED ACTIVITIES

Dynasafe Demil Systems is part of the Dynasafe Group, an international enterprise in the demilitarization industry. With decades of experience, the Group provides integrated solutions across the whole disposal value chain, offering survey, search, location, clearance, containment, safe transport, recycling, and disposal. The Group is composed of three business units: Area Clearance surveys, locates, and clears UXO on land and under water; Protection Systems designs, engineers, and manufactures EOD systems, bomb-disposal systems, and explosion-protection systems that contain and transport CBRNe material; and Demil Systems designs and engineers plants that dismantle and dispose of conventional and chemical munitions. Group companies include BACTEC, GRV LUTHE, MineTech, Dynasafe Demil Systems, Dynasafe Protection Systems, and Dynasafe Marine Services. Dynasafe Demil Systems provides complete plants (including operator training) for the destruction of conventional and chemical munitions, as well as equipment for dismantling munitions and off-gas treatment systems for munitions-destruction plants, meeting the highest international environmental standards. These plants can be mobile, semi-mobile, transportable, or stationary. The Dynasafe Static Detonation Chamber (SDC) is the main technology being used in the thermal destruction plants, but rotary kilns and other furnaces can be supplied too.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

Dynasafe Demil Systems works with defence contractors, governments, international organizations, and the private sector working on munitions and explosives disposal. The companies under Dynasafe Demil Systems are certified ISO 9001. Dynasafe Demil Systems has delivered more than 24 plants worldwide (Europe, Asia, North America, Middle East) with operational experience of more than 100 years.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Information accurate as of 11 December 2013

DynCorp International (DI)

HEADQUARTERS

McLean, Virginia, United States

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SHORT DESCRIPTION

DynCorp International, which dates back to 1946 (but became DynCorp International in 2005), is a global services provider of a wide range of services—including aviation, field deployments, logistics, base operations, and training—often in remote and austere environments.

UEMS-RELATED ACTIVITIES

DI undertakes comprehensive munitions management services, which includes (but is not limited to) receiving, storing, inspecting, testing, transporting, and maintaining munitions. DI also undertakes destruction of obsolete and surplus ordnance. DI provides training and mentoring to increase capacity at local levels on which it operates. DI works with local partners and funders in Africa, Asia, Europe, and South America to ensure safety and quality programme implementation. (It also provides post-explosion clean-up services.) Starting in 2008 DI, through the US Department of State, has provided a 'Quick Reaction Force' (QRF) of fully trained and certified weapons removal and abatement technical specialists. Under this arrangement DI is to deploy a team of experts within a 72-hour window along with supporting infrastructure to rapidly implement short-term conventional weapons destruction and mitigation solutions designed to reduce or eliminate threats posed by explosive hazards to civilian populations.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

DI has deployed over 21 times since 2008 to numerous countries, including Afghanistan, Congo, Lebanon, Papua New Guinea, and the Philippines, providing training, munitions management, and PSSM. DI also provides munitions management services for the US government at facilities in several countries, including Bahrain, Oman, and Qatar. In Sierra Leone, DI destroyed more than 80,000 units of obsolete and surplus small arms ammunition and UXO (and 2,500 weapons) totalling around 90 tons for the armed forces, and more than 200 tons of ammunition for the Ecuadorian government. (It has also removed or destroyed conventional weapons and UXO in response to explosions in Bulgaria, Cyprus, and Tanzania.)

PUBLICATIONS AND MATERIALS OF NOTE

- None

EOD Solutions (EODS)

HEADQUARTERS

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SHORT DESCRIPTION

EOD Solutions, established in 1987, is a private company specializing in the safe storage and transport of weapons and ammunition and the demilitarization of surplus stockpiles of this materiel. It also undertakes large-scale clean-up of unexploded ordnance left over from UEMS events and factory explosions.

UEMS-RELATED ACTIVITIES

EODS specializes in the logistical requirements of disposing of surplus and obsolete stockpiles of munitions. It provides for the safe transport and storage of munitions for countries undertaking to upgrade their stockpiles and make them more secure. EODS produces the Transportable Ammunition Destruction System (TRADS) in two sizes for the destruction of small arms ammunition up to and including 14.5 mm.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

EODS works toward NATO standards. In Albania it destroyed more than 8,000 tonnes of ammunition (plus an additional 175,000 weapons), and also refurbished a factory to undertake the safe reverse-engineering and dismantling of thousands of 82 mm mortars. It has also been active for many years in destroying surplus munitions in Bosnia and Herzegovina. In Montenegro EODS safely destroyed 1,500 MANPADS (and additional munitions). EODS is active beyond South-east Europe, for example in Afghanistan, where it is destroying munitions at Camp Bastion military base in Lashkar Gah (the capital of Helmand Province) for small arms ammunition with expired shelf life in the possession of Australian and British forces stationed there. EODS has also provided a small, trailer-mounted TRADS unit for use by police forces and ammunition manufacturers to destroy relatively small quantities of munitions.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Explosive Capabilities Limited

Explosive Capabilities (ExCap)

HEADQUARTERS

Kent, United Kingdom

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SHORT DESCRIPTION

ExCap, established in 1998, is a small specialist company offering impartial, independent, and world-class consultancy and project management services in the following fields: Blast Analysis, Counter-Proliferation, Disarmament, Demilitarization, Explosion and Ballistic Protection (EBP), Explosive Ordnance Disposal (EOD), and Explosive Engineering.

UEMS-RELATED ACTIVITIES

ExCap has staff with extensive strategic planning and operational experience of ammunition-stockpile management and demilitarization systems and processes. (ExCap staff and consultants have also functioned as arms experts on UN Sanctions Monitoring Panels.) The company or its staff has contributed to the technical authorship of the UN International Ammunition Technical Guidelines (IATG), provided technical advice to the UN Office for Disarmament Affairs, and given technical advice to the UN Group of Governmental Experts (GGE) on Conventional Ammunition in Surplus. ExCap for years helped to set the agenda by issuing frequent updates on explosions at munitions storage sites (see below). (It stopped producing this report in 2011, when that data contributed to the development of the Small Arms Survey UEMS Database.) The company also has extensive expertise in the design, development, and operation of ammunition demilitarization processes.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

All Explosive Capabilities Limited operations and technical advice comply with numerous international standards and guidelines (such as IATG, IMAS, and ISOs). Its staff has formally investigated major UEMS events in Albania, Kuwait, Mozambique, Serbia, and Ukraine for a range of governments and international organizations. ExCap has also developed PSSM-related and ammunition-demilitarization projects in more than 40 countries.

PUBLICATIONS AND MATERIALS OF NOTE

- *The Threat from Explosive Events in Ammunition Storage Areas* (updated regularly 2007–2011; subsequently the data has fed into the Survey's UEMS Database).

Fenix Insight

HEADQUARTERS

Copthorne, Surrey, United Kingdom

WEBSITE

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POC

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SHORT DESCRIPTION

Fenix Insight, established in 2011, designs and oversees comprehensive, effective, and efficient practical solutions to the complex operational challenges in mine action, EOD, stockpile destruction, and other ordnance-related activities.

UEMS-RELATED ACTIVITIES

Fenix Insight undertakes a wide range of activities related to the management and disposal of landmines and other ammunition categories. In addition to the operational destruction of munitions, Fenix has contributed to a range of studies, standards, and documents promoting the management and disposal of ammunition stockpiles. It has developed disassembly procedures, processes, systems, tools, and training aids (such as inert copies with sophisticated sensors and sectioned models) for use in demilitarization programmes. Fenix maintains an extensive image library and technical database, which are used for the identification and assessment of munitions and in the development of disassembly techniques. Fenix produces detailed technical reports on munitions for government agencies and NGOs (based in part on a director's long affiliation with the Jane's publishing group as a writer and editor of materials on munitions and explosives). The company also designs innovative programmes for the recycling of ammunition, such as the combined demilitarization and conversion (to demolition charges) of anti-personnel mines.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

Fenix Insight is certified to ISO 9001, ISO 14001, and OHSAS 18001. Clients include the British Foreign and Commonwealth Office, International Committee of the Red Cross (ICRC), GICHD, and Norwegian People's Aid (NPA) on a variety of mine and ordnance disposal programmes. It has been active in more than 20 countries, on commissions including the disposal of cluster munitions in Macedonia, Moldova, and Serbia.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Geneva International Centre for Humanitarian Demining (GICHD)

HEADQUARTERS

Geneva, Switzerland

WEBSITE

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SHORT DESCRIPTION

GICHD, established in 1998, is an international expert organization working towards the elimination of anti-personnel mines, cluster munitions, ERW, and other explosive hazards, such as potentially unsafe ammunition stockpiles.

UEMS-RELATED ACTIVITIES

GICHD initially focused on supporting international efforts to combat anti-personnel landmines and help implement the Ottawa Convention. It has subsequently expanded its efforts to support implementation of the Conventions on Cluster Munitions (CCM) and Certain Conventional Weapons (CCW). GICHD provides advice, supports capacity-building initiatives, undertakes applied research, disseminates knowledge and best practice, and develops standards. More recently its technical ammunition specialist, together with an extensive network of partner institutions, has undertaken a GICHD-led project to start to address problematic munitions stockpiles and UEMS. GICHD is producing a low-cost system to implement effective ammunition safety management (ASM) in developing countries. This ASM support would include the training of national authorities by GICHD staff. The GICHD ASM 'toolset', which was under development in 2013, is set to be tested and made available in 2014.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

In addition to serving as permanent secretary, GICHD follows and promotes adherence to International Mine Action Standards (IMAS), and—of greater relevance to countering UEMS—the more recent International Ammunition Technical Guidelines (IATG). GICHD can assess and evaluate a country's ammunition-related organizations and, if necessary, can steer those organizations through a suitable improvement programme. GICHD offers expert advice and assistance on ammunition- and explosive-related topics to any nation which requests it.

PUBLICATIONS AND MATERIALS OF NOTE

- GICHD. 2002. *Explosive Remnants of War (ERW): A Threat Analysis.*

Golden West Humanitarian Foundation (Golden West)

HEADQUARTERS

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SHORT DESCRIPTION

Golden West, established in 1997, addresses operational limitations in landmine and unexploded ordnance clearance. It focuses on field-supportable technology to make operations safer, faster, and cheaper, drawing on its expertise: military (e.g. EOD), technical (e.g. engineering), and scientific (e.g. chemistry and geophysics).

UEMS-RELATED ACTIVITIES

Golden West strives to set the agenda and inform best practices by sharing its experiences of demilitarization and stockpile management through frequently referenced and reputable publications such as the *Journal of ERW and Mine Action* and the *GICHD Mine Action Technology Newsletter*. It has also helped develop governments' national action plans to establish standards, and destruction plans to manage and dispose of a wide range of munitions. Golden West has designed and manufactured mobile and stationary cutting units to enable the safe removal of munitions' initiating systems and facilitate the safe transport or storage of munitions, thereby reducing the time, effort, and expense required to safely dispose of or destroy surplus materiel. It has also produced a Modular Small Arms Burner, which safely and economically disposes of small arms ammunition in large quantities, and which can be used in remote areas using liquefied petroleum gas canisters. Golden West has also developed technologies and instruments to better detect and map underwater AXO.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

Golden West has undertaken UEMS-related preventative work in Belize, Cambodia, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Macedonia, Marshall Islands, Moldova, Nicaragua, the Solomon Islands, and Vietnam.

PUBLICATIONS AND MATERIALS OF NOTE

- None

The HALO Trust

HEADQUARTERS

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SHORT DESCRIPTION

The HALO Trust, formally established in 1988, is a non-political, non-religious NGO specializing in the removal of hazardous debris of war.

UEMS-RELATED ACTIVITIES

The HALO Trust focuses primarily on destroying unexploded ordnance and making land safe for local people to use. (In 25 years it has destroyed more than 1 million landmines, 50 million rounds of small arms ammunition, 10 million other items of ordnance, and 100,000 assault rifles, and in so doing cleared more than 10,000 km of roads and 100,000 hectares of land.) Recently, it has increased its work on ammunition security. In 2011, for example, HALO surveyed Côte d'Ivoire's storage facilities and subsequently embarked on a far-ranging stockpile security project to relocate munitions from populated areas to more remote, purpose-built storage facilities. HALO is also working with the police and military to improve weapons security arrangements across the country. The project includes the small-scale rehabilitation and construction of dozens of armories, storage rooms, and large-scale ammunition storage areas. To help ensure that the new standards are maintained, HALO provides technical assistance and training to the Ivorian government, on matters including evaluating ammunition stocks; planning, segregating, and distributing ammunition; and the monitoring, mentoring, and evaluation (MME) of new stores. The work being undertaken in Côte d'Ivoire is likely to serve as a template for HALO PSSM activities elsewhere.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

The HALO Trust has worked in more than a dozen countries, from Afghanistan to Zimbabwe. HALO's Weapons & Ammunition Disposal (WAD) teams have worked in Cambodia, Mozambique, and Timor Leste. As of August 2013, HALO WAD teams were working in Afghanistan, Angola, Côte d'Ivoire, Georgia (Abkhazia), and Somalia (Somaliland). HALO has acted as the lead implementing partner for the destruction of unwanted stocks of weapons and ammunition for the governments of Afghanistan and Angola.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Handicap International (HI)

HEADQUARTERS

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SHORT DESCRIPTION

Handicap International, established in 1982, is an independent and impartial aid organization working in situations of poverty and exclusion, conflict and disaster. HI works alongside people with disabilities and vulnerable populations, taking action, and bearing witness in order to respond to their essential needs, improve their living conditions, and promote respect for their dignity and fundamental rights.

UEMS-RELATED ACTIVITIES

HI has long been active in advocacy work to promote a convention to ban anti-personnel landmines and cluster munitions, both of which involve destroying munitions. HI is also active in demining and EOD operations. Besides providing disposal and destruction of munitions, via its global programmes, HI promotes and facilitates stockpile management, undertakes technical assessments of munitions sites, and provides training and instruction to national authorities.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

The eight national associations of Handicap International (from Belgium, Canada, France, Germany, Luxembourg, Switzerland, the United Kingdom, and the United States) mobilize resources and manage projects across the globe, in support of disabled and vulnerable people. The federation has undertaken stockpile management and has carried out destruction of surplus munitions in the DRC, Libya, and Mauritania. In Mauritania HI supported the national authority in developing national standards for munitions management and destruction. This involved working with the national authority to identify and train key personnel to be responsible for stockpile management, transporting munitions, and cutting apart small arms and light weapons. HI was also involved in clearance activities held in Congo following the unplanned explosion of the Mpila ammunition depot. In post-conflict countries, HI works with relevant communities, including relevant authorities, to raise awareness about the dangers of poorly stocked and poorly managed ammunitions. In Libya, HI has gained access to, and helped ensure the safe storage and disposal of, munitions held by various non-state armed groups.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Institute of Munitions Clearance & Search Engineers (IMCSE)

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SHORT DESCRIPTION

IMCSE, formed in 1998, is a non-profit organization which promotes professionalism within the international munitions clearance industry. To this end, it engages commercial, governmental, and non-governmental actors to develop and promote best practice.

UEMS-RELATED ACTIVITIES

IMCSE vets its members, currently more than 500 individuals and organizations, to ensure that they are capable and proficient. It works with them to develop the profession and to share expertise and ideas for improving current practice. It maintains a database of skilled professionals and provides its expertise to those organizations, national and international, requiring munitions to be cleared. IMCSE works towards the effective and efficient regulation of clearance actors and activities, and accredits training academies and courses. It has designed and manufactured identification card sets (in the form of playing cards to promote use and familiarization) on mines, UXO, and IEDs (all currently available in English only). Upon request, IMCSE also conducts confidential reviews of UEMS events, detection methods, and disposal techniques.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

IMCSE is committed to the constant updating of regulations in the United Kingdom (and elsewhere) concerning its interests and is represented on UK regulatory bodies. Accordingly, it collaborates with relevant bodies, including the Institute of Explosives Engineers (IExpE), the UK Risk & Security Management Forum (RSMF), and the UK National Association of Security Dog Users (NASDU). IMCSE neither seeks nor receives assistance from governments, international bodies, nor commercial enterprises. It is funded by members' fees to ensure its independence. It assists its members or approved agencies upon request for technical assistance and provides charitable contributions to members of its profession who have suffered occupational injuries.

PUBLICATIONS AND MATERIALS OF NOTE

- IMSCE. n.d.b. *Danger IED* identification/playing cards.
- IMSCE. n.d.c. *Danger SA* identification/playing cards.
- IMSCE. n.d.d. *Danger Mines* identification/playing cards.
- IMSCE. n.d.e. *Danger UXO* identification/playing cards.

ICRC

International Committee of the Red Cross (ICRC)

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SHORT DESCRIPTION

ICRC, established in 1863, is an independent and neutral organization working to provide humanitarian help for people affected by conflict and armed violence, to promote the laws that protect victims of war.

UEMS-RELATED ACTIVITIES

ICRC received a formal mandate for its work in 1949, with four Geneva Conventions adopted in the same year (supplementing earlier conventions dating back to 1864). In addition to providing a range of humanitarian assistance, the ICRC strives to reduce the impact of weapons on people and offers training and capacity-building support to national authorities in on-site munitions management and the disposal and destruction of munitions. The ICRC plans to continue and expand this work, in both the direct action that it carries out and the technical support that it supplies to national authorities. ICRC has been instrumental in developing and promoting the conventions on anti-personnel mines and cluster munitions, and the Protocol on Explosive Remnants of War and the Arms Trade Treaty. It participates in meetings within the PoA framework and has supported the development of ISACS.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

The ICRC may operate where there is an evident threat posed to civilians, with the agreement of all parties involved. In April 2013 the ICRC concluded an agreement with Moldova: the ICRC would provide the Moldovan military with training on dismantling and destroying munitions and would help to finance the destruction of approximately 50 tonnes of ammunition. (Similarly, the ICRC has supported the destruction of ERW in Congo, Côte d'Ivoire, Iraq, and Libya.)

PUBLICATIONS AND MATERIALS OF NOTE

- None

ISSEE

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SHORT DESCRIPTION

ISSEE, established in 2000, provides expertise on national security and counter-terrorism to governments and businesses. Explosives safety management—training courses, advisory, consulting, and management services—represents the major component of ISSEE's work.

UEMS-RELATED ACTIVITIES

ISSEE (formerly known as the International School for Security and Explosives Education, but now known only by its acronym) provides courses on explosives management and EOD training. Courses range from a two-day introduction on the proper storage of explosives to 15-day courses on EOD activities, designed for beginners and supervisors. It offers training and consulting on design measures appropriate for blast prevention and mitigation, and a full suite of services to address ammunition and explosives logistics and disposal needs. This includes testing explosives and setting up environmentally safe disposal. ISSEE adheres to, and its senior management has contributed to, the development of UK National Occupational Standards for Explosives, Munitions and Search Occupations, as determined by the UK Standards Setting Body, of which ISSEE is a member. The standards are now identified by EUExcert, the European Explosives Certification organization, as the basis for explosives-training best practice in Europe.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

ISSEE adheres to IMAS standards, UK national standards, and ISO 9001:2008 and 14001 quality-assurance standards. Its clients include government ministries, defence and police forces, emergency services, defence manufacturers, private companies, NGOs, and charities. It has delivered services identified above to more than 40 organizations in more than 20 countries during the past 13 years. ISSEE has addressed the ammunition and explosives logistics and disposal needs of 17 countries: Afghanistan, Bahrain, Brunei, Kuwait, Latvia, Libya, Lithuania, Malaysia, Montenegro, Nigeria, Oman, Qatar, Saudi Arabia, Singapore, Sweden, Ukraine, and the United Kingdom.

PUBLICATIONS AND MATERIALS OF NOTE

- None

ITF Enhancing Human Security (ITF)

HEADQUARTERS

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SHORT DESCRIPTION

ITF, established in 1998, is a humanitarian, non-profit organization dedicated to the elimination of threat from post-conflict and disruptive challenges. Such challenges include landmines, ERW, and the illicit ownership and use of small arms and light weapons.

UEMS-RELATED ACTIVITIES

ITF Enhancing Human Security—until 2012 known as the International Trust Fund for Demining and Mine Victim Assistance—has recently broadened its focus from landmines to UXO, PSSM, and the disposal of ammunition surplus more broadly speaking. ITF has undertaken to dispose of old and unserviceable ammunition surplus (in Albania, Bosnia and Herzegovina, Croatia, Lithuania, and Montenegro). It has worked with Lithuania to develop the country's demilitarization capabilities, including the refurbishment of a military facility. (ITF has also undertaken post-UEMS clean-up operations in Gërdec, Albania, and in Chelopechene, Bulgaria, the latter of which included underwater operations.) ITF has provided PSSM and disposal/destruction training to government officials (including from Bosnia and Herzegovina, Croatia, Montenegro, and Serbia). As a founding member of the Steering Committee of the RASR Initiative, ITF is active in setting an agenda for the nine participating countries. More recently, in collaboration with OSCE, ITF organized Explosives Hazards Reduction Training in Kyrgyzstan, and a Quality and Information Management workshop on explosive hazards reduction and response for participants from Central Asia.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

ITF initially focused on Bosnia-Herzegovina. Then it expanded its work to other countries in Southeast Europe, the Middle East, North Africa, Caucasus, Central Asia, and Lithuania. Its mandate does not preclude it from assisting countries in other regions.

PUBLICATIONS AND MATERIALS OF NOTE

- ITF. 2013. *Design of Ammunition Taking into Account Safe Storage Concerns*. (Available only in the Latin alphabet of Bosnian, Croatian, Montenegrin, and Serbian (BCMS).)

Mines Advisory Group (MAG)

HEADQUARTERS

Manchester, United Kingdom

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SHORT DESCRIPTION

For 25 years, MAG has worked towards establishing a safe and secure future for men, women, and children affected by armed violence and conflict. MAG saves lives and builds futures by working with others to reclaim land contaminated with the debris of conflict, to reduce the daily risk of death or injury for civilians, and to create safe and secure conditions for development.

UEMS-RELATED ACTIVITIES

MAG's initial programming focused on humanitarian mine-action activities, particularly survey and clearance operations and risk education. However, PSSM operations have also been a core component of MAG's global programming for several years. MAG's PSSM initiatives aim to promote secure conditions for states that it assists to prevent the diversion of weapons and munitions, destroy surplus arms, and reduce the risk of unplanned explosions at munitions sites (UEMS). Working under a principle of national ownership, MAG undertakes expert technical assessments of armouries and munitions stores, and provides technical support in the identification and disposal of surplus and obsolete weapons and munitions. This is in addition to the design and delivery of training programmes for national authorities, and support for the relocation or rehabilitation of armouries and munitions stores. MAG was an expert member of the ISACS initiative and works actively to establish and promote best practice relating to the implementation of ISACS and the International Ammunition Technical Guidelines (IATG), particularly in low-capacity and fragile contexts.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

MAG has worked in more than 40 countries in Africa, Asia, Europe, the Middle East, and Central and South America since it was founded in 1989. MAG has provided PSSM support to Burundi, DRC, El Salvador, Libya, Rwanda, Somalia, and South Sudan—as well as support to regional organizations in Africa.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Norwegian People's Aid (NPA)

HEADQUARTERS

Oslo, Norway

WEBSITE

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SHORT DESCRIPTION

NPA, established in 1939, is a humanitarian organization which supports people in the struggle for more power and influence over their own lives and in the development of their societies. It has its roots in the Norwegian Labour Movement.

UEMS-RELATED ACTIVITIES

NPA has been active in humanitarian mine action since 1992. It lobbied hard for drafting and passage of both the landmine and cluster munitions conventions, drawing on its on-the-ground development and humanitarian experiences and activities. To promote implementation of the Convention on Cluster Munitions (CCM), NPA developed the programme Self-Help Ammunition Destruction Options Worldwide (SHADOW) to assist lower-economy countries to destroy their cluster munitions when industrial demilitarization is not a viable option, or transportation of the material is deemed too risky. (This is part of NPA's ethos to promote national ownership and capacity-building within its programmes.) The Ammunition Processing Buildings (APBs) established—or refurbished—under SHADOW can be and have been used for destroying other munitions as part of stockpile management operations. Additionally, NPA helps to secure Ammunition Storage Areas (ASAs) and undertakes Ammunition Stockpile Management (ASM) projects (including the inspection of facilities, proper storage, training, and advice) to help prevent accidental explosions and diversion of weapons and ammunition.

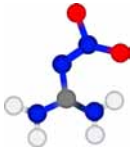
ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

As of December 2013, NPA had undertaken mine action and munitions management activities in 38 countries and was currently active in 22 of them. Prior to the advent of SHADOW, NPA routinely identified and helped destroy surplus, abandoned, and obsolete munitions in several countries in which it was active (including Iraq and South Sudan). The first SHADOW project was undertaken in Moldova, from 2009 to 2010, and NPA continued to work with Moldova on securing its munitions stockpiles through 2012 (including inspecting and re-storing munitions according to international best practices).

PUBLICATIONS AND MATERIALS OF NOTE

- NPA. 2010. *Self-help Options for Destruction of Cluster Munition Stockpiles.*
- NPA. 2012. *20 Years of Action: Mines and Arms Department Portfolio 2012.*

Information accurate as of 11 December 2013



PICRITE

HEADQUARTERS

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POC

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SHORT DESCRIPTION

PICRITE, established in 2011, is an explosives ordnance engineering consultancy company, working in the fields of munitions storage, surveillance, demilitarization, and EOD.

UEMS-RELATED ACTIVITIES

PICRITE provides advice on explosives safety, compliance and assurance, management of explosives storage and processing, design of explosive tools, counter-IED (improvised explosive device) and explosive ordnance disposal (EOD), risk assessment, and consequence analysis and mitigation. It reviewed parts of the IATG during their development and now actively promotes their use and trains to their standards. PICRITE worked in the development of storage standards as a peer reviewer of the NATO publication, *AASTP-5—Operational Storage*, and UK *MOD Explosives Regulations JSP482*. It has authored the joint 'Guidance Notes for Commercial Explosive Ordnance Disposal Operations', set to be co-published with the Institute of Explosives Engineers/ Health and Safety Executive in the first quarter of 2014. On behalf of the British Army and various civil clients, PICRITE has conducted retrospective investigations into ammunition accidents, to determine root causes and recommend procedural and practical solutions to prevent such events from recurring.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

PICRITE is a member of EUExcert, working towards common competence standards for explosives workers across Europe. (Its director is chairman of EUExcert UK and a member of the Board of the EUExcert Association.) PICRITE has worked on stockpile management, storage licensing, and safeguarding explosives facilities for the British Army in Afghanistan, Belize, Cyprus, Germany, Kenya, Iraq, and the United Kingdom, providing assurance of safe storage and the safe condition of munitions through local in-service surveillance and the destruction of unserviceable stock. In Afghanistan, Belize, Iraq, and the United Kingdom, PICRITE personnel have destroyed surplus, unserviceable, or damaged stocks of small arms ammunition, pyrotechnics, propellant, artillery shells and rockets, aircraft bombs, mines, guided missiles, and UXO.

PUBLICATIONS AND MATERIALS OF NOTE

- None

SAFEX International

HEADQUARTERS

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SHORT DESCRIPTION

SAFEX International, a non-profit organization established in 1954, is a voluntary association of global manufacturers of civil and military explosives as well as technical-grade ammonium nitrate (TGAN). It strives to eliminate the harmful effects of explosives on people, property, and the environment by encouraging its members to learn from each other's experiences.

UEMS-RELATED ACTIVITIES

SAFEX activities encompass the life cycle of explosives from design to development, manufacture, storage, distribution, and ultimately use and disposal or recycling of explosives products. The exchange of incident information by way of incident reports and the maintenance of an incident database has been SAFEX's focus since its inception. This information is used to drive subsequent activities such as the development of good practices and the promotion of explosives competencies. Networking internally among members and externally with like-minded individuals and organizations in pursuit of SAFEX's purpose is also an important activity. SAFEX promotes good practices through its specialist Workgroups and Expert Panels, as well as promoting explosives competencies by way of training courses and publications. (It also vets best practices from other organizations and promotes those that it believes merit adherence by its members.)

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

SAFEX has 250 member companies in more than 50 countries. Each member company declares its willingness to share all relevant experiences, in line with SAFEX's goals: especially information about explosives incidents. (Incident information is available to SAFEX members only, as this provides a non-litigious environment for the open exchange of information.) SAFEX Good Practice Guides (GPGs), available only to its members, tend to focus on manufacturing safety, but also include guidelines focusing on storage and destruction (see below). (SAFEX also periodically publishes a Topical Paper series, which is available to members and non-members alike. Some of these have focused on storage and transport of industrial explosives, but not military munitions.)

PUBLICATIONS AND MATERIALS OF NOTE

- SAFEX. n.d.a. *Site Remediation: Historical Reviews of Explosives Contaminated Sites and Facilities* (GPG05(1)). Available upon request from SAFEX.
- SAFEX. n.d.b. *Storage of Solid Technical Grade Ammonium Nitrate (TGAN)* (GPG02Rev1). Available upon request from SAFEX.
- SAFEX. forthcoming. *Disposal of Blasting Explosives*. Available upon request from SAFEX.

Information accurate as of 14 February 2014

Small Arms Survey

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POC

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SHORT DESCRIPTION

The Small Arms Survey, established in 1999, is a research institute which examines all aspects of small arms and armed violence. It conducts evidence-based research and analysis, to support governments in countering illicit arms proliferation and in promoting armed violence reduction efforts.

UEMS-RELATED ACTIVITIES

The Small Arms Survey (referred to as 'the Survey') supports UN and regional efforts to promote best practice regarding stockpile management, through the UN PoA process. It does so by assisting UNODA and various meeting chairs, reviewing national reports, and commissioning, publishing, disseminating, and promoting policy-relevant and agenda-setting studies. The Survey's researchers routinely contribute to training courses for mid- and senior-level policy-makers and practitioners, promoting stockpile management and surplus destruction as appropriate means to counter to the illicit proliferation of small arms and ammunition. As a founding member of the Steering Committee of the Regional Approach to Stockpile Reduction (RASR) Initiative, the Survey is active in setting an agenda for nine countries participating in that initiative and, accordingly, is responsible for the content and upkeep of its website (www.rasrinitiative.org), making available information on PSSM courses and relevant reference materials.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

The Survey routinely lectures and trains military and civilian government officials on the importance of stockpile management and surplus identification and destruction. This takes place at seminars and workshops on stockpile management and security, including at international and regional forums such as MSAG-led courses, NATO and OSCE workshops, and UN PoA framework meetings. The Survey's expertise contributed to the EU-led assessment of international efforts to respond to the UEMS which took place in 2012, in the Congo.

PUBLICATIONS AND MATERIALS OF NOTE

- Berman, Gobinet, and Reina. 2006 (revised 2012). *Unplanned Explosions at Munitions Sites.*
- Berman, King, and Reina. 2014. *The UEMS Incident Reporting Template (IRT).*
- Berman and Reina. 2014. *UEMS Handbook: Excess Stockpiles as Liabilities rather than Assets.*
- Bevan, ed. 2008. *Conventional Ammunition in Surplus: A Reference Guide.*
- Small Arms Survey. n.d. *PSSM Best-practice Cards*. (Available in Albanian, BCMS, English, Russian, and Spanish.)

STERLING
GLOBAL OPERATIONS, INC

Sterling Global Operations (SGO)

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POC

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SHORT DESCRIPTION

SGO, established in 1981, is an employee-owned stability operations company employing approximately 3,500 professionals worldwide. The company serves customers with munitions response, intelligence support, logistics, security operations, and other services in some of the world's most austere and hostile environments.

UEMS-RELATED ACTIVITIES

SGO works with governments and international corporate clients on stockpile management, surplus munitions destruction, and explosives clearance. (It also clears UXO-contaminated land to make it safe for commercial and agricultural development and residential use.) SGO works with governments to help establish national technical standards and guidelines (NTSGs) to control and manage their munitions. SGO provides training to host governments on stockpile management and storage, including advice on demilitarization or destruction of excess or unsafe munitions.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

Although it is US-based, SGO works at home and abroad. (In the United States it has cleared and disposed of UXO and discarded munitions and explosives at various defence sites.) SGO has surveyed and disposed of munitions and provided PSSM training in several other countries, including Bosnia and Herzegovina, El Salvador, Libya, and Montenegro. SGO's staff with extensive EOD and counter-IED experience have taught courses and helped develop curriculums at government schools in Afghanistan, Cambodia, El Salvador, Iraq, Laos, and Libya.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Swiss Foundation for Mine Action (FSD)

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SHORT DESCRIPTION

FSD, an NGO established in 1997, focuses on locating and destroying landmines and unexploded ordnance (UXO) to prevent accidents. Its overarching aim is to alleviate and diminish the social, economic, and environmental impacts of landmines and UXO to create favourable conditions for the reconstruction and development of war-torn countries.

UEMS-RELATED ACTIVITIES

FSD's expertise has grown over the years to include all aspects of mine action and explosive threat reduction, including (but not limited to) surveys, chemical testing, training and mentoring, explosive ordnance disposal (EOD), ammunition technical management, and stockpile management and capacity building. Increasingly, PSSM and ammunition-safety management (ASM) activities have become integrated within FSD's mine-action operations and doctrine in order to further mitigate the threat from explosive hazards and contamination in affected communities. Where possible, FSD strives to address immediate threats and develop national capacities to enable recipients to safely manage their own ordnance.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

FSD adheres to IATG best practice and relevant national doctrine. It has undertaken PSSM and ASM activities and destruction programmes for munitions other than landmines in five countries: Iraq, Libya, Mali, South Sudan, and Tajikistan. Specifically, FSD has conducted training and mentoring of security personnel on stockpile management issues in Central African Republic, Libya, Mali, South Sudan, and Tajikistan. In Libya and Tajikistan FSD has also implemented physical stockpile destruction operations. FSD disposed of up to 25 tonnes per month over three years in Tajikistan and projected a further 200 tonnes for 2013. In 2012 FSD disposed of approximately 300 tonnes of ordnance and stockpiled ammunition in Libya; a further operation is planned for 2014. Ordnance destroyed in these programmes ranges from MANPADS and large-calibre rockets to air-dropped bombs and artillery ordnance.

PUBLICATIONS AND MATERIALS OF NOTE

- None

Multinational Small Arms and Ammunition Group (MSAG)

HEADQUARTERS

n/a

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POC

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SHORT DESCRIPTION

MSAG, established in 2005, is an apolitical, informal, and multinational platform which strives to develop training modules, support standard setting, share experience, and coordinate assistance concerning PSSM. Its 15 members contribute according to national priorities and capacities.

UEMS-RELATED ACTIVITIES

MSAG was created to assess how international instruments promoting stockpile management could be implemented effectively. MSAG contributes to standard-setting efforts, develops training modules for donor nations, implements common projects, and provides a platform to exchange knowledge and expertise. MSAG offers classroom- and field-based training to decision-makers, practitioners, and managers. MSAG nations can provide comprehensive support in the establishment of proper life-cycle management of weapons and munitions. MSAG's half-yearly meetings (the 18th was held in November 2013) improve coordination, facilitate pooling of resources, and help to prevent costly duplication of efforts. (These meetings benefit from expertise from international and regional institutions as well as from civil society organizations.) A typical project cycle for a country receiving assistance from MSAG would include an assessment visit, awareness raising, project planning, training and technical advice, supporting implementation, and reassessment and evaluation of changing needs and progress made.

ADHERENTS TO COMMITMENTS AND RECIPIENTS OF ASSISTANCE

MSAG members (Austria, Belgium, Canada, Denmark, Germany, France, Hungary, Ireland, Norway, Poland, Spain, Sweden, Switzerland, the UK, and the United States) review their course modules annually to ensure that they adhere to latest international standards and best practice. Although all MSAG members are also OSCE members, recipients of MSAG assistance need not be members of that organization. Officials from some 30 countries in the OSCE 'region' as well as Africa have participated in MSAG-sponsored courses at regional training centres (e.g. RACVIAC in Croatia, International Peace Support Training Centre in Kenya, and NATO School in Germany), and at MSAG members' training facilities. Countries receiving direct and sustained support to manage their weapons and munitions stores include—but are not limited to—Bosnia and Herzegovina, Ethiopia, Moldova, Tajikistan, and Turkmenistan.

PUBLICATIONS AND MATERIALS OF NOTE

- MSAG. 2013. *Coursebook on Physical Security and Stockpile Management of Arms, Ammunition and Explosives*.

Information accurate as of 16 December 2013

PART IV

Annotated Bibliography and Review of Selected Tools

Overview

This section of the Handbook, the annotated bibliography and review of selected tools, provides a list of important research resources available in the field of PSSM and features related to UEMS. These sources form the foundation of the research conducted for this Handbook and are recommended for researchers and practitioners wishing to further their understanding in the field.

An annotated bibliography lists and comments on key resources in a given field of study or research. These include books, articles, handbooks, best-practice guidelines, print and digital sources, and resources found uniquely online. The annotation serves to describe and evaluate the source, thereby informing the reader of the relevance, accuracy, and quality of the sources cited. After the full bibliographic data, the short paragraph that follows outlines the main argument of the work, indicates the intended audience or readership, and identifies the research methods used, when applicable. The summary may mention conclusions or findings and may highlight special features of the text that are unique or helpful.

Part IV provides short synopses of 30 written reports and two Internet-based aids. The written reports include eight best-practice guides, twelve policy-relevant studies, and ten thematic studies of note. They are listed below:

Best-practice guidelines

International/Global

1. UNODA. 2011. *International Ammunition Technical Guidelines (IATG).*
2. UN CASA. n.d. *International Small Arms Control Standards (ISACS).*

Regional

1. OSCE. 2003. *OSCE Document on Stockpiles of Conventional Ammunition.*
2. OSCE. 2008. *OSCE Handbook of Best Practices on Conventional Ammunition.*
3. NATO. 2010. *Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives.*
4. RECSA. 2008. *Best Practice Guidelines for the Implementation of the Nairobi Declaration and the Nairobi Protocol on SALW.*
5. SEESAC. 2007. *The Regional Micro-disarmament Standards and Guidelines (RMDS/G).*
6. UNLIREC. 2013. *UNLIREC Standard Operating Procedures (SOPs).*

Policy-relevant studies

Country studies and incident assessments

1. Action on Armed Violence. 2012. *Mpila Munitions Depot Explosion, 4 March 2012.*
2. Florquin, Nicolas, Dauren Aben, and Takhmina Karimova. 2012. *Blue Skies and Dark Clouds: Kazakhstan and Small Arms.*

3. GICHD and the Small Arms Survey. 2013. *Assessment of the Rubble Excavation and Clearance Operations in the Districts Affected by the Explosion of Mpila Munitions Depots in Brazzaville, Republic of Congo.*
4. Gobinet, Pierre. 2014. *Countdown to Catastrophe: The Mpila Ammunition Depot Explosions.*
5. UNDAC. 2008. *Assessment and Recommendations Following Gërdec Explosions, Albania: 20 March–3 April 2008.*

Regional studies

1. Francis, Steven, Ioane Alama, and Lorraine Kershaw. 2011. *WWII Unexploded Ordnance: A Study of UXO in Four Pacific Island Countries.*
2. Gobinet, Pierre. 2011. *Significant Surpluses: Weapons and Ammunition Stockpiles in South-east Europe.*
3. Gobinet, Pierre. 2012. *Capabilities and Capacities: A Survey of South-east Europe's Demilitarization Infrastructure.*
4. Lazarevič, Jasna. 2010. *South-east European Surplus Arms: State Policies and Practices.*
5. Lazarevič, Jasna. 2012. *Costs and Consequences: Unplanned Explosions and Demilitarization in South-east Europe.*
6. Tracy, Lauren. 2011. *Ticking Time Bombs: Ineffective Weapons Stockpile Management in Africa.*
7. US PM/WRA. 2012. *To Walk the Earth in Safety,* 11th edn.

Thematic studies

1. Bevan, James, ed. 2008. *Conventional Ammunition in Surplus: A Reference Guide.*
2. GICHD (Geneva International Centre for Humanitarian Demining). 2008. *A Guide to Ammunition Storage.*
3. Gobinet, Pierre and Tom Van Beneden. 2012. *Buy and Burn: Factoring Demilitarization into Ammunition Procurement.*
4. Ilyin, Vadim, Vyacheslav Kozlov, and Igor Sevryukov. 2012. *Development of a Theory of Analysis of Accidents in Munitions Sites.*
5. Kahl, Marius. 2012. *Starter Guide towards Strong Arms and Ammunition Management Practices.*
6. Karp, Aaron, ed. 2009. *The Politics of Destroying Surplus Small Arms: Inconspicuous Disarmament.*
7. King, Benjamin, ed. 2011. *Safer Stockpiles: Practitioners' Experiences with Physical Security and Stockpile Management (PSSM) Assistance Programmes.*
8. MSIAC. 2006. *Review of Demilitarisation and Disposal Techniques for Munitions and Related Materials.*
9. Turner, Mandy. 2006. *Costs of Disarmament: Cost–Benefit Analysis of SALW Destruction versus Storage.*
10. US PM/WRA. 2012. *Dangerous Depots: The Growing Humanitarian Problem Posed by Aging and Poorly Maintained Munitions Storage Sites.*

Selected tools

Web-based training and calculation sites

1. GICHD Ammunition Safety Management
2. UN Safer*G*uard

Best-practice guidelines

International/Global

UNODA (United Nations Office for Disarmament Affairs). 2011. *International Ammunition Technical Guidelines (IATG)*. New York: UNODA.
<http://www.un.org/disarmament/convarms/Ammunition/IATG>

The IATG was developed as a tool to assist states attempting to develop national standards and regulations for ammunition management. The guidelines are not required tasks, but provide a frame of reference for states to use while developing their national standards. The IATG is designed to be comprehensive, covering the entire life cycle of activities involved in properly managing ammunition: storage, processing, accounting, demilitarization or destruction, securing stockpiles, and transportation. A unique aspect of the IATG is the use of the tiered Risk Reduction Process Levels (RRPL). The IATG recognizes that developing states in particular have vast needs pertaining to ammunition storage management. Completely overhauling a system to meet the highest standards is not an option for most states. So the IATG provides states with a three-tiered target for reducing risks and improving practices. Level 1 provides states with the most basic goals for stockpile reduction. These are the most achievable and necessary goals. Each higher level further improves the state's systems and further reduces the risks. The IATGs are rolled out in 12 volumes, and each volume contains many chapters. The IATG is now seen to supersede the other regional guides, such as the OSCE and SEESAC.

UN CASA. n.d. *International Small Arms Control Standards (ISACS)*.
<www.smallarmsstandards.org>

The International Small Arms Control Standards (ISACS) establish comprehensive guidance to states, covering the range of small arms and light weapons control activities. Partially released in 2012, ISACS support practitioners and policy-makers on all of the fundamental themes emphasized within the UN PoA, ITI, and Firearms Protocol. The text defines the key elements necessary for states to comply with the legal and practical requirements found in these instruments. However, like each of these instruments, the instructions exclude ammunition and apply solely to weapons and weapons systems.

The standards are divided into an introduction followed by five thematic sections: the context of small arms control; legislation and regulations; design and management; operational support; and cross-cutting issues. Each series was developed through a collaborative effort among global experts and asserts best practice on the topic. The first and to-date only series released, Series 5: Operational Support, provides implementing guidance that is particularly useful for PSSM practitioners. Series 5 details the technical requirements necessary for effectively managing weapons, including conducting weapons surveys, stockpile management, marking and record keeping, tracing, destruction, and border control features; and defines the key features of responsible PSSM systems. Others series will be available once finalized. The ISACS guides are now seen to supersede other regional guidelines.

Regional

OSCE (Organization for Security and Co-operation in Europe). 2003. *OSCE Document on Stockpiles of Conventional Ammunition*. Vienna: OSCE.
<http://www.osce.org/fsc/58667>

The *OSCE Document on Stockpiles of Conventional Ammunition* describes the framework by which states may request financial or expert assistance necessary to improve their own stockpiles. As all stockpiles pose inherent threats, this document argues that states must reduce the threat by improving their PSSM practices, particularly in their handling of surplus items. The text identifies straightforward assessment tools, including providing indicators of surplus and the basic features of stockpile risk assessment. States are then responsible for mitigating the dangers posed by the stockpiles. If they are unable to make the necessary improvements unaided, states are then encouraged to request assistance. The document clearly asserts that PSSM assistance from the OSCE and its member states is available if, and only if, a state requests it. The most significant contribution made by the document is in regards to facilitating PSSM programme assistance. The document defines the process that requesting and assisting states should follow. This includes a description of what information both parties should provide, determining the scope of the work, and the procedures that each state agrees to follow. The publication contains annexes of model questionnaires for both states. To conclude, this is a unique document, providing practical guidance for future bilateral and multilateral assistance programmes.

OSCE. 2008. *OSCE Handbook of Best Practices on Conventional Ammunition*. Vienna: OSCE.
<http://www.osce.org/fsc/33371>

The *OSCE Handbook of Best Practices on Conventional Ammunition* provides comprehensive guidance on managing ammunition throughout its life cycle. While the Handbook

does not set a requirement standard for OSCE states, it does exemplify strong practices for any state to follow. The Handbook argues that effective management of ammunition is a responsibility of each state. The effort begins from the time they place orders, by ensuring that manufacturers place proper markings on the ammunition and packaging (p. 5), throughout its time in storage, to the eventual destruction of the surplus items.

The publication explains ammunition management as a systematic and cohesive process. Ammunition management tasks are broken down into five thematic areas: (1) ammunition marking, registration, and record keeping, (2) management procedures, (3) physical security, (4) transportation, and (5) destruction. Each area highlights all of the features that need to be in place in order to achieve a well regulated management system. The features are action-oriented and drafted in such a way as to make them implementable. The Handbook encourages states to provide the book to national authorities for implementation (p. 2).

NATO (North Atlantic Treaty Organization). 2010. *Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives*. Allied Ammunition Storage and Transportation Publication. Brussels: NATO.
<http://nsa.nato.int/nsa/zPublic/ap/AASTP-1%281%29c3.pdf>

The Allied Ammunition Storage and Transportation Publication (AASTP) series presents perhaps the most comprehensive reference guide for ammunition storage. The Manual presents the agreed safety principles for ammunition management among NATO member states. They were designed to ensure that regulations for the layout of storage depots of conventional ammunition and explosives were consistent among the member states (p. ix). NATO states are encouraged, but not bound, to enact the entire document (p. xi).

AASTP-1 presents a comprehensive examination of the technical aspects related to ammunition storage. NATO Hazard Divisions are discussed (ch. 2), as well as the issue of ammunition compatibility groups and the mixing of ammunitions in storage units. Construction of above-ground storage depots (ch. 3) discusses various storage building designs, the use of barricades, and the principles of the quantity–distance (QD) calculations. Further tools to help readers calculate QD are provided in the Annexes (Annex 1-A). AASTP-1 also covers ammunition with special concerns (such as depleted-uranium ammunition (ch. 9)) and fire-fighting principles (ch. 7), and recommends systematic reporting of accidental explosions of ammunition among member states (ch. 8).

AASTP-1 is the first publication in a five-part series of manuals on the topic of ammunition and explosives management. The four other manuals include AASTP-2—Manual of NATO Safety Principles for the Transport of Military Ammunition; AASTP-3—Manual of NATO Safety Principles for the Hazard Classification of Military Ammunition and Explosives; AASTP-4—Explosive Safety Risk Analysis; and AASTP-5—NATO Guidelines for the Storage, Maintenance and Transportation of Ammunition on Deployed Operations or Missions.

RECSA (The Regional Centre on Small Arms in the Great Lakes Region, the Horn of Africa and Bordering States). 2008. *Best Practice Guidelines for the Implementation of the Nairobi Declaration and the Nairobi Protocol on Small Arms and Light Weapons*. Nairobi: RECSA.
<http://www.recsasec.org/index.php/publications>

The Guidelines offer states a 'framework for the development of policy, review of national legislation, [and] general operational guidelines' for all aspects related to the implementation of the Nairobi Protocol (p. 4). The Guidelines advise the 15 Nairobi Protocol signatory states. However, because the message is consistent with other international and regional agreements such as the UN PoA, UN ITI, and Bamako Agreements, its content has value for other states (p. 10).

The content within the publication is comprehensive and covers SALW and ammunition control issues from acquisition to disposal. The features specific to UEMS, however, involve stockpile management, surplus management, and disposal. The Guidelines focus more on the legislative and regulatory aspects related to stockpile management than do operational-focused reference materials, such as the IATG. Section 1.1 in particular explains the range of regulations that states should impose in order to maintain control of their weapons at every stage of weapon and ammunition ownership. The Guidelines also provide a useful pro/con listing of the various methods of small arms destruction tools.

SEESAC (South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons). 2007. *The Regional Micro-disarmament Standards and Guidelines (RMDS/G)*.
<http://www.seesac.org/resource.php?l1=69&l2=70>

The Regional Micro-disarmament Standards and Guidelines were developed by SEESAC. The RMDS/G provide guidance to states on developing the operational procedures and practices in small arms control. Similar to the IATG and ISACS, the RMDS/G provide states with a framework from which they can develop their own national standards. Though universal in their design, the RMDS/G are intended specifically for South-east Europe. This regional design focus aims to demonstrate agreement and consensus between stakeholders and to provide common and agreed levels of performance (01:10:3(d) p. 1). The RMDS/G are available in English and Bosnian.

The RMDS/G cover a wide variety of topics, extending beyond what can be considered directly related to UEMS. Though less comprehensive than the IATG and ISACS, the RMSD/G cover a variety of ammunition and explosive PSSM themes, including ammunition and explosive storage and safety management (05.40), and ammunition and explosive stockpile management (05.50). Unique to the RMDS/G is the chapter on reporting and investigation of weapons, ammunition, and explosive accidents (05.45). This chapter outlines the responsible reporting practices for both the immediate term (for alerting authorities during the incident) and longer, investigatory procedures. It outlines full incident reporting and the considerations that should be borne in mind by the investigating team.

UNLIREC (United Nations Regional Centre for Peace, Disarmament and Development in Latin America and the Caribbean). 2013. *Standard Operating Procedures (SOPs)*. Peru: UNLIREC.
<www.unlirec.org/Documents/sops.pdf>

UNLIREC developed a set of standard operation procedures (SOPs) on weapons and ammunition stockpile management and destruction. The SOPs assist states in their efforts to comply with international norms by clarifying how they can implement the IATGs and ISACS standards. States can use them to define how features of these standards are then translated into actions down to the unit (or individual) level. The SOPs clarify the specific activities related to a theme and specify defining roles for key individuals involved. UNLIREC designed the SOPs in a generic format to make them applicable in other regions.

UNLIREC divided the SOPs into five categories ('Series') with 41 separate documents covering one specific theme. Series 1 (inventory management), Series 2 (stockpile management), and Series 3 (destruction) address UEMS-related topics, while Series 4 and 5 cover forensic ballistic subjects. Many SOPs include annexes with examples of record-keeping templates necessary for the operations covered in that particular activity. The SOPs are available in English and Spanish and are available upon request from programme@unlirec.org.

Policy-relevant studies

Country studies and incident assessments

AOAV (Action on Armed Violence). 2012. *Mpila Munitions Depot Explosion, 4 March 2012*. Case Studies of Explosive Violence series: Brazzaville. London: AOAV.
<http://aoav.org.uk/wp-content/uploads/2013/06/2012_06_case_study_of_explosive_violence_republic_of_congo1.pdf>

AOAV publishes a series called 'Case Studies of Explosive Violence' to highlight the harmful effects of explosive weapons in populated areas. The series includes reports on explosive issues in Libya, Pakistan, and Syria. Each of the reports advocates that measures be taken to reduce the impact of all forms of explosive violence on civilian populations.

The June 2012 report examines the munitions depot explosion that occurred in Brazzaville, Republic of Congo. The study describes the effects of the explosion on the surrounding infrastructure, but more significantly, through a series of interviews conducted in Brazzaville, depicts the impact of the blast on the lives of the affected population. By personalizing these experiences the report reveals the devastating and sustained impact that UEMS have on surrounding communities.

Florquin, Nicolas, Dauren Aben, and Takhmina Karimova. 2012. *Blue Skies and Dark Clouds: Kazakhstan and Small Arms*. Occasional Paper No. 29. Geneva: Small Arms Survey.
<http://www.smallarmssurvey.org/fileadmin/docs/B-Occasional-papers/SAS-OP29-Kazakhstan.pdf>

Compared with its neighbours, Kazakhstan appears to be less affected by the negative impacts associated with small arms. The country has avoided falling into civil war and does not suffer the high levels of armed violence common in the region. Nevertheless, Kazakhstan has been disproportionately affected by UEMS, having suffered six incidents since 2001. In 2011 and 2012, the Small Arms Survey examined the conditions of these incidents in detail by conducting a series of household surveys and focus group research. These studies concluded that civilian ownership of small arms is relatively low compared with such ownership in neighbouring states. There are positive trends in both homicide rates and an overall sense of security. The study also reveals that although the government identified surplus stocks and worked to eliminate them, much remains to be done: 1.1 million rounds of surplus were destroyed, but another 1.4 million rounds

remained. These leave Kazakhstan at continued high risk of future UEMS incidents. This study also took a unique approach by conducting focus-group research with local people who lived through each of the events. Analysis from six focus groups revealed that, while nearby residents were aware of the depots, they had not received emergency-response training from the authorities.

GICHD (Geneva International Centre for Humanitarian Demining) and the Small Arms Survey. 2013. *Assessment of the Rubble Excavation and Clearance Operations in the Districts Affected by the Explosion of Mpila Munitions Depots in Brazzaville, Republic of Congo*.
<http://www.gichd.org/fileadmin/pdf/evaluations/database/Congo/EU-Evaluation-Executive-Summary-Brazzaville-GICHD-March2013-en.pdf>

The 2012 Congo blasts devastated several districts, notably Ouenzé and Talangaï, and scattered UXO and numerous projectiles over a radius of several kilometres, thus contaminating an area of nearly 15,000 inhabitants and exposing them directly to the risk of new explosions. The European Union (EU) commissioned Demeter Déminage to organize the assessment of the effectiveness of the clearance activities, of the coordination between the national authorities and the implementation partners, and of the risk education given to communities around Mpila concerning the threats and potential danger of UXO. The assessment mandate was entrusted to the GICHD, acting in partnership with the independent research project Small Arms Survey. The assessment report is based principally on the testimonies and interviews collected by the four members of the assessment team during the period spent in Brazzaville from 14 to 23 January 2013, when the clearance work was not complete. The team acquired additional information through telephone interviews, as well as by consulting internal reports supplied by the agencies and organizations involved.

The report deals with four main themes: coordination; implementation; capacity development and transfer of responsibilities to the national authorities; and funding. The conclusions seek to highlight the actions and initiatives that contributed to the achievement of the goals formulated within the set deadlines and which could provide a blueprint of 'good practices' able to be applied subsequently in the context of similar rubble-excavation and clearance programmes. The conclusions also underline, in the form of experience gained and 'lessons to be learned', the obstacles or inadequacies that may have hampered and/or slowed down the successful implementation of the clearance and risk-education (RE) activities. The full report is available in French only.

Gobinet, Pierre. 2014. 'Countdown to Catastrophe: The Mpila Ammunition Depot Explosions.' In *Small Arms Survey 2014: Women and Guns*. Cambridge: Cambridge University Press, pp. 144–77.

On 4 March 2012, a series of explosions destroyed several military barracks in the Mpila area of Brazzaville, Congo, and seriously affected two surrounding, densely populated districts of the city. In this chapter, the Survey focuses on the long-term ammunition procurement and stockpiling practices that led to the explosions, and the direct and indirect consequences of the blasts on the city's population, the country's finances, and government policy. The research draws upon a wide range of (mostly) internal documents obtained during an initial EU-funded evaluation conducted with GICHD in January 2013, including reports from the Congolese Armed Forces (FAC), international organizations, NGOs, and the joint EOD Coordination Center.

In the first section, a chronological description of the Mpila ammunition depot explosions and their root causes leads to a discussion on the types and quantities of ammunition that were in the depot pre-explosion, as well as the probable origins of this ordnance. The second section details the impact of the explosions on the city's population and infrastructure, government finances, and the country's socio-economic development. The third and final section highlights the opportunities that Congo had to avoid the explosion, the country's multilateral commitments for stockpile management, and future perspectives.

United Nations Disaster Assessment and Coordination (UNDAC). 2008. *Assessment and Recommendations Following Gërdec Explosions, Albania: 20 March–3 April 2008*.
<http://www.unep.org/french/greenstar//publications/Report%20Ammunition%20Blast,%20Albania,%202008%5B2%5D.pdf>

Following the UEMS on 15 March 2008 in Gërdec, Albania, UNDAC sent a team to the area to report on the situation and assistance needs. The team arrived in Albania five days after the explosion to interview national and local authorities. This paper is a summary report of the team's findings.

The report provides a useful analysis of the scope of the damage caused by UEMS. Costs to the government (national and local) are significant, and often require short-, medium-, and long-term support. These costs started adding up immediately. The high number of casualties strained trauma centres to the point that some of the most injured were evacuated to hospitals in nearby countries. Costs will continue, as many of the 300 injured require ongoing recovery support. There were 4,000 people evacuated and who needed temporary shelter. Long-term housing proved a significant challenge, as 308 homes were completely destroyed and another 3,835 damaged. Infrastructure, public

buildings (particularly schools), and the natural environment (damage to which posed a threat to water supply) all needed repair costing in the millions. UNDAC recognized the challenge of the clean-up and recommended the government of Albania to establish a tracking system to enable the international community to contribute to the recovery effort.

Regional studies

Francis, Steven, Ioane Alama, and Lorraine Kershaw. 2011. *WWII Unexploded Ordnance: A Study of UXO in Four Pacific Island Countries*. Suva, Fiji: PIF Secretariat. <http://www.forumsec.org/resources/uploads/attachments/documents/UXO%20final.pdf>

During the Second World War battles in the Pacific (1941–1945), large quantities of US and Japanese munitions were brought to the Pacific Islands region. These items were stored on the islands and used in military operations. After fighting ended, significant quantities remained in remote storage areas, or more commonly as unexploded ordnance (UXO). This report examines the scope and impact of these remnant munitions in four Pacific islands: Kiribati, Palua, Papa New Guinea, and the Solomon Islands. The study reveals that each of the islands still has thousands of tonnes of remnant munitions on the surface, underground, or underwater. The region's UXOs and remnant stockpiles have resulted in unplanned explosions and have been used in criminal and conflict-related activities. The report argues that efforts to reduce the threat posed by these munitions must be increased. However, while some clean-up work has occurred, none of the islands possesses the capacity or technical expertise to resolve the situation alone.

Gobinet, Pierre. 2011. *Significant Surpluses: Weapons and Ammunition Stockpiles in South-east Europe*. Special Report No. 13. A joint publication of the Regional Approach for Stockpile Reduction, the US Department of State's Office of Weapons Removal and Abatement, and the Small Arms Survey. <http://www.smallarmssurvey.org/fileadmin/docs/C-Special-reports/SAS-SR13-Significant-Surpluses.pdf>

This Special Report was compiled between November 2010 and November 2011 in support of the Regional Approach to Stockpile Reduction (RASR) Initiative. It benefited from many contributions from the South-east European PSSM community, including from MoD representatives who participated in RASR workshops in Sarajevo (2010) and Ljubljana (2011), and in personal interviews conducted on behalf of the RASR Initiative. This publication is designed to provide regional PSSM stakeholders with a clear, concise, and comparative overview of the region's weapons and ammunition stockpiles, and the current state of stockpile reduction activities in the region. It is a direct response to the First RASR Workshop, held on 5–7 May 2009 in Zagreb, Croatia, at which stakeholders highlighted the scarcity of information on the size and content of stockpiles in each country in the region. This Special Report compiles the latest surplus stockpile figures provided by RASR participating countries (as of May 2011). To facilitate regional comparison, the report presents a series of country case studies, organized into thematic sections. Each case study presents a short historical narrative, followed by available stockpile figures as well as acknowledged PSSM priorities.

Gobinet, Pierre. 2012. *Capabilities and Capacities: A Survey of South-east Europe's Demilitarization Infrastructure*. Special Report No. 15. A joint publication of the Regional Approach for Stockpile Reduction, the US Department of State's Office of Weapons Removal and Abatement, and the Small Arms Survey. <http://www.smallarmssurvey.org/fileadmin/docs/C-Special-reports/SAS-SR15-South-East-Europe-Demilitarization.pdf>

This Special Report, compiled between November 2010 and November 2011 in support of the RASR Initiative, benefited from many contributions from the South-east European PSSM community. The Special Report is targeted primarily at national civilian decision-makers and is designed to provide regional PSSM stakeholders with a clear, concise, and comparative overview of the regional capabilities and capacities for the demilitarization of surplus weapons and ammunition. It is a direct response to the First RASR Workshop, held on 5–7 May 2009 in Zagreb, Croatia, at which stakeholders suggested that a study be conducted to assess national capabilities in the region and consider how they could be consolidated so as to be more cost-effective. The publication presents each RASR country's national demilitarization capabilities and capacities in a clear and comparable form, including within its scope past accomplishments; comparative annual small arms, light weapons, and ammunition demilitarization outputs; coordination with private industry actors; and the recurring capability gaps that regional countries are trying to address. Each case study presents a short historical narrative, followed by a general overview of open burning and open detonation (OB/OD) and industrial demilitarization capabilities, covering location, process, capacities, and existing commitments.

Lazarevič, Jasna. 2010. *South-east European Surplus Arms: State Policies and Practices*. Issue Brief No. 1. Geneva: Small Arms Survey. <http://www.smallarmssurvey.org/fileadmin/docs/G-Issue-briefs/SAS-RASR-IB1_SE-European-Surplus-Arms.pdf>

States in South-east Europe may differ with respect to how they determine their weapons needs, but all confirm that they have surplus small arms and ammunition. RASR Issue

Brief No. 1 was launched at the Third RASR Workshop, held in Sarajevo from 2–4 November 2010. This Issue Brief profiles the policies and procedures put in place by the South-east European countries operating within the RASR Initiative to address their surplus small arms and ammunition. The first section reviews the international and regional political frameworks for addressing surplus and examines available policy options. The second section provides an overview of each country's treatment of its national stockpiles with respect to surplus. The third section focuses on these countries' approach to weapons and ammunition seized and confiscated from civilians, but does not cover weapons collected through national and internationally sponsored weapons collection programmes. The study confirms the political will of South-east European states to address the problem of surplus weapons and ammunition within their boundaries. It finds that surplus destruction is not the favoured policy option among South-east European countries, and that in most cases the preferred method for disposal is through sale. These findings are likely to apply to other regions.

Lazarevič, Jasna. 2012. *Costs and Consequences: Unplanned Explosions and Demilitarization in South-east Europe*. Special Report No. 18. A joint publication of the Regional Approach for Stockpile Reduction, the US Department of State's Office of Weapons Removal and Abatement, and the Small Arms Survey.
<http://www.smallarmssurvey.org/fileadmin/docs/C-Special-reports/SAS-SR18-costs-and-consequences.pdf>

This Special Report follows on from a series of five workshops held for regional and international PSSM stakeholders to discuss unplanned explosions at munitions sites (UEMS) and their impacts. The report, published as part of the Regional Approach to Stockpile Reduction (RASR) Initiative, provides a concise overview of the risks posed by poorly maintained, improperly stored, abandoned, damaged, and unstable ammunition stockpiles. The first section provides a global and regional overview of UEMS events and presents recent incidents and their impact on populations and states. The second section discusses the costs and benefits of demilitarization in South-east Europe. In its third section, the report presents a typology of the direct and indirect effects of UEMS. This section considers the full range of impacts, and their related costs, in order to illustrate the effect of UEMS events on countries and their economies. By means of country case studies—from Albania, Bulgaria, and Serbia—the remaining sections estimate the costs of selected UEMS events in each country. The case study covers issues such as duration and costs of clearance operations, and attempts to measure the impact of these explosive events on lives, livelihoods, housing, the environment, and development.

Tracy, Lauren. 2011. *Ticking Time Bombs: Ineffective Weapons Management in Africa*. Pretoria: Institute for Security Studies. Paper No. 223. pp. 1–12.
<http://www.issafrica.org/uploads/Paper223.pdf>

Weapons and ammunition explosions at government depots, in particular at military stockpiles across the world, highlight the risks posed by inadequately managed and poorly stored weapons stockpiles. In Africa, the physical risks posed by these stockpiles and the explosions that occur as a result of them have inflicted injury and death on many communities. This research paper, funded by the Government of the Netherlands and published in April 2011, illustrates the importance of conventional weapon and ammunition stockpile management in Africa, with a particular focus on military stockpiles of small arms, light weapons, and ammunition. The author begins by giving a broad overview of the various international and sub-regional legal frameworks adopted to assist governments in controlling and managing such stockpiles. The paper depicts two case studies to highlight the causes of ammunition-stockpile explosions occurring in Africa: Dar es Salaam, Tanzania, on 29 April 2009, and a RENAMO base in Mozambique, less than a month later, on 27 May 2009. The analysis identifies the impact that the explosions have had on these countries, as well as any progress made to date in implementing any national, regional, and international legally binding agreements on weapons stockpile management that the two countries have adopted thus far. It concludes with recommendations on how stockpile management can be improved in the African context, outlining basic guidelines that have been developed which could help improve the management of these weapons and ammunition stockpiles in Africa.

US Department of State's Bureau of Political–Military Affairs. 2012. *To Walk the Earth in Safety,* 11th edn. Washington DC: US Department of State's Bureau of Political–Military Affairs.
<http://www.state.gov/t/pm/rls/rpt/walkearth/2012/index.htm>

The yearly *To Walk the Earth in Safety* report by the US Department of State's Bureau of Political–Military Affairs details the projects and partnerships of the United States' Conventional Weapons Destruction (CWD) programme throughout the world. This includes providing assistance for the clearance of landmines and explosive remnants of war, as well as the destruction of at-risk and unsecured weapons and munitions. The United States is the world's single largest financial supporter of humanitarian mine action. The CWD programme has contributed close to USD 2 billion to more than 90 countries, to reduce the harmful worldwide effects generated by indiscriminately used, illicit, and abandoned conventional weapons of war since 1993. In the fiscal year 2011, the Department of State allocated USD 142 million in assistance to 42 countries, thereby helping

communities recover, and countries become more secure. The report details the US Department of State's partnership with the Department of Defense, US Agency for International Development, the Centers for Disease Control and Prevention, and a host of experts from across the US government. The report also emphasizes the Public–Private Partnership Program, which counts almost 70 partners among civil society, non-governmental organizations, and the private sector, and continues to apply new energy, ideas, and financial resources to the field of CWD, including humanitarian mine action.

Thematic studies

Bevan, James, ed. 2008. *Conventional Ammunition in Surplus: A Reference Guide*. Geneva: Small Arms Survey with BICC, FAS, GRIP, and SEESAC.
<http://www.smallarmssurvey.org/fileadmin/docs/D-Book-series/book-05-Conventional-Ammo/SAS-Conventional-Ammunition-in-Surplus-Book.pdf>

As part of its support for the 2008 United Nations Group of Governmental Experts (GGE), the German Federal Foreign Office requested that the Small Arms Survey coordinate the publication of a reference guide that would provide information on the full spectrum of issues related to conventional ammunition in surplus. *Conventional Ammunition in Surplus* is designed to quickly impart to its readers the most important information pertaining to the management of conventional ammunition. It is a book for policy-makers and for people closely involved in policy-making processes. The book responds to the requirement for a single source of easily accessible, reliable, and authoritative information. Some of the book's 18 chapters restate and update existing information, with the aim of providing readers with the most authoritative, publicly available information within a single, easy-to-read volume. Other chapters break new ground by presenting unexplored or under-explored issues related to arms and ammunition management. Due to the cross-cutting nature of the field, many of the chapters cover closely linked themes, depicting effective arms and ammunition management as a system, rather than as a series of isolated activities. The book's chapters are cross-referenced so that readers can easily navigate between related issues within the book. Chapters also feature 'Further reading' lists.

GICHD (Geneva International Centre for Humanitarian Demining). 2008. *A Guide to Ammunition Storage*. Geneva: GICHD.
<http://www.gichd.org/fileadmin/pdf/publications/Ammunition-Storage-2008.pdf>

By identifying and promoting good practice in the safe storage of ammunition, this Guide contributes to international efforts to address the issue of unplanned ammunition depot explosions. It complements a previous report issued by the GICHD in 2002, *Explosive Remnants of War (ERW)—Undesired Explosive Events in Ammunition Storage Areas*. It is intended to provide guidance to practitioners and policy-makers alike, and does not attempt to serve as or replace operating procedures for ammunition storage. The Guide recaps the genesis and history of international (UN) efforts to reduce the risk of unplanned explosions, and emphasizes the role of regional bodies. It describes the risks from ammunition storage areas, the deterioration of ammunition and explosives, and the impact of explosions. The guide also gives a useful overview of: (i) key norms and standards applicable to ammunition storage, (ii) basic principles for safe storage of ammunition, including environmental factors, ammunition packaging, and stacking, and (iii) basic principles for the control of ammunition storage areas, including location of storage areas, safety distances, protection from fire, access restriction, day-to-day management, and field storage.

Gobinet, Pierre and Tom Van Beneden. 2012. *Buy and Burn: Factoring Demilitarization into Ammunition Procurement*. Issue Brief No. 2. A joint publication of the Regional Approach for Stockpile Reduction, the US Department of State's Office of Weapons Removal and Abatement, and the Small Arms Survey.
<http://www.smallarmssurvey.org/fileadmin/docs/G-Issue-briefs/SAS-RASR-IB2-Buy-and-Burn.pdf>

In South-east Europe, some states participating in the Regional Approach to Stockpile Reduction (RASR) Initiative already have a clear understanding of their surplus ammunition and its corresponding status, and have made the decision to dispose of parts of it, using various demilitarization methods. Yet states that demilitarize also procure ammunition: defence reform implies the destruction of surplus ammunition stockpiles, but standardization or modernization requirements simultaneously call for the procurement of modern ordnance. Procuring ammunition is similar to subscribing to a national defence insurance policy: a large part of what is procured will never be used before its shelf life expires. Newly purchased ammunition is therefore likely to comprise tomorrow's problematic surpluses, unless states address their future demilitarization challenges proactively and invest in life-cycle stockpile management planning. This Issue Brief, compiled by the Small Arms Survey in support of the RASR Initiative, aims to increase participating states' awareness of the future costs that they will incur in disposing of the weapons and ammunition that they acquire today. It also profiles the options for reducing demilitarization costs in the future—including offsetting disposal costs in the purchase price and 'design for demil' (DfD) technologies—and the likely impact on states' retention of surpluses in the future.

Ilyin, Vadim, Vyacheslav Kozlov, and Igor Sevryukov. 2012. *Development of a Theory of Analysis of Accidents in Munitions Sites*. Perm: Zapadno-Uralskiy Institut Ekonomiki i Prava (Institute of Economics and Law of West Ural).

The secure management of explosives and ammunition calls for new methods to anticipate emergencies, appropriate solutions for storing and managing ammunition and explosives, and ideas about the nature of processes related to explosive percolation. This publication emphasizes the need to analyse the complex phenomena of explosions at munitions sites, to find ways to ensure that munitions stockpiles are managed effectively. It argues that although no single methodology exists for predicting the impacts of an accidental explosion, characteristics of the effects of such explosions can be predicted by means of mathematical modelling. These mathematical models are designed to illustrate the forces created in an explosion, the consequences of these explosions, and the impact of these forces on munitions storage facilities and other objects. The study comprises five chapters, covering: (1) analyses of storage conditions of munitions, (2) the impact of explosions, (3) models for predicting the consequences of explosions, (4) methods used to evaluate the occurrence of emergencies and their progression, and (5) an analysis of methods of secure stockpile management. Although the study is intended for a specialized readership, it is useful for policy-makers seeking to minimize the consequences of unplanned explosions at munitions sites. The publication is available in Russian only.

Kahl, Marius. 2012. *Starter Guide towards Strong Arms and Ammunition Management Practices*. Bonn: BICC (Bonn International Center for Conversion).

BICC (Internationales Konversionszentrum Bonn—Bonn International Center for Conversion) was founded as a non-profit limited company in 1994, with the support of the Land of North Rhine-Westphalia (NRW). As an independent, non-profit organization, BICC deals with a wide range of global topics in the field of peace and conflict research. The *Starter Guide* was jointly developed with the Bundeswehr Verification Center, the US Defense Threat Reduction Agency (DTRA), The HALO Trust, the Mines Advisory Group (MAG), the Small Arms Survey, the United Nations Mine Action Service (UNMAS), and the United Nations Office of Disarmament Affairs (UNODA). It addresses countries that wish to start improving their approaches to and practices of arms and ammunition management and are at relatively early stages of improvement. The publication makes reference to existing international standards and guidelines, but offers a systematic approach to strengthening arms and ammunition management where current approaches and practices within states are still basic. It provides a four-step approach which supports countries to improve implementation and to move towards the basic elements of the International Standards and the recommendations of existing best-practice guides.

Karp, Aaron, ed. 2009. *The Politics of Destroying Surplus Small Arms: Inconspicuous Disarmament*. London: Routledge.
<http://www.smallarmssurvey.org/publications/by-type/book-series/the-politics-of-destroying-surplus-small-arms.html>

This edited collection was first published as a special issue of *Contemporary Security Policy*. Contributors include Michael Ashkenazi, Philip Alpers, Christine Beeck, Peter Courtney-Green, Sami Faltas, Hugh Griffiths, Yuriy Kryvonos, Elli Kytömäki, and Rebecca Roberts. This volume is the first full-length examination of how inconspicuous disarmament of military small arms, which receives much less attention than better known disarmament processes, is reshaping the global picture of firearms, light weapons, and ammunition. From a total of roughly 200 million modern military small arms worldwide, about 500,000 are destroyed every year. The case studies in this book examine the politics of military small arms destruction by NATO and the OSCE, and in Bulgaria, Cambodia, Germany, Kazakhstan, Papua New Guinea, Romania, Serbia, and Ukraine, among other countries. They reflect on certain factors that influence the prospects, the likeliness, and the effectiveness of surplus destruction, such as the commitment of major governments and international organizations or the existence of conflicts creating unprecedented demand for second-hand weaponry. Aaron Karp is Lecturer in Political Science at old Dominion University in Norfolk, Virginia, and Senior Consultant with the Small Arms Survey in Geneva, Switzerland.

King, Benjamin, ed. 2011. *Safer Stockpiles: Practitioners' Experiences with Physical Security and Stockpile Management (PSSM) Assistance Programmes*. Occasional Paper No. 27. Geneva: Small Arms Survey.
<http://www.smallarmssurvey.org/fileadmin/docs/B-Occasional-papers/SAS-OP27-Safer-Stockpiles.pdf>

Many nations have received international assistance intended for improving some aspects of their PSSM practices. The assistance provided can range from small, short-term support to multi-million-dollar investment in infrastructure. And while these projects start with the best of intentions, practitioners consistently face obstacles that may delay or completely halt progress. *Safer Stockpiles* examines the various challenges that arise during the implementation of PSSM assistance programmes. The study highlights the reoccurring dilemmas facing practitioners at the various stages of the programme cycle. The discussion focuses on how practitioners must balance the short-term and long-term needs of the state with realistic support offered by donors. Subsequent chapters examine the challenges unique to implementing PSSM programmes in less developed nations and provide a case study of the German Bundeswehr's PSSM programme efforts in Cambodia.

MSIAC (Munitions Safety Information Analysis Center). 2006. *Review of Demilitarisation and Disposal Techniques for Munitions and Related Materials*. Brussels: NATO.
<http://www.rasrinitiative.org/pdfs/MSIAC-2006.pdf>

This spreadsheet is provided courtesy of its author, the Munitions Safety Information Analysis Center (MSIAC). MSIAC is a NATO Project Office that is directly funded and managed by its member nations and is located at NATO Headquarters, Brussels, Belgium. MSIAC collects and distributes information, provides analysis, and makes recommendations via answered technical questions, open and limited reports, development of software tools, databases, training, and workshops in four major areas which relate to munitions life-cycle safety: threats to munitions; explosives (energetic materials); systems-related technical issues; and munitions logistics, movement, and storage-related safety issues. The paper serves as a literature review of the technology involved in demilitarization, the legislation and regulation that affects it, as well as a summary of the organizations involved in demilitarization. The main body of the paper begins with Section 4, covering environmental impact and regulation of demilitarization activities. Section 5 covers transport regulation, in particular the issue of hazardous waste classification, and is applicable to all demilitarization techniques. Section 6 covers particular demilitarization techniques and technology. Each technique is described briefly, along with its application and some evidence of its use or state of research. Finally, Section 7 provides a summary of the major organizations and companies involved in relevant research or activities.

Turner, Mandy. 2006. *Costs of Disarmament: Cost–Benefit Analysis of SALW Destruction versus Storage*. Geneva: UNIDIR.
<http://www.unidir.ch/programmes/weapons-of-societal-disruption/cost-benefit-analysis-of-small-arms-and-light-weapons-destruction>

This report explains that the majority of states in South-east Europe believe that the sale of surplus stocks will generate income, which can then be used to support the restructuring of their armed forces. While this would initially appear to make good business sense, the reality is that the global market is now saturated with the weapon types found in national inventories of this region, throughout which there is a massive surplus of small arms, light weapons, and ammunition. Given this market saturation and the law of supply and demand, it is likely that any potential income will be minimal in the short- to medium-term. In order to demonstrate this, UNIDIR commissioned Bradford University's Centre for International Cooperation and Security (CICS) to develop a cost–benefit analysis, with technical assistance from SEESAC and the UK Ministry of Defence. Dedicated software was developed in order to help states estimate the real costs involved in storing ammunition and weapons. The software also allows a comparison of the potential benefits from sale versus the costs of storage. The cost–benefit analysis model, which comes in the form of an Excel 'Planning Matrix' spreadsheet, is available at the above website, along with a user manual.

US Department of State's Bureau of Political–Military Affairs. 2012. *Dangerous Depots: The Growing Humanitarian Problem Posed by Aging and Poorly Maintained Munitions Storage Sites*. Fact Sheet, 23 January.
<http://www.state.gov/t/pm/rls/fs/182344.htm>

Every year, the US Department of State's Bureau of Political–Military Affairs updates an online fact sheet entitled *Dangerous Depots: The Growing Humanitarian Problem Posed by Aging and Poorly Maintained Munitions Storage Sites*. In 2012, the fact sheet lists 60 incidents of unplanned explosions at munitions sites in 31 countries, from 16 July 1995 to 23 January 2012. The fact sheet provides a summary of each incident and—wherever data is available—describes the impact and consequences of the explosion on the surrounding population and infrastructure. The data reflects the increasing number of catastrophic explosions at arms storage facilities around the world since the 1990s. The frequency of such incidents has increased as urban populations have expanded outward from city centres to the vicinity of what were often previously isolated depots. US experts from the Office of Weapons Removal and Abatement in the Department of State's Bureau of Political–Military Affairs (PM/WRA) and the Department of Defense's Defense Threat Reduction Agency (DTRA) provide stockpile-management support to partner countries, either by helping them to mitigate risks from other potentially dangerous depots, or by safely removing and disposing of UXO following incidents at these facilities.

Selected tools

Web-based training and calculation sites

GICHD. forthcoming. Ammunition Safety Management.
<http://www.gichd.org/operations/stockpile-destruction-and-eod/ammunition-safety-management/>

The Geneva International Centre for Humanitarian Demining (GICHD) is currently developing an ammunition safety management (ASM) system to assist developing countries which have received little or no international aid in implementing the removal and destruction of hazardous ammunition and the safe storage of serviceable stocks. The ASM system comprises a toolset which trains local staff to make their countries' ammunition safe with minimal external assistance, and enables them to manage their stockpiles in a safe, effective manner. It will enable countries to progress incrementally towards the lowest standard set by the International Ammunition Technical Guidelines (IATG). Each task is divided into simple steps, so that first IATG standard is attainable. With each step the ammunition will be made perceptibly safer, encouraging the workforce to move on to the next step. The system intends to assist countries no matter what level their current ammunition safety management status is. The basic improvements start from the lowest level (i.e. unpackaged and unsorted ammunition lying in the open), and accompany the user incrementally through (i) the relocation of the ammunition to a secure temporary storage area, (ii) the demolition of any dangerous ammunition, (iii) the implementation of an ASM regime, (iv) the construction of a new storage site which meets the lowest IATG standard, and ultimately (v) the relocation of the ammunition stocks. There are plans to develop a further module to address UXO clearance after a UEMS has occurred.

UN Safer*Guard*
<http://www.un.org/disarmament/un-saferguard/>

The UNODA creators describe the UN Safer*Guard* site as a toolkit of web-based applications designed to support the implementation of the IATG. The toolkit is primarily intended to assist ammunition experts. Each application permits the user to measure risks and calculate the effects of an explosion, based on data from actual storage facilities. Together these applications help the user determine the threats posed by a particular storage facility and to identify key risk mitigation strategies currently absent.

The toolkit highlights four analytical tools, although others can be found on the site. The Risk Reduction Checklist enables users to determine their Risk Reduction Process Level (RRPL) of a stockpile, based on an extensive list of yes/no questions. After completing the form, the tool computes the level of risk reduction features and the percentage of acceptable responses at a particular site. The site also contains a Quantity Distance Calculator and Vertical Danger Area with which to determine the effect of a potential explosion. Finally, the Explosives Limit License (ELL) enables the user to calculate a site's explosive-storage capacity and actually print ELLs for display in a facility. The site also links to other useful calculating tools, as well as to IATG documents.

PART V

Annexes

Annexe A. UEMS Incident Reporting Template (IRT)

1. *When?* (When did the UEMS incident occur?)	
Date (yyyy/mm/dd)	/ /
Hour (hh:mm) [using 24-hour clock]	:
Weather conditions (e.g. temperature °C, light, wind, rain, lightning)	

2. *Where?* (Where did the UEMS incident occur?)
Country
City or town
Site/location name

3. *Who?* (Who owns or manages the site and the contents on it?)

3.1. Who owns or manages the site?			
Owner	☐ state		☐ non-state
			manager (if different)
Details (e.g. type)	☐ police	☐ military	☐ private company
	☐ foreign (e.g. peacekeeping force)		☐ armed group
	☐ other (e.g. state companies), specify:		☐ other (e.g. criminal gang), specify:

3.2. What type of facility housed the munitions?		
3.2.1. Status of storage site?	☐ permanent	☐ temporary
3.2.2. What types of activity took place there?	☐ storage	
	☐ processing	
	☐ loading/unloading	
3.2.3. What was the design of the storage facility?	☐ purpose-built storage	
	☐ non-purpose-built storage	
	☐ dump	
	☐ unknown	

3.3. What munitions were stored there?	**Type of material or munitions**		**Quantity/measurement** (total estimate, providing any data available)	
Comments (e.g. age, origin, type, and condition of munitions)	☐ aircraft	☐ armour and artillery	☐ quantity (in number)	
	☐ cluster	☐ explosives and pyrotechnics	☐ weight (in tonnes)	
	☐ mines	☐ naval	☐ value (indicate currency)	
	☐ SALW*	☐ unknown		

4. *Why?* (Why did the UEMS incident occur?)**

(e.g. degradation of ammunition; poor storage or poor infrastructure; material being mishandled or dropped; external, environmental events (such as floods or fires); poor security; poor working conditions)

*Small arms and light weapons **See Table 8, UEMS: classification of causes

5. *What?* (What happened as a result of the explosion?)

5.1 How large was the affected area?	5.2. Who was affected by the explosion?	5.3. What infrastructure was damaged or destroyed in the explosion?
Blast radius (km) (distance of pressure expanding outwards from explosion)	**Fatalities** (total) ☐ yes ☐ no ☐ unknown If yes, no. of facility fatalities no. of civilian, non-staff fatalities	**Type of infrastructure damaged** (selecting all that apply) ☐ schools ☐ housing ☐ health services ☐ transport hub ☐ other, specify:
Fragmentation radius (km) (distance contaminated by munitions, explosives, weapons, and debris, posing a continuing risk)	**Injuries** (total) ☐ yes ☐ no ☐ unknown If yes, no. of facility staff injuries no. of civilian, non-staff injuries	**Total cost of damages** (indicate currency)

Comments

5.4. What are the other consequences of a UEMS?

Government response ☐ safety investigation ☐ legal investigation	**Compensation** ☐ yes ☐ no ☐ n/a* If yes, how many families received compensation?	**Total cost of compensation** (indicate currency)
Political impact (e.g. senior officials being reprimanded, demoted, convicted, or jailed)	**Other impacts** (e.g. environmental, economic, social, or health)	

6. *How?* (How did the state and international community respond?)

Was an emergency-plan response implemented? ☐ yes ☐ no ☐ n/a	**Prior presence of EOD** expertise on-site?** ☐ yes ☐ no ☐ unknown	**Relocation of displaced people** ☐ yes ☐ no ☐ n/a	If yes, how many?
Evacuated people ☐ yes ☐ no ☐ n/a If yes, how many?	If yes, was displacement ☐ temporary or ☐ permanent?	**UXO removal** ☐ yes ☐ no ☐ n/a Details (e.g. quantity or weight in tonnes)	
Comments (e.g. names of actors assisting, including local, national, or international)			

Reporting person, contact details
Name
Institution
Mailing address
Phone
Email

*n/a = not applicable **Explosive ordnance disposal

Annexe B. UEMS by year, 1979–2013

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
1979							
no incidents recorded							
1980							
16.11.1980	Thailand	Bangkok	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	54	353
1981							
16.08.1981	Zimbabwe	Harare	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	n/a
1982							
—.11.1982	Australia	Mulwala	—	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
1983							
05.12.1983	Russian Federation	Dolan, KAL	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
1984							
17.05.1984	Russian Federation	Severomorsk, MUR	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	250	200
31.05.1984	Russian Federation	Bobruysk, MOG	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
30.06.1984	Germany	Schwerin	foreign (intervention)	6. cause currently undetermined or unrecorded	—	n/a	n/a
13.09.1984	United States	Independence, MO	state (military)	6. cause currently undetermined or unrecorded	—	0	0
29.10.1984	Indonesia	Jakarta	state (military)	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	15	200
11.11.1984	United States	—, MT	n/a	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
11.11.1984	United States	Independence, MO	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
—.—.1984	China	Chiayi	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	n/a	n/a
1985							
06.06.1985	United States	Richmond, KY	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
19.06.1985	France	Toulon	n/a	6. cause currently undetermined or unrecorded	—	4	n/a
05.10.1985	Mozambique	Maputo	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	13	100
1986							
27.01.1986	United Kingdom	Foulness	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
18.06.1986	Turkey	Kirikkale	state (military)	6. cause currently undetermined or unrecorded	—	n/a	20
26.08.1986	Afghanistan	Kabul	foreign (other)	5. poor security	5.1. criminal/deliberate act	0	0
26.11.1986	Sweden	Järna	state (military)	5. poor security	5.1. criminal/deliberate act	0	0
27.12.1986	Iran	Tehran	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
—.—.1986	Slovenia	Grgar	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	13	n/a

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
1987							
28.04.1987	Turkey	Erzurum	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	7	7
10.10.1987	Switzerland	Saignelegier	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
10.10.1987	United States	Texarkana, TX	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
11.11.1987	Thailand	Bangkok	state (military)	6. cause currently undetermined or unrecorded	—	10	n/a
21.12.1987	Egypt	Alexandria	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	6	1,000
25.12.1987	Greece	Malakasa	state (military)	5. poor security	5.1. criminal/deliberate act	1	4
1988							
06.04.1988	Hungary	Veszprem	state (other)	6. cause currently undetermined or unrecorded	—	1	n/a
10.04.1988	Pakistan	Rawalpindi	state (military)	5. poor security	5.1. criminal/deliberate act	93	1,100
26.04.1988	Trinidad and Tobago	Chaguaramas	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	6	20
25.05.1988	Zambia	Kabwe	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	1	50
15.06.1988	Chile	—	state (military)	5. poor security	5.1. criminal/deliberate act	3	2
29.06.1988	Russian Federation	Khabarovsk, KHA	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
23.10.1988	Namibia	Grootfontein	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	1
24.10.1988	Vietnam	Ho Chi Minh City	state (other)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
25.11.1988	Denmark	Jaegerspris	n/a	6. cause currently undetermined or unrecorded	—	1	n/a
1989							
09.05.1989	India	Pulgaon	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	3	15
09.08.1989	United States	Hawthorne, NV	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
14.08.1989	Turkey	Gölcük	non-state (armed group)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	3	4
21.09.1989	Russian Federation	Yurga, KEM	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	3
15.11.1989	Pakistan	Gharam Chashma	non-state (armed group)	6. cause currently undetermined or unrecorded	—	40	8
1990							
07.02.1990	Czech Republic	Oldruvki	state (other)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	n/a	n/a
15.04.1990	Nicaragua	Managua	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
16.09.1990	El Salvador	Ilopango	state (police)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
—.—.1990	Ethiopia	Addis Ababa	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
1991							
09.01.1991	Czech Republic	Teplice	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	20	n/a
31.05.1991	Pakistan	Nowshera	state (military)	6. cause currently undetermined or unrecorded	—	18	50
04.06.1991	Ethiopia	Addis Ababa	state (military)	5. poor security	5.1. criminal/deliberate act	100	80

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
11.07.1991	Kuwait	Doha	foreign (other)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	56
02.08.1991	Greece	Dervenohoria	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
—.08.1991	Afghanistan	Kabul	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
29.10.1991	Russian Federation	Vozdvizhenka, PRI	n/a	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
31.10.1991	North Korea	Pyongyang	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	120	n/a
—.—.1991	Azerbaijan	Baku	state (other)	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	3
1992							
23.03.1992	Russian Federation	Primorsky Krai, PRI	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
08.04.1992	Armenia	Yerevan	state (military)	6. cause currently undetermined or unrecorded	—	n/a	7
14.05.1992	Russian Federation	Vladivostok, PRI	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	n/a
28.06.1992	United States	White Oak, MD	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
21.08.1992	Azerbaijan	Gyuzdek	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	3
04.09.1992	Singapore	—	state (military)	1. lack of surveillance leading to ammunition deterioration	1.3. chemical deterioration	n/a	n/a
15.10.1992	Angola	Luanda	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
19.10.1992	Iraq	Baghdad	state (military)	6. cause currently undetermined or unrecorded	—	3	27
02.11.1992	Switzerland	Steingletscher	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	6	0
19.11.1992	Russian Federation	Yelizovo, KAM	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
1993							
05.04.1993	Pakistan	Spin Tangi	non-state (armed group)	6. cause currently undetermined or unrecorded	—	8	n/a
23.05.1993	India	Leh	state (military)	6. cause currently undetermined or unrecorded	—	18	9
—.—.1993	Honduras	Naco	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	n/a	n/a
—.—.1993	India	Srinagar	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
1994							
07.04.1994	Croatia	Zagreb	state (military)	6. cause currently undetermined or unrecorded	—	n/a	17
14.05.1994	Russian Federation	Novonezhino, PRI	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
01.09.1994	United States	Indian Head, MD	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
16.09.1994	Angola	Lubango	state (military)	6. cause currently undetermined or unrecorded	—	2	32
20.10.1994	Russian Federation	Pskov, PSK	state (military)	6. cause currently undetermined or unrecorded	—	3	7
—.—.1994	China	Chiayi	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	n/a	n/a
—.—.1994	Serbia	Lisičji	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
1995							
31.01.1995	Brazil	Paracambi	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
30.03.1995	Russian Federation	Taly, KOM	state (military)	6. cause currently undetermined or unrecorded	—	0	0
31.03.1995	Russian Federation	Vladivostok, PRI	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	n/a	n/a

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
04.04.1995	Russian Federation	Elban, KEM	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	n/a
14.04.1995	China	Beijing	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
27.05.1995	Yemen	Aden	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	10	0
20.06.1995	Philippines	Zamboanga City	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	1	34
16.07.1995	Brazil	Ilha do Boqueirão	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	23	60
28.07.1995	Turkey	Pamukova	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
14.10.1995	Guinea-Bissau	Cufar	n/a	6. cause currently undetermined or unrecorded	—	14	n/a
03.11.1995	Argentina	Cordoba	state (military)	5. poor security	5.1. criminal/deliberate act	7	300
04.11.1995	Angola	Lubango	state (military)	6. cause currently undetermined or unrecorded	—	0	4
1996							
15.02.1996	Afghanistan	Kabul	n/a	6. cause currently undetermined or unrecorded	—	60	125
14.05.1996	Yemen	Aden	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	3	18
21.06.1996	Serbia	Baric	state (other)	3. handling errors and inappropriate working practices	3.5. suspected	3	3
25.06.1996	Russian Federation	Boyets Kuznetsov, PRI	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	0	0
25.06.1996	Saudi Arabia	Phakran	n/a	6. cause currently undetermined or unrecorded	—	19	0
27.06.1996	Georgia	Osiauri	state (military)	6. cause currently undetermined or unrecorded	—	0	0
07.08.1996	United States	—, MD	n/a	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
21.08.1996	United States	Texarkana, TX	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
07.09.1996	Belarus	Slutsk, MIN	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	1
12.11.1996	Russian Federation	Grozny, CHA	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	4
18.12.1996	France	Le Crotoy	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	2
24.12.1996	Afghanistan	Kabul	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	1	8
1997							
26.01.1997	Angola	Luanda	state (military)	6. cause currently undetermined or unrecorded	—	9	22
12.02.1997	Mali	Kati	state (military)	6. cause currently undetermined or unrecorded	—	6	n/a
20.02.1997	Albania	Suc	state (military)	5. poor security	5.1. criminal/deliberate act	1	2
28.02.1997	Albania	Qafe Shtame	state (military)	5. poor security	5.1. criminal/deliberate act	23	3
11.03.1997	Albania	Kordhoce	state (military)	5. poor security	5.1. criminal/deliberate act	1	2
12.03.1997	Albania	Laci	state (military)	5. poor security	5.1. criminal/deliberate act	2	9
19.03.1997	Afghanistan	Jalalabad	non-state (armed group)	6. cause currently undetermined or unrecorded	—	30	128
20.03.1997	Albania	Peshkopi	state (military)	5. poor security	5.1. criminal/deliberate act	0	3
20.03.1997	Albania	Pilur-Vlore	state (military)	5. poor security	5.1. criminal/deliberate act	2	0

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
—.03.1997	Albania	Gjegjan	state (military)	5. poor security	5.1. criminal/deliberate act	30	3
—.03.1997	Albania	Shen Vasil/Sasaj	state (military)	5. poor security	5.1. criminal/deliberate act	3	0
05.04.1997	Albania	Fushe-Kruje	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
07.04.1997	Albania	Ura e Gjadrit	state (military)	5. poor security	5.1. criminal/deliberate act	2	6
13.04.1997	Albania	Picar	state (military)	5. poor security	5.1. criminal/deliberate act	5	19
18.04.1997	Albania	Gjeroven	state (military)	5. poor security	5.1. criminal/deliberate act	1	5
24.04.1997	Albania	Malesia Lezhe	state (military)	5. poor security	5.1. criminal/deliberate act	3	0
27.04.1997	Albania	Palikesht	state (military)	5. poor security	5.1. criminal/deliberate act	2	14
27.04.1997	Russian Federation	Bira, JEW	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
30.04.1997	Albania	Burrel	state (military)	5. poor security	5.1. criminal/deliberate act	27	n/a
05.05.1997	Albania	Picar	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	14
15.05.1997	Albania	Gjirokaster	state (military)	6. cause currently undetermined or unrecorded	—	1	n/a
19.05.1997	Vietnam	Ho Chi Minh City	state (military)	6. cause currently undetermined or unrecorded	—	2	40
09.06.1997	Peru	Piura	state (military)	6. cause currently undetermined or unrecorded	—	0	6
18.06.1997	Albania	Mbreshtan	state (military)	5. poor security	5.1. criminal/deliberate act	7	1
26.06.1997	Albania	Klos	state (military)	5. poor security	5.1. criminal/deliberate act	3	1
04.07.1997	Ecuador	Amaguaña	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	3	185
09.07.1997	Albania	—	n/a	6. cause currently undetermined or unrecorded	—	16	n/a
07.11.1997	Russian Federation	Vladivostok, PRI	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
—.—.1997	Canada	Winnipeg	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	0
1998							
21.02.1998	Russian Federation	Engels, SAR	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
21.02.1998	Russian Federation	Volgograd, VGG	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
03.04.1998	Russian Federation	Pogranichny, PRI	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
04.05.1998	Sri Lanka	Vavuniya	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	n/a
02.06.1998	Iran	Tehran	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
04.06.1998	Russian Federation	Arzamas, NIZ	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	91	1,000
19.06.1998	Russian Federation	Elk, SVE	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	14	23
—.06.1998	Guinea-Bissau	Paiol de Bra	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
17.07.1998	Sudan	Khartoum	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
31.07.1998	Malaysia	—	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
14.08.1998	Italy	Ghedi	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	2

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
17.08.1998	Russian Federation	Dzerzhinsk, NIZ	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
10.11.1998	India	Balasore	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
01.12.1998	Philippines	Tarlac City	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
04.12.1998	Russian Federation	Yekaterinburg, SVE	state (military)	6. cause currently undetermined or unrecorded	—	3	n/a
—.—.1998	Congo	Brazzaville	n/a	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	n/a
1999							
15.02.1999	Afghanistan	Kabul	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	0
04.04.1999	China	Wangjiabao	state (military)	3. handling errors and inappropriate working practices	3.3. tampering	100	n/a
05.05.1999	Afghanistan	Kabul	non-state (armed group)	6. cause currently undetermined or unrecorded	—	1	8
11.06.1999	Russian Federation	Kotluban', VGG	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	3	n/a
13.07.1999	Sri Lanka	—	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
19.07.1999	Finland	Ähtäri	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
29.08.1999	Cambodia	Ream	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
09.10.1999	Afghanistan	Mazār-e Sharīf	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	7	47
—.—.1999	Ecuador	La Balbina	state (military)	6. cause currently undetermined or unrecorded	—	5	n/a
—.—.1999	India	—, Kashmir	n/a	5. poor security	5.1. criminal/deliberate act	n/a	n/a
2000							
14.04.2000	DRC	Kinshasa	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	101	200
28.04.2000	India	Bharatpur	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	5	10
10.05.2000	El Salvador	San Salvador	state (military)	1. lack of surveillance leading to ammunition deterioration	1.3. chemical deterioration	60	65
18.05.2000	Russian Federation	Rzhevskiy, LEN	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	1	n/a
21.05.2000	Russian Federation	Vanino, KHA	state (military)	5. poor security	5.1. criminal/deliberate act	0	n/a
26.05.2000	Afghanistan	Kabul	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.3. other	0	0
26.06.2000	Russian Federation	St. Petersburg, SPB	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
09.07.2000	Bulgaria	Ivanovo	n/a	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
03.10.2000	Dominican Republic	San Cristobal	n/a	6. cause currently undetermined or unrecorded	—	1	n/a
24.10.2000	Iran	Mashhad	state (military)	6. cause currently undetermined or unrecorded	—	8	10
18.12.2000	Guyana	Georgetown	state (military)	6. cause currently undetermined or unrecorded	—	3	11
—.—.2000	Bosnia and Herzegovina	Bihac	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
—.—.2000	Cambodia	—	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	n/a	n/a
—.—.2000	Guinea-Bissau	Cufar	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	15	n/a

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
2001							
18.02.2001	Cameroon	Yaounde	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
02.03.2001	Guinea	Conakry	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	10	n/a
—.03.2001	Thailand	Bangkok	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	0
29.04.2001	India	Pathankot	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
29.04.2001	United States	East Camden, AR	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
20.05.2001	Yemen	Al-Bayda	non-state (armed group)	6. cause currently undetermined or unrecorded	—	14	50
24.05.2001	India	Suratgarh	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	1	5
08.06.2001	Russian Federation	Ramenskoye, MOS	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
08.06.2001	Vietnam	Thuy Hoa Vien	state (military)	6. cause currently undetermined or unrecorded	—	0	4
22.06.2001	Russian Federation	Nerchinsk, CHI	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	5	1
11.07.2001	Afghanistan	Darulaman	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	3
11.07.2001	Thailand	Korat	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	2	70
21.07.2001	Russian Federation	Gusinoozersk, BUR	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	3	17
08.08.2001	Kazakhstan	Balkhash, KAR	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
23.08.2001	Croatia	Osijek	state (police)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	3
06.09.2001	Kazakhstan	Almaty Oblast, ALT	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
25.10.2001	Thailand	Korat	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	19	90
2002							
05.01.2002	Sierra Leone	Tongoma	foreign (peacekeeping)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	13
11.01.2002	India	Ganganar-Bikaner	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	12
27.01.2002	Nigeria	Lagos	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	1,500	5,000
29.01.2002	Thailand	Korat	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	11	n/a
07.03.2002	Afghanistan	Kandahar	foreign (intervention)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
08.03.2002	Sri Lanka	Kankesanturai	n/a	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	0	0
28.03.2002	Thailand	Aranyaprathet	state (military)	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	0	5
05.05.2002	Guinea	Conakry	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
02.06.2002	France	Saint Martin de Crau	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
27.06.2002	Afghanistan	Spin Boldak	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	32	70
08.07.2002	Afghanistan	Spin Boldak	n/a	6. cause currently undetermined or unrecorded	—	n/a	2
10.07.2002	Russian Federation	Ulan-Ude, BUR	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	3	11
29.07.2002	France	Vimy	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
05.08.2002	Afghanistan	Spin Boldak	n/a	6. cause currently undetermined or unrecorded	—	0	2
10.08.2002	Afghanistan	Jalalabad	non-state (company)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	26	90
17.09.2002	Germany	Torgau	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	1
16.10.2002	Russian Federation	Tayozhny, PRI	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	26
24.10.2002	Mozambique	Beira	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	6	50
12.11.2002	Germany	Lubben	non-state (company)	3. handling errors and inappropriate working practices	3.5. suspected	4	0
12.11.2002	Nicaragua	Managua	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	5	5
20.11.2002	Ecuador	Riobamba	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	10	538
13.12.2002	Russian Federation	Petropavlovsk-Kamchatsky, KAM	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	0
2003							
22.01.2003	Serbia	Čačak	state (military)	6. cause currently undetermined or unrecorded	—	0	3
23.01.2003	Peru	Tumbes	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	7	98
15.03.2003	Afghanistan	Tokhichi	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	1	3
23.03.2003	Ecuador	Guayaquil	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	1	28
14.04.2003	Iraq	Baghdad	n/a	6. cause currently undetermined or unrecorded	—	17	n/a
15.04.2003	France	Pontfaverger Moronvilliers	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
25.04.2003	Colombia	Yopal	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
26.04.2003	Iraq	Baghdad	state (other)	5. poor security	5.1. criminal/deliberate act	10	51
—.04.2003	Iraq	Dibis	n/a	6. cause currently undetermined or unrecorded	—	17	n/a
05.05.2003	Vietnam	Thay Nguyen	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	2	31
22.05.2003	Iraq	Mosul	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	1	1
01.06.2003	India	Jodhpur	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
09.06.2003	Iraq	Diwaniyah	state (military)	6. cause currently undetermined or unrecorded	—	3	2
09.06.2003	Iraq	Karbala	foreign (intervention)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
10.06.2003	Russian Federation	Ulyanovsk, ULY	state (military)	6. cause currently undetermined or unrecorded	—	5	0
18.06.2003	Russian Federation	—, AMU	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
20.06.2003	Bosnia and Herzegovina	Rabic	state (military)	6. cause currently undetermined or unrecorded	—	2	0
22.06.2003	Iraq	Najaf	state (military)	5. poor security	5.1. criminal/deliberate act	40	0
28.06.2003	Iraq	Haditha	state (military)	5. poor security	5.1. criminal/deliberate act	30	6
30.06.2003	Iraq	Fallujah	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	5	4

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Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
30.06.2003	Pakistan	—	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	2	3
12.07.2003	Russian Federation	Nadezhda district, PRI	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	13
16.07.2003	Angola	Menongue	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	15
03.08.2003	Afghanistan	Aqcha	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	25	9
14.08.2003	Russian Federation	Babstovo, JEW	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	2	8
17.08.2003	Iraq	Tikrit	state (military)	5. poor security	5.1. criminal/deliberate act	12	0
04.09.2003	Iraq	Rutba	state (military)	6. cause currently undetermined or unrecorded	—	3	16
19.09.2003	Afghanistan	Bagram	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	10
19.09.2003	Afghanistan	Mehtar Lam	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	9	0
10.10.2003	Ukraine	Artemovsk, [region no.] 14	n/a	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	0	2
03.11.2003	China	—	n/a	6. cause currently undetermined or unrecorded	—	9	6
—.—.2003	Mozambique	Beira	state (military)	6. cause currently undetermined or unrecorded	—	5	n/a
—.—.2003	South Sudan	Wau	—	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
2004							
30.01.2004	Afghanistan	Ghazni	state (military)	6. cause currently undetermined or unrecorded	—	7	3
01.02.2004	Iraq	—	state (military)	5. poor security	5.1. criminal/deliberate act	20	0
19.02.2004	India	Amritsar	state (police)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	30
25.02.2004	Philippines	Quezon City	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	4
—.02.2004	North Korea	Seonggang	n/a	6. cause currently undetermined or unrecorded	—	1,000	n/a
—.02.2004	Paraguay	Asuncion	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
09.04.2004	Vietnam	Ho Chi Minh City	n/a	6. cause currently undetermined or unrecorded	—	1	10
28.04.2004	Iraq	Kirkuk	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	0	0
02.05.2004	Iraq	Kirkuk	state (other)	5. poor security	5.1. criminal/deliberate act	0	0
06.05.2004	Ukraine	Novobogdanovka, [region no.] 23	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	5	85
08.06.2004	Iraq	Kufa	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	2	9
26.06.2004	Ecuador	Riobamba	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
09.07.2004	India	Kamla Nagar	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	2
11.07.2004	Afghanistan	Herat	n/a	5. poor security	5.1. criminal/deliberate act	5	34
22.07.2004	China	Jinmen	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	0	0
27.07.2004	Afghanistan	Bagrami	state (military)	5. poor security	5.1. criminal/deliberate act	0	0
26.08.2004	India	Charbatia	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	n/a	n/a

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Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
12.09.2004	North Korea	Ryanggang	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
18.09.2004	France	Vimy	n/a	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
13.10.2004	United States	Milan, Tennessee	state (military)	3. handling errors and inappropriate working practices	3.2 Inappropriate work practices	2	1
20.10.2004	South Africa	—	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	2	n/a
06.11.2004	China	Chishan	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	0
07.12.2004	Russian Federation	Achkhoi-Martan, CHA	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	3
29.12.2004	China	Jinmen	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
—.—.2004	Tanzania	Gongo la Mboto	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
2005							
09.01.2005	Iraq	Suwayrah	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	8	11
—.01.2005	Mozambique	Beira	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
13.02.2005	Lebanon	Majadel	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
23.02.2005	South Sudan	Juba	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	27	75
24.02.2005	Nigeria	Kaduna	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	4	44
04.03.2005	Côte d'Ivoire	Abidjan	foreign (intervention)	3. handling errors and inappropriate working practices	3.5. suspected	2	1
31.03.2005	Cambodia	Andong Chen	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	6	20
01.04.2005	Lebanon	Majadel	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
10.04.2005	Italy	Baiano di Spoleto	state (military)	6. cause currently undetermined or unrecorded	—	0	5
02.05.2005	Afghanistan	Bajgah	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	30	70
06.05.2005	Ukraine	Tsvitokha, [region no.] 68	n/a	6. cause currently undetermined or unrecorded	—	9	11
17.05.2005	Russian Federation	Kronstadt Kotlin Island, SPB	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	6
18.05.2005	Guatemala	Guatemala City	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
20.06.2005	France	Vimy	state (police)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
22.06.2005	China	Taiyuan	state (police)	6. cause currently undetermined or unrecorded	—	n/a	336
25.06.2005	Afghanistan	Rustaq	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	2	20
23.07.2005	Ukraine	Novobogdanovka, [region no.] 23	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	1
25.08.2005	Somalia	Oodweyne	non-state (armed group)	6. cause currently undetermined or unrecorded	—	0	0
09.09.2005	China	Mazu Liedao	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
12.09.2005	Philippines	Taguig	state (police)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	107
30.09.2005	Russian Federation	Yuzhnaya Koriakiya, KAM	state (military)	5. poor security	5.1. criminal/deliberate act	1	0
25.11.2005	DRC	Walikale	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	6	0
08.12.2005	Pakistan	Jandola	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	12	50

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
2006							
28.01.2006	Kenya	Nairobi	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
07.02.2006	Pakistan	Dera Bugti	non-state (armed group)	2. inappropriate storage systems and infrastructure	2.3. suspected	3	0
23.03.2006	Afghanistan	Jabal-os-Saraj	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	60
28.04.2006	Russian Federation	Sergiyev Posad, MOS	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	0
30.04.2006	Kuwait	Al Nuwaiseeb	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
06.05.2006	Albania	Tepelena	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	3
10.05.2006	China	Taipei	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	2	10
20.05.2006	South Sudan	Juba	state (other)	5. poor security	5.1. criminal/deliberate act	2	10
29.05.2006	Serbia	Baric	state (other)	6. cause currently undetermined or unrecorded	—	3	1
05.06.2006	Turkey	Pamukova	state (military)	4. failure to take into account external, environmental influences and events	4.3. other	1	2
09.06.2006	Yemen	Khormaksar	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	3	2
14.06.2006	France	Bellerive-sur-Allier	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
05.07.2006	United States	Herndon, WV	non-state (company)	6. cause currently undetermined or unrecorded	—	n/a	n/a
08.07.2006	Montenegro	Vir	non-state (company)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	50
15.07.2006	United States	Doyline, LA	non-state (company)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
01.08.2006	Sri Lanka	Kalutura	state (military)	6. cause currently undetermined or unrecorded	—	0	0
10.08.2006	Sri Lanka	Allai-Kantalai	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	35	0
19.08.2006	Ukraine	Novobogdanovka, [region no.] 23	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	0	4
07.09.2006	Finland	Niinisalo	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
10.10.2006	Iraq	Baghdad	foreign (intervention)	5. poor security	5.1. criminal/deliberate act	0	0
19.10.2006	Serbia	Paracin	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	23
06.12.2006	Mozambique	Beira	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	5	0
2007							
02.01.2007	Brazil	São Paulo	state (police)	6. cause currently undetermined or unrecorded	—	1	5
29.01.2007	Mozambique	Malhazine	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	3
02.03.2007	Slovakia	Nováky	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	8	45
22.03.2007	Mozambique	Malhazine	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	107	515
07.04.2007	Sudan	Khartoum	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	7
18.04.2007	France	Ressaincourt	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	1
23.04.2007	Thailand	Muang	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0

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Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
16.05.2007	United States	Milan, TN	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	2	1
18.05.2007	Israel	Ramat HaSharon	state (other)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
18.05.2007	Ukraine	Novobogdanovka, [region no.] 23	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	1
31.05.2007	Yemen	Sana'a	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	n/a	n/a
11.06.2007	Yemen	Sana'a	n/a	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
17.06.2007	DRC	Mbandaka	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	3	52
23.06.2007	Mozambique	Maputo	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	5	11
29.06.2007	India	Bhadravathi	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
30.06.2007	Yemen	Noqum	n/a	4. failure to take into account external, environmental influences and events	4.3. other	0	0
15.07.2007	Colombia	Leticia	state (military)	6. cause currently undetermined or unrecorded	—	0	0
26.07.2007	Syria	Aleppo	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	15	50
11.08.2007	India	Srinagar	state (military)	6. cause currently undetermined or unrecorded	—	18	25
24.08.2007	Serbia	Paracin	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
30.08.2007	Mexico	San Antonio de Las Palmas	n/a	6. cause currently undetermined or unrecorded	—	2	4
20.09.2007	Vietnam	Minh Son	state (military)	6. cause currently undetermined or unrecorded	—	3	4
13.11.2007	Iran	Parchin	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	4
29.12.2007	Colombia	Medellin	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	8
31.12.2007	China	Shinsheh	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	1
2008							
25.02.2008	Iran	Tabiz	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
15.03.2008	Albania	Gërdec	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	26	300
—.03.2008	South Sudan	Kegulu	non-state (armed group)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
11.04.2008	Iran	Shiraz	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	12	n/a
11.04.2008	Ukraine	Lozovaya, [region no.] 63	state (military)	6. cause currently undetermined or unrecorded	—	0	3
23.05.2008	Russian Federation	Lodeinoye Pole, SPB	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	0	0
27.05.2008	Poland	Gliwice	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
07.06.2008	China	Jinmen	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
17.06.2008	Germany	Hunxe	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	n/a
03.07.2008	Bulgaria	Chelopechene	state (military)	6. cause currently undetermined or unrecorded	—	0	1
09.07.2008	Uzbekistan	Kagan	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	7	30
02.08.2008	Mexico	Indaparapeo	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
10.08.2008	Bulgaria	Kazanlak	non-state (company)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
10.08.2008	Pakistan	Quetta	state (police)	2. inappropriate storage systems and infrastructure	2.3. suspected	1	3
23.08.2008	Georgia	Tskhinvali	foreign (intervention)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
27.08.2008	Ukraine	Lozovaya, [region no.] 63	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	3	2
30.08.2008	India	Bandipora	state (police)	6. cause currently undetermined or unrecorded	—	0	0
01.09.2008	Mozambique	Beira	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
30.09.2008	Russian Federation	Fokino, PRI	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
20.10.2008	India	Khundru	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	3
31.10.2008	Philippines	Datu Odin Sinsuat	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
04.12.2008	India	Gandhidamn	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	2	6
27.12.2008	Iran	Zarin-Shrar	state (military)	6. cause currently undetermined or unrecorded	—	8	n/a
—.—.2008	Congo	Pointe Noire	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
2009							
06.01.2009	Albania	Polican	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	1
18.02.2009	Brazil	São José dos Campos	state (military)	6. cause currently undetermined or unrecorded	—	0	1
08.03.2009	Georgia	Akhalgori	foreign (intervention)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
17.03.2009	Nigeria	Lagos	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	0
19.03.2009	Kazakhstan	Arys, SOK	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	17
29.04.2009	Tanzania	Dar es Salaam	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	26	700
17.05.2009	Egypt	Ismailia	state (military)	6. cause currently undetermined or unrecorded	—	0	n/a
24.05.2009	United States	Owensville, OH	non-state (company)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
27.05.2009	Mozambique	Maringue	non-state (armed group)	6. cause currently undetermined or unrecorded	—	0	1
06.06.2009	Sri Lanka	Jaffna	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
08.06.2009	Kazakhstan	Almaty, ALT	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	n/a
09.06.2009	Sri Lanka	Vavuniya	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
22.06.2009	Afghanistan	Behsud	foreign (intervention)	6. cause currently undetermined or unrecorded	—	4	17
22.06.2009	Afghanistan	Jalalabad	state (military)	6. cause currently undetermined or unrecorded	—	1	20
28.06.2009	Cambodia	Ta Khmau	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	2
06.07.2009	Ecuador	Sangolqui	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
13.07.2009	Turkey	Yüksekova	state (military)	6. cause currently undetermined or unrecorded	—	4	0
14.07.2009	Lebanon	Khirbet Silim	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
03.09.2009	Serbia	Užice	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	7	15

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
14.09.2009	Russian Federation	Karabash, CHE	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	1	2
25.09.2009	China	Hulunbeier	state (police)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	3	7
25.09.2009	Iraq	Baashika	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	15	n/a
04.10.2009	Sri Lanka	Kilinochchi	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
11.10.2009	Lebanon	Tayr Filsi	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	5	n/a
15.10.2009	Indonesia	South Sumatra	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
13.11.2009	Russian Federation	Ulyanovsk, ULY	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	10	60
23.11.2009	Russian Federation	Ulyanovsk, ULY	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	8	2
31.12.2009	India	Jalandhar	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	2	2
—.—.2009	Congo	Brazzaville	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
—.—.2009	DRC	Goma	n/a	6. cause currently undetermined or unrecorded	—	n/a	1
—.—.2009	DRC	Kananga	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
—.—.2009	Tajikistan	—	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	n/a
2010							
20.01.2010	Iran	Bandar Abbas	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	3
03.02.2010	Bulgaria	Gorni Lom	non-state (company)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	4
19.02.2010	Russian Federation	Ulyanovsk, ULY	state (military)	6. cause currently undetermined or unrecorded	—	1	35
02.03.2010	Yemen	Taiz	non-state (private)	5. poor security	5.1. criminal/deliberate act	19	15
07.03.2010	Montenegro	Niksic	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	3
13.03.2010	Ukraine	Hruzevystsya, [region no.] 68	state (other)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	1
26.03.2010	India	Panagarh	state (military)	6. cause currently undetermined or unrecorded	—	0	0
10.05.2010	Serbia	Valjevo	non-state (company)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	2
11.05.2010	Tanzania	Mbagala	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	3	150
12.05.2010	Lebanon	Al Tayri	foreign (peacekeeping)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	11
17.05.2010	Bulgaria	Sofia	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
24.05.2010	Pakistan	Bara Tehsil	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	0
23.06.2010	Russian Federation	Ryazan, RYA	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	30
01.07.2010	Russian Federation	Ulyanovsk, ULY	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	2
03.07.2010	Russian Federation	Verkh-Katunskoye, ALT	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	0
04.07.2010	China	Li Shui	state (police)	6. cause currently undetermined or unrecorded	—	0	3
24.08.2010	Russian Federation	Sterlitamak, BAS	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	0

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
01.09.2010	United States	Johnson City, TN	non-state (company)	6. cause currently undetermined or unrecorded	—	0	0
03.09.2010	Lebanon	Shehabiyya	non-state (armed group)	6. cause currently undetermined or unrecorded	—	n/a	n/a
07.09.2010	Belgium	Seneffe	non-state (company)	6. cause currently undetermined or unrecorded	—	n/a	n/a
10.09.2010	Sri Lanka	Vavuniya	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	3
17.09.2010	Sri Lanka	Karadiyana	state (police)	3. handling errors and inappropriate working practices	3.1. mechanical damage	27	52
13.10.2010	Iran	Khorramabad	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	18	14
20.10.2010	Palestinian Territories	Rafah	non-state (armed group)	6. cause currently undetermined or unrecorded	—	12	n/a
22.10.2010	Kazakhstan	Zhambyl, ZHA	state (military)	6. cause currently undetermined or unrecorded	—	0	0
28.10.2010	Russian Federation	Khabarovsk, KHA	state (military)	2. inappropriate storage systems and infrastructure	2.1. falling objects	0	1
20.11.2010	India	Binnaguri	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
27.12.2010	Serbia	Čačak	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	0
—.—.2010	Congo	Brazzaville	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
—.—.2010	DRC	Mbandaka	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
—.—.2010	Laos	Seno	state (military)	6. cause currently undetermined or unrecorded	—	8	n/a
2011							
05.01.2011	Côte d'Ivoire	Séguéla	non-state (armed group)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	2
30.01.2011	Venezuela	Maracay	state (other)	2. inappropriate storage systems and infrastructure	2.3. suspected	1	40
16.02.2011	Tanzania	Gongo la Mboto	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	27	500
04.03.2011	Libya	Ar-Rajma	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	27	20
05.03.2011	Cuba	Santiago de Las Vegas	state (military)	6. cause currently undetermined or unrecorded	—	0	0
27.03.2011	Yemen	Ja'ar	state (military)	5. poor security	5.1. criminal/deliberate act	150	150
06.04.2011	Russian Federation	Kadinka, LIP	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	4	1
11.04.2011	Russian Federation	Ashuluk, AST	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	n/a
25.04.2011	Pakistan	Peshawar	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	14
27.04.2011	Albania	Polican	state (military)	6. cause currently undetermined or unrecorded	—	1	3
26.05.2011	Russian Federation	Urman, BAS	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	12
26.05.2011	Ukraine	Shostka, [region no.] 59	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	1
26.05.2011	Yemen	Sana'a	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	28	n/a
02.06.2011	Russian Federation	Pugachevo, UDM	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	95
15.06.2011	Germany	Priort	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	1
29.06.2011	Libya	Benghazi	non-state (armed group)	6. cause currently undetermined or unrecorded	—	0	0
01.07.2011	Belgium	Jéhonville	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	2

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
04.07.2011	Russian Federation	Pugachevo, UDM	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	100
07.07.2011	Turkmenistan	Abadan	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	100	1,328
11.07.2011	Cyprus	Mari	state (military)	1. lack of surveillance leading to ammunition deterioration	1.3. chemical deterioration	13	62
11.07.2011	Pakistan	Islamabad	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	1	3
12.07.2011	Russian Federation	Snegovaia Pad, PRI	state (military)	5. poor security	5.1. criminal/deliberate act	7	12
24.08.2011	Côte d'Ivoire	Daloa	state (military)	6. cause currently undetermined or unrecorded	—	2	4
14.09.2011	Croatia	Paðene	state (police)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
19.09.2011	Vietnam	Da Nang	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	10
24.09.2011	Libya	Tripoli	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
26.09.2011	Sri Lanka	Weerawila	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	1
07.10.2011	DRC	Kibomango	n/a	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
17.10.2011	Russian Federation	—	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	2
12.11.2011	Azerbaijan	Bolsulu	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	0
12.11.2011	Bulgaria	Lovnidol	non-state (company)	5. poor security	5.1. criminal/deliberate act	0	0
12.11.2011	Iran	Bidganeh	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	27	16
23.11.2011	Lebanon	Siddiqine	non-state (armed group)	6. cause currently undetermined or unrecorded	—	n/a	n/a
27.11.2011	DRC	Lubumbashi	n/a	5. poor security	5.1. criminal/deliberate act	n/a	n/a
06.12.2011	Libya	Tripoli	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	10	n/a
08.12.2011	Ecuador	Quito	state (police)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	14
17.12.2011	Venezuela	La Concepción	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
2012							
02.01.2012	Turkey	Yasiha	state (military)	6. cause currently undetermined or unrecorded	—	4	0
11.01.2012	Bulgaria	Charkovo	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	1
26.01.2012	Thailand	Phayuha Khiri	state (military)	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	0	0
10.02.2012	Lebanon	Tripoli	non-state (armed group)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	3
01.03.2012	Libya	Ad Dafiniya	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	1	1
04.03.2012	Congo	Brazzaville	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	500	3,277
02.05.2012	Russian Federation	Nizhny Novgorod, NIZ	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	3
17.05.2012	United States	Point Pleasant, WV	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
18.05.2012	Russian Federation	Primorsky Krai, PRI	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	n/a	2
25.05.2012	Libya	Sirte	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.3. other	7	n/a
05.06.2012	Bulgaria	Straldzha	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	9

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
11.06.2012	Russian Federation	Koltubanovka, ORE	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	2
26.06.2012	Thailand	Chao Phraya Bodindecha	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	3
09.07.2012	Turkey	Rahmiye	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	4
19.07.2012	Azerbaijan	Baku	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	9
05.09.2012	Turkey	Afyonkarahisar	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	25	7
11.09.2012	Bulgaria	Kazanlak	non-state (company)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
03.10.2012	Lebanon	Baalbek	non-state (armed group)	6. cause currently undetermined or unrecorded	—	3	4
09.10.2012	Russian Federation	Donguz, ORE	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
15.10.2012	United States	Doyline, LA	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
18.10.2012	Yemen	Sana'a	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	0	0
22.10.2012	Yemen	Aden	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	0
30.11.2012	Yemen	Sana'a	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	18
08.12.2012	Syria	Saraqeb	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	13	50
17.12.2012	Lebanon	Tair Harfa	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	3	n/a
20.12.2012	Brazil	Alagoas	state (police)	3. handling errors and inappropriate working practices	3.5. suspected	1	4
2013							
07.02.2013	Yemen	Abs	state (military)	6. cause currently undetermined or unrecorded	—	10	n/a
09.04.2013	Nepal	Pokhara	state (police)	6. cause currently undetermined or unrecorded	—	0	0
13.04.2013	Pakistan	Badaber	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
21.04.2013	Thailand	Bangkok	state (military)	6. cause currently undetermined or unrecorded	—	0	3
29.04.2013	India	Chandipur	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
02.05.2013	Syria	Damascus	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
16.05.2013	Pakistan	Mir Ali Tehsil	non-state (company)	6. cause currently undetermined or unrecorded	—	4	0
18.06.2013	Egypt	Asyut	state (military)	6. cause currently undetermined or unrecorded	—	2	14
18.06.2013	Russian Federation	Chapayevsk, SAM	state (military)	6. cause currently undetermined or unrecorded	—	0	48
19.06.2013	Syria	Latakia	state (military)	6. cause currently undetermined or unrecorded	—	n/a	6
05.07.2013	Syria	Latakia	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
01.08.2013	Syria	Homs	state (military)	5. poor security	5.1. criminal/deliberate act	40	120
15.08.2013	South Sudan	Juba	state (other)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0

n/a = data unavailable or unrecorded

Date	Country	Location	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
20.08.2013	Turkey	Hasandede	state (other)	6. cause currently undetermined or unrecorded	—	0	0
03.09.2013	Turkey	Gazipaşa	non-state (armed group)	3. handling errors and inappropriate working practices	3.5. suspected	6	3
04.09.2013	Syria	Azmarin	non-state (company)	6. cause currently undetermined or unrecorded	—	6	n/a
05.10.2013	Yemen	Sana'a	state (military)	4. failure to take into account external, environmental influences and events	4.3. other	0	0
20.11.2013	India	Nagrota	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	1
28.11.2013	Libya	Brak al-Chati	state (military)	5. poor security	5.1. criminal/deliberate act	40	n/a
09.12.2013	Libya	Brak al-Chati	state (military)	5. poor security	5.1. criminal/deliberate act	10	4
12.12.2013	Afghanistan	Kabul	state (military)	6. cause currently undetermined or unrecorded	—	0	0
16.12.2013	Serbia	Čačak	non-state (company)	5. poor security	5.1. criminal/deliberate act	2	2

n/a = data unavailable or unrecorded

Annexe C. UEMS by country (within regions), 1979–2013

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
AFRICA	Eastern Africa	Burundi		no incident recorded					
		Comoros		no incident recorded					
		Djibouti		no incident recorded					
		Eritrea		no incident recorded					
		Ethiopia	Addis Ababa	04.06.1991	state (military)	5. poor security	5.1. criminal/deliberate act	100	80
		Ethiopia	Addis Ababa	—.—.1990	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Kenya	Nairobi	28.01.2006	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Madagascar		no incident recorded					
		Malawi		no incident recorded					
		Mauritius		no incident recorded					
		Mozambique	Maputo	05.10.1985	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	13	100
		Mozambique	Beira	24.10.2002	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	6	50
		Mozambique	Beira	—.—.2003	state (military)	6. cause currently undetermined or unrecorded	—	5	n/a
		Mozambique	Beira	—.01.2005	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Mozambique	Beira	06.12.2006	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	5	0
		Mozambique	Malhazine	29.01.2007	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	3
		Mozambique	Malhazine	22.03.2007	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	107	515
		Mozambique	Maputo	23.06.2007	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	5	11
		Mozambique	Beira	01.09.2008	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Mozambique	Maringue	27.05.2009	non-state (armed group)	6. cause currently undetermined or unrecorded	—	0	1
		Rwanda		no incident recorded					
		Seychelles		no incident recorded					
		Somalia	Oodweyne	25.08.2005	non-state (armed group)	6. cause currently undetermined or unrecorded	—	0	0
		South Sudan	Wau	—.—.2003	—	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
		South Sudan	Juba	23.02.2005	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	27	75
		South Sudan	Kegulu	—.03.2008	non-state (armed group)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
		South Sudan	Juba	20.05.2006	state (other)	5. poor security	5.1. criminal/deliberate act	2	10
		South Sudan	Juba	15.08.2013	state (other)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Tanzania	Gongo la Mboto	—.—.2004	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Tanzania	Dar es Salaam	29.04.2009	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	26	700

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
AFRICA	Eastern Africa	Tanzania	Mbagala	11.05.2010	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	3	150
		Tanzania	Gongo la Mboto	16.02.2011	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	27	500
		Uganda		no incident recorded					
		Zambia	Kabwe	25.05.1988	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	1	50
		Zimbabwe	Harare	16.08.1981	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	n/a
	Middle Africa	Angola	Luanda	15.10.1992	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
		Angola	Lubango	16.09.1994	state (military)	6. cause currently undetermined or unrecorded	—	2	32
		Angola	Lubango	04.11.1995	state (military)	6. cause currently undetermined or unrecorded	—	0	4
		Angola	Luanda	26.01.1997	state (military)	6. cause currently undetermined or unrecorded	—	9	22
		Angola	Menongue	16.07.2003	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	15
		Cameroon	Yaounde	18.02.2001	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
		Central African Republic		no incident recorded					
		Chad		no incident recorded					
		Congo	Brazzaville	—.—.1998	n/a	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	n/a
		Congo	Pointe Noire	—.—.2008	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Congo	Brazzaville	—.—.2009	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Congo	Brazzaville	—.—.2010	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Congo	Brazzaville	04.03.2012	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	500	3,277
		DRC	Kinshasa	14.04.2000	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	101	200
		DRC	Walikale	25.11.2005	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	6	0
		DRC	Mbandaka	17.06.2007	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	3	52
		DRC	Goma	—.—.2009	n/a	6. cause currently undetermined or unrecorded	—	n/a	1
		DRC	Kananga	—.—.2009	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		DRC	Mbandaka	—.—.2010	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		DRC	Kibomango	07.10.2011	n/a	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
		DRC	Lubumbashi	27.11.2011	n/a	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		Equatorial Guinea		no incident recorded					
		Gabon		no incident recorded					
		São Tomé and Príncipe		no incident recorded					

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
AFRICA	Northern Africa	Algeria		no incident recorded					
		Egypt	Alexandria	21.12.1987	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	6	1,000
		Egypt	Ismailia	17.05.2009	state (military)	6. cause currently undetermined or unrecorded	—	0	n/a
		Egypt	Asyut	18.06.2013	state (military)	6. cause currently undetermined or unrecorded	—	2	14
		Libya	Ar-Rajma	04.03.2011	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	27	20
		Libya	Benghazi	29.06.2011	non-state (armed group)	6. cause currently undetermined or unrecorded	—	0	0
		Libya	Tripoli	24.09.2011	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
		Libya	Tripoli	06.12.2011	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	10	n/a
		Libya	Ad Dafiniya	01.03.2012	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	1	1
		Libya	Sirte	25.05.2012	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.3. other	7	n/a
		Libya	Brak al-Chati	28.11.2013	state (military)	5. poor security	5.1. criminal/deliberate act	40	n/a
		Libya	Brak al-Chati	09.12.2013	state (military)	5. poor security	5.1. criminal/deliberate act	10	4
		Morocco		no incident recorded					
		Sudan	Khartoum	17.07.1998	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
		Sudan	Khartoum	07.04.2007	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	7
		Tunisia		no incident recorded					
	Southern Africa	Botswana		no incident recorded					
		Lesotho		no incident recorded					
		Namibia	Grootfontein	23.10.1988	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	1
		South Africa	—	20.10.2004	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	2	n/a
		Swaziland		no incident recorded					
	Western Africa	Benin		no incident recorded					
		Burkina Faso		no incident recorded					
		Cape Verde		no incident recorded					
		Côte d'Ivoire	Abidjan	04.03.2005	foreign (intervention)	3. handling errors and inappropriate working practices	3.5. suspected	2	1
		Côte d'Ivoire	Séguéla	05.01.2011	non-state (armed group)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	2
		Côte d'Ivoire	Daloa	24.08.2011	state (military)	6. cause currently undetermined or unrecorded	—	2	4
		Gambia		no incident recorded					
		Ghana		no incident recorded					
		Guinea	Conakry	02.03.2001	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	10	n/a
		Guinea	Conakry	05.05.2002	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Guinea-Bissau	Cufar	14.10.1995	n/a	6. cause currently undetermined or unrecorded	—	14	n/a
		Guinea-Bissau	Paiol de Bra	—.06.1998	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
AFRICA	Western Africa	Guinea-Bissau	Cufar	—.—.2000	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	15	n/a
		Liberia	no incident recorded						
		Mali	Kati	12.02.1997	state (military)	6. cause currently undetermined or unrecorded	—	6	n/a
		Mauritania	no incident recorded						
		Niger	no incident recorded						
		Nigeria	Lagos	27.01.2002	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	1,500	5,000
		Nigeria	Kaduna	24.02.2005	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	4	44
		Nigeria	Lagos	17.03.2009	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	0
		Senegal	no incident recorded						
		Sierra Leone	Tongoma	05.01.2002	foreign (peacekeeping)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	13
		Togo	no incident recorded						
AMERICAS	Caribbean	Antigua and Barbuda	no incident recorded						
		Bahamas	no incident recorded						
		Barbados	no incident recorded						
		Cuba	Santiago de Las Vegas	05.03.2011	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		Dominica	no incident recorded						
		Dominican Republic	San Cristobal	03.10.2000	n/a	6. cause currently undetermined or unrecorded	—	1	n/a
		Grenada	no incident recorded						
		Haiti	no incident recorded						
		Jamaica	no incident recorded						
		Saint Kitts and Nevis	no incident recorded						
		Saint Lucia	no incident recorded						
		Saint Vincent and the Grenadines	no incident recorded						
		Trinidad and Tobago	Chaguaramas	26.04.1988	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	6	20
	Central America	Belize	no incident recorded						
		Costa Rica	no incident recorded						
		El Salvador	Ilopango	16.09.1990	state (police)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		El Salvador	San Salvador	10.05.2000	state (military)	1. lack of surveillance leading to ammunition deterioration	1.3. chemical deterioration	60	65
		Guatemala	Guatemala City	18.05.2005	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Honduras	Naco	—.—.1993	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	n/a	n/a
		Mexico	San Antonio de Las Palmas	30.08.2007	n/a	6. cause currently undetermined or unrecorded	—	2	4

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
AMERICAS	Central America	Mexico	Indaparapeo	02.08.2008	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Nicaragua	Managua	15.04.1990	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
		Nicaragua	Managua	12.11.2002	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	5	5
		Panama	no incident recorded						
	Northern America	Canada	Winnipeg	—.—.1997	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	0
		United States	Independence, MO	13.09.1984	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		United States	—, MT	11.11.1984	n/a	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		United States	Independence, MO	11.11.1984	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	Richmond, KY	06.06.1985	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	Texarkana, TX	10.10.1987	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	Hawthorne, NV	09.08.1989	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	White Oak, MD	28.06.1992	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	Indian Head, MD	01.09.1994	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	—, MD	07.08.1996	n/a	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		United States	Texarkana, TX	21.08.1996	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		United States	East Camden, AR	29.04.2001	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		United States	Milan, Tennessee	13.10.2004	state (military)	3. handling errors and inappropriate working practices	3.2 Inappropriate work practices	2	1
		United States	Herndon, WV	05.07.2006	non-state (company)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		United States	Doyline, LA	15.07.2006	non-state (company)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
		United States	Milan, TN	16.05.2007	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	2	1
		United States	Owensville, OH	24.05.2009	non-state (company)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		United States	Johnson City, TN	01.09.2010	non-state (company)	6. cause currently undetermined or unrecorded	—	0	0
		United States	Point Pleasant, WV	17.05.2012	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
		United States	Doyline, LA	15.10.2012	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
	South America	Argentina	Cordoba	03.11.1995	state (military)	5. poor security	5.1. criminal/deliberate act	7	300
		Bolivia	no incident recorded						
		Brazil	Paracambi	31.01.1995	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Brazil	Ilha do Boqueirão	16.07.1995	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	23	60
		Brazil	São Paulo	02.01.2007	state (police)	6. cause currently undetermined or unrecorded	—	1	5
		Brazil	São José dos Campos	18.02.2009	state (military)	6. cause currently undetermined or unrecorded	—	0	1
		Brazil	Alagoas	20.12.2012	state (police)	3. handling errors and inappropriate working practices	3.5. suspected	1	4
		Chile	—	15.06.1988	state (military)	5. poor security	5.1. criminal/deliberate act	3	2
		Colombia	Yopal	25.04.2003	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Colombia	Leticia	15.07.2007	state (military)	6. cause currently undetermined or unrecorded	—	0	0

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
AMERICAS	South America	Colombia	Medellin	29.12.2007	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	8
		Ecuador	Amaguaña	04.07.1997	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	3	185
		Ecuador	La Balbina	—.—.1999	state (military)	6. cause currently undetermined or unrecorded	—	5	n/a
		Ecuador	Riobamba	20.11.2002	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	10	538
		Ecuador	Guayaquil	23.03.2003	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	1	28
		Ecuador	Riobamba	26.06.2004	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
		Ecuador	Sangolqui	06.07.2009	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		Ecuador	Quito	08.12.2011	state (police)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	14
		Guyana	Georgetown	18.12.2000	state (military)	6. cause currently undetermined or unrecorded	—	3	11
		Paraguay	Asuncion	—.02.2004	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Peru	Piura	09.06.1997	state (military)	6. cause currently undetermined or unrecorded	—	0	6
		Peru	Tumbes	23.01.2003	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	7	98
		Suriname	no incident recorded						
		Uruguay	no incident recorded						
		Venezuela	Maracay	30.01.2011	state (other)	2. inappropriate storage systems and infrastructure	2.3. suspected	1	40
		Venezuela	La Concepción	17.12.2011	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
ASIA	Central Asia	Kazakhstan	Balkhash, KAR	08.08.2001	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		Kazakhstan	Almaty, ALT	06.09.2001	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Kazakhstan	Arys, SOK	19.03.2009	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	17
		Kazakhstan	Almaty, ALT	08.06.2009	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	n/a
		Kazakhstan	Zhambyl, ZHA	22.10.2010	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		Kyrgyztan	no incident recorded						
		Tajikistan	—	—.—.2009	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	n/a
		Turkmenistan	Abadan	07.07.2011	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	100	1,328
		Uzbekistan	Kagan	09.07.2008	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	7	30
	Eastern Asia	China	Chiayi	—.—.1984	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	n/a	n/a
		China	Chiayi	—.—.1994	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	n/a	n/a
		China	Beijing	14.04.1995	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		China	Wangjiabao	04.04.1999	state (military)	3. handling errors and inappropriate working practices	3.3. tampering	100	n/a
		China	—	03.11.2003	n/a	6. cause currently undetermined or unrecorded	—	9	6
		China	Jinmen	22.07.2004	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	0	0
		China	Chishan	06.11.2004	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	0
		China	Jinmen	29.12.2004	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		China	Taiyuan	22.06.2005	state (police)	6. cause currently undetermined or unrecorded	—	n/a	336

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	Eastern Asia	China	Mazu Liedao	09.09.2005	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
		China	Taipei	10.05.2006	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	2	10
		China	Shinsheh	31.12.2007	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	1
		China	Jinmen	07.06.2008	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		China	Hulunbeier	25.09.2009	state (police)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	3	7
		China	Li Shui	04.07.2010	state (police)	6. cause currently undetermined or unrecorded	—	0	3
		Japan		no incident recorded					
		Mongolia		no incident recorded					
		North Korea	Pyongyang	31.10.1991	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	120	n/a
		North Korea	Ryanggang	12.09.2004	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		North Korea	Seonggang	—.02.2004	n/a	6. cause currently undetermined or unrecorded	—	1,000	n/a
	South-Eastern Asia	Brunei Darussalam		no incident recorded					
		Cambodia	Ream	29.08.1999	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Cambodia	—	—.—.2000	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	n/a	n/a
		Cambodia	Andong Chen	31.03.2005	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	6	20
		Cambodia	Ta Khmau	28.06.2009	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	2
		Indonesia	Jakarta	29.10.1984	state (military)	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	15	200
		Indonesia	South Sumatra	15.10.2009	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Laos	Seno	—.—.2010	state (military)	6. cause currently undetermined or unrecorded	—	8	n/a
		Malaysia	—	31.07.1998	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
		Myanmar		no incident recorded					
		Philippines	Zamboanga City	20.06.1995	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	1	34
		Philippines	Tarlac City	01.12.1998	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		Philippines	Quezon City	25.02.2004	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	4
		Philippines	Taguig	12.09.2005	state (police)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	107
		Philippines	Datu Odin Sinsuat	31.10.2008	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	0
		Singapore	—	04.09.1992	state (military)	1. lack of surveillance leading to ammunition deterioration	1.3. chemical deterioration	n/a	n/a
		Thailand	Bangkok	16.11.1980	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	54	353
		Thailand	Bangkok	11.11.1987	state (military)	6. cause currently undetermined or unrecorded	—	10	n/a
		Thailand	Bangkok	—.03.2001	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	0
		Thailand	Korat	11.07.2001	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	2	70
		Thailand	Korat	25.10.2001	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	19	90
		Thailand	Korat	29.01.2002	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	11	n/a
		Thailand	Aranyaprathet	28.03.2002	state (military)	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	0	5

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	South-Eastern Asia	Thailand	Muang	23.04.2007	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		Thailand	Phayuha Khiri	26.01.2012	state (military)	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	0	0
		Thailand	Chao Phraya Bodindecha	26.06.2012	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	3
		Thailand	Bangkok	21.04.2013	state (military)	6. cause currently undetermined or unrecorded	—	0	3
		Timor-Leste	no incident recorded						
		Vietnam	Ho Chi Minh City	24.10.1988	state (other)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		Vietnam	Ho Chi Minh City	19.05.1997	state (military)	6. cause currently undetermined or unrecorded	—	2	40
		Vietnam	Thuy Hoa Vien	08.06.2001	state (military)	6. cause currently undetermined or unrecorded	—	0	4
		Vietnam	Thay Nguyen	05.05.2003	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	2	31
		Vietnam	Ho Chi Minh City	09.04.2004	n/a	6. cause currently undetermined or unrecorded	—	1	10
		Vietnam	Minh Son	20.09.2007	state (military)	6. cause currently undetermined or unrecorded	—	3	4
		Vietnam	Da Nang	19.09.2011	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	10
	Southern Asia	Afghanistan	Kabul	26.08.1986	foreign (other)	5. poor security	5.1. criminal/deliberate act	0	0
		Afghanistan	Kabul	—.08.1991	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		Afghanistan	Kabul	15.02.1996	n/a	6. cause currently undetermined or unrecorded	—	60	125
		Afghanistan	Kabul	24.12.1996	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	1	8
		Afghanistan	Jalalabad	19.03.1997	non-state (armed group)	6. cause currently undetermined or unrecorded	—	30	128
		Afghanistan	Kabul	15.02.1999	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	0
		Afghanistan	Kabul	05.05.1999	non-state (armed group)	6. cause currently undetermined or unrecorded	—	1	8
		Afghanistan	Mazār-e Sharīf	09.10.1999	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	7	47
		Afghanistan	Kabul	26.05.2000	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.3. other	0	0
		Afghanistan	Darulaman	11.07.2001	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	3
		Afghanistan	Kandahar	07.03.2002	foreign (intervention)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
		Afghanistan	Spin Boldak	27.06.2002	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	32	70
		Afghanistan	Spin Boldak	08.07.2002	n/a	6. cause currently undetermined or unrecorded	—	n/a	2
		Afghanistan	Spin Boldak	05.08.2002	n/a	6. cause currently undetermined or unrecorded	—	0	2
		Afghanistan	Jalalabad	10.08.2002	non-state (company)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	26	90
		Afghanistan	Tokhichi	15.03.2003	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	1	3
		Afghanistan	Aqcha	03.08.2003	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	25	9
		Afghanistan	Bagram	19.09.2003	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	10
		Afghanistan	Mehtar Lam	19.09.2003	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	9	0
		Afghanistan	Ghazni	30.01.2004	state (military)	6. cause currently undetermined or unrecorded	—	7	3
		Afghanistan	Herat	11.07.2004	n/a	5. poor security	5.1. criminal/deliberate act	5	34

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	Southern Asia	Afghanistan	Bagrami	27.07.2004	state (military)	5. poor security	5.1. criminal/deliberate act	0	0
		Afghanistan	Bajgah	02.05.2005	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	30	70
		Afghanistan	Rustaq	25.06.2005	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	2	20
		Afghanistan	Jabal-os-Saraj	23.03.2006	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	60
		Afghanistan	Behsud	22.06.2009	foreign (intervention)	6. cause currently undetermined or unrecorded	—	4	17
		Afghanistan	Jalalabad	22.06.2009	state (military)	6. cause currently undetermined or unrecorded	—	1	20
		Afghanistan	Kabul	12.12.2013	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		Bangladesh		no incident recorded					
		Bhutan		no incident recorded					
		India	Pulgaon	09.05.1989	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	3	15
		India	Leh	23.05.1993	state (military)	6. cause currently undetermined or unrecorded	—	18	9
		India	Srinagar	—.—.1993	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		India	Balasore	10.11.1998	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		India	—, Kashmir	—.—.1999	n/a	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		India	Bharatpur	28.04.2000	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	5	10
		India	Pathankot	29.04.2001	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	0
		India	Suratgarh	24.05.2001	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	1	5
		India	Ganganar-Bikaner	11.01.2002	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	12
		India	Jodhpur	01.06.2003	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		India	Amritsar	19.02.2004	state (police)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	30
		India	Kamla Nagar	09.07.2004	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	2
		India	Charbatia	26.08.2004	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	n/a	n/a
		India	Bhadravathi	29.06.2007	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
		India	Srinagar	11.08.2007	state (military)	6. cause currently undetermined or unrecorded	—	18	25
		India	Bandipora	30.08.2008	state (police)	6. cause currently undetermined or unrecorded	—	0	0
		India	Khundru	20.10.2008	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	3
		India	Gandhidamn	04.12.2008	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	2	6
		India	Jalandhar	31.12.2009	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	2	2
		India	Panagarh	26.03.2010	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		India	Binnaguri	20.11.2010	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		India	Chandipur	29.04.2013	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
		India	Nagrota	20.11.2013	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	1
		Iran	Tehran	27.12.1986	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Iran	Tehran	02.06.1998	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a

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Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	Southern Asia	Iran	Mashhad	24.10.2000	state (military)	6. cause currently undetermined or unrecorded	—	8	10
		Iran	Parchin	13.11.2007	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	0	4
		Iran	Tabiz	25.02.2008	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Iran	Shiraz	11.04.2008	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	12	n/a
		Iran	Zarin-Shrar	27.12.2008	state (military)	6. cause currently undetermined or unrecorded	—	8	n/a
		Iran	Bandar Abbas	20.01.2010	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	3
		Iran	Khorramabad	13.10.2010	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	18	14
		Iran	Bidganeh	12.11.2011	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	27	16
		Maldives		no incident recorded					
		Nepal	Pokhara	09.04.2013	state (police)	6. cause currently undetermined or unrecorded	—	0	0
		Pakistan	Rawalpindi	10.04.1988	state (military)	5. poor security	5.1. criminal/deliberate act	93	1,100
		Pakistan	Gharam Chashma	15.11.1989	non-state (armed group)	6. cause currently undetermined or unrecorded	—	40	8
		Pakistan	Nowshera	31.05.1991	state (military)	6. cause currently undetermined or unrecorded	—	18	50
		Pakistan	Spin Tangi	05.04.1993	non-state (armed group)	6. cause currently undetermined or unrecorded	—	8	n/a
		Pakistan	—	30.06.2003	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	2	3
		Pakistan	Jandola	08.12.2005	non-state (armed group)	3. handling errors and inappropriate working practices	3.1. mechanical damage	12	50
		Pakistan	Dera Bugti	07.02.2006	non-state (armed group)	2. inappropriate storage systems and infrastructure	2.3. suspected	3	0
		Pakistan	Quetta	10.08.2008	state (police)	2. inappropriate storage systems and infrastructure	2.3. suspected	1	3
		Pakistan	Bara Tehsil	24.05.2010	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	0	0
		Pakistan	Peshawar	25.04.2011	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	14
		Pakistan	Islamabad	11.07.2011	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	1	3
		Pakistan	Badaber	13.04.2013	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Pakistan	Mir Ali Tehsil	16.05.2013	non-state (company)	6. cause currently undetermined or unrecorded	—	4	0
		Sri Lanka	Vavuniya	04.05.1998	state (police)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	n/a
		Sri Lanka	—	13.07.1999	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Sri Lanka	Kankesanturai	08.03.2002	n/a	1. lack of surveillance leading to ammunition deterioration	1.2. mechanical deterioration	0	0
		Sri Lanka	Kalutura	01.08.2006	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		Sri Lanka	Allai-Kantalai	10.08.2006	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	35	0
		Sri Lanka	Jaffna	06.06.2009	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
		Sri Lanka	Vavuniya	09.06.2009	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
		Sri Lanka	Kilinochchi	04.10.2009	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Sri Lanka	Vavuniya	10.09.2010	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	3
		Sri Lanka	Karadiyana	17.09.2010	state (police)	3. handling errors and inappropriate working practices	3.1. mechanical damage	27	52
		Sri Lanka	Weerawila	26.09.2011	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	1

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	Western Asia	Armenia	Yerevan	08.04.1992	state (military)	6. cause currently undetermined or unrecorded	—	n/a	7
		Azerbaijan	Baku	—.—.1991	state (other)	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	3
		Azerbaijan	Gyuzdek	21.08.1992	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	3
		Azerbaijan	Bolsulu	12.11.2011	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	0
		Azerbaijan	Baku	19.07.2012	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	9
		Bahrain		no incident recorded					
		Cyprus	Mari	11.07.2011	state (military)	1. lack of surveillance leading to ammunition deterioration	1.3. chemical deterioration	13	62
		Georgia	Osiauri	27.06.1996	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		Georgia	Tskhinvali	23.08.2008	foreign (intervention)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
		Georgia	Akhalgori	08.03.2009	foreign (intervention)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		Iraq	Baghdad	19.10.1992	state (military)	6. cause currently undetermined or unrecorded	—	3	27
		Iraq	Baghdad	14.04.2003	n/a	6. cause currently undetermined or unrecorded	—	17	n/a
		Iraq	Baghdad	26.04.2003	state (other)	5. poor security	5.1. criminal/deliberate act	10	51
		Iraq	Dibis	—.04.2003	n/a	6. cause currently undetermined or unrecorded	—	17	n/a
		Iraq	Mosul	22.05.2003	n/a	2. inappropriate storage systems and infrastructure	2.3. suspected	1	1
		Iraq	Diwaniyah	09.06.2003	state (military)	6. cause currently undetermined or unrecorded	—	3	2
		Iraq	Karbala	09.06.2003	foreign (intervention)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		Iraq	Najaf	22.06.2003	state (military)	5. poor security	5.1. criminal/deliberate act	40	0
		Iraq	Haditha	28.06.2003	state (military)	5. poor security	5.1. criminal/deliberate act	30	6
		Iraq	Fallujah	30.06.2003	n/a	3. handling errors and inappropriate working practices	3.1. mechanical damage	5	4
		Iraq	Tikrit	17.08.2003	state (military)	5. poor security	5.1. criminal/deliberate act	12	0
		Iraq	Rutba	04.09.2003	state (military)	6. cause currently undetermined or unrecorded	—	3	16
		Iraq	—	01.02.2004	state (military)	5. poor security	5.1. criminal/deliberate act	20	0
		Iraq	Kirkuk	28.04.2004	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	0	0
		Iraq	Kirkuk	02.05.2004	state (other)	5. poor security	5.1. criminal/deliberate act	0	0
		Iraq	Kufa	08.06.2004	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	2	9
		Iraq	Suwayrah	09.01.2005	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	8	11
		Iraq	Baghdad	10.10.2006	foreign (intervention)	5. poor security	5.1. criminal/deliberate act	0	0
		Iraq	Baashika	25.09.2009	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	15	n/a
		Israel	Ramat HaSharon	18.05.2007	state (other)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Jordan		no incident recorded					
		Kuwait	Doha	11.07.1991	foreign (other)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	56
		Kuwait	Al Nuwaiseeb	30.04.2006	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Lebanon	Majadel	13.02.2005	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	Western Asia	Lebanon	Majadel	01.04.2005	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		Lebanon	Khirbet Silim	14.07.2009	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
		Lebanon	Tayr Filsi	11.10.2009	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	5	n/a
		Lebanon	Al Tayri	12.05.2010	foreign (peacekeeping)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	11
		Lebanon	Shehabiyya	03.09.2010	non-state (armed group)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Lebanon	Siddiqine	23.11.2011	non-state (armed group)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Lebanon	Tripoli	10.02.2012	non-state (armed group)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	3
		Lebanon	Baalbek	03.10.2012	non-state (armed group)	6. cause currently undetermined or unrecorded	—	3	4
		Lebanon	Tair Harfa	17.12.2012	non-state (armed group)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	3	n/a
		Oman		no incident recorded					
		Qatar		no incident recorded					
		Saudi Arabia	Phakran	25.06.1996	n/a	6. cause currently undetermined or unrecorded	—	19	0
		Syria	Aleppo	26.07.2007	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	15	50
		Syria	Saraqeb	08.12.2012	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.4. suspected	13	50
		Syria	Damascus	02.05.2013	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		Syria	Latakia	19.06.2013	state (military)	6. cause currently undetermined or unrecorded	—	n/a	6
		Syria	Latakia	05.07.2013	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		Syria	Homs	01.08.2013	state (military)	5. poor security	5.1. criminal/deliberate act	40	120
		Syria	Azmarin	04.09.2013	non-state (company)	6. cause currently undetermined or unrecorded	—	6	n/a
		Turkey	Kirikkale	18.06.1986	state (military)	6. cause currently undetermined or unrecorded	—	n/a	20
		Turkey	Erzurum	28.04.1987	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	7	7
		Turkey	Gölcük	14.08.1989	non-state (armed group)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	3	4
		Turkey	Pamukova	28.07.1995	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Turkey	Pamukova	05.06.2006	state (military)	4. failure to take into account external, environmental influences and events	4.3. other	1	2
		Turkey	Yüksekova	13.07.2009	state (military)	6. cause currently undetermined or unrecorded	—	4	0
		Turkey	Yasiha	02.01.2012	state (military)	6. cause currently undetermined or unrecorded	—	4	0
		Turkey	Rahmiye	09.07.2012	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	4
		Turkey	Afyonkarahisar	05.09.2012	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	25	7
		Turkey	Hasandede	20.08.2013	state (other)	6. cause currently undetermined or unrecorded	—	0	0
		Turkey	Gazipaşa	03.09.2013	non-state (armed group)	3. handling errors and inappropriate working practices	3.5. suspected	6	3
		United Arab Emirates		no incident recorded					
		Yemen	Aden	27.05.1995	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	10	0
		Yemen	Aden	14.05.1996	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	3	18
		Yemen	Al-Bayda	20.05.2001	non-state (armed group)	6. cause currently undetermined or unrecorded	—	14	50

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Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
ASIA	Western Asia	Yemen	Khormaksar	09.06.2006	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	3	2
		Yemen	Sana'a	31.05.2007	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	n/a	n/a
		Yemen	Sana'a	11.06.2007	n/a	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		Yemen	Noqum	30.06.2007	n/a	4. failure to take into account external, environmental influences and events	4.3. other	0	0
		Yemen	Taiz	02.03.2010	non-state (private)	5. poor security	5.1. criminal/deliberate act	19	15
		Yemen	Ja'ar	27.03.2011	state (military)	5. poor security	5.1. criminal/deliberate act	150	150
		Yemen	Sana'a	26.05.2011	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	28	n/a
		Yemen	Sana'a	18.10.2012	non-state (armed group)	5. poor security	5.1. criminal/deliberate act	0	0
		Yemen	Aden	22.10.2012	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	0
		Yemen	Sana'a	30.11.2012	non-state (armed group)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	18
		Yemen	Abs	07.02.2013	state (military)	6. cause currently undetermined or unrecorded	—	10	n/a
		Yemen	Sana'a	05.10.2013	state (military)	4. failure to take into account external, environmental influences and events	4.3. other	0	0
		Palestinian Territories	Rafah	20.10.2010	non-state (armed group)	6. cause currently undetermined or unrecorded	—	12	n/a
EUROPE	Eastern Europe	Belarus	Slutsk, MIN	07.09.1996	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	1
		Bulgaria	Ivanovo	09.07.2000	n/a	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		Bulgaria	Chelopechene	03.07.2008	state (military)	6. cause currently undetermined or unrecorded	—	0	1
		Bulgaria	Kazanlak	10.08.2008	non-state (company)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		Bulgaria	Gorni Lom	03.02.2010	non-state (company)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	4
		Bulgaria	Sofia	17.05.2010	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
		Bulgaria	Lovnidol	12.11.2011	non-state (company)	5. poor security	5.1. criminal/deliberate act	0	0
		Bulgaria	Charkovo	11.01.2012	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	1
		Bulgaria	Straldzha	05.06.2012	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	9
		Bulgaria	Kazanlak	11.09.2012	non-state (company)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
		Czech Republic	Oldruvki	07.02.1990	state (other)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	n/a	n/a
		Czech Republic	Teplice	09.01.1991	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	20	n/a
		Hungary	Veszprem	06.04.1988	state (other)	6. cause currently undetermined or unrecorded	—	1	n/a
		Moldova	no incident recorded						
		Poland	Gliwice	27.05.2008	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
		Romania	no incident recorded						

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Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
EUROPE	Eastern Europe	Russian Federation	Dolan, KAL	05.12.1983	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Russian Federation	Severomorsk, MUR	17.05.1984	state (military)	2. inappropriate storage systems and infrastructure	2.3. suspected	250	200
		Russian Federation	Bobruysk, MOG	31.05.1984	n/a	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Russian Federation	Khabarovsk, KHA	29.06.1988	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Russian Federation	Yurga, KEM	21.09.1989	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	3
		Russian Federation	Vozdvizhenka, PRI	29.10.1991	n/a	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		Russian Federation	Primorsky Krai, PRI	23.03.1992	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
		Russian Federation	Vladivostok, PRI	14.05.1992	state (military)	4. failure to take into account external, environmental influences and events	4.4. suspected	n/a	n/a
		Russian Federation	Yelizovo, KAM	19.11.1992	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Russian Federation	Novonezhino, PRI	14.05.1994	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	n/a	n/a
		Russian Federation	Pskov, PSK	20.10.1994	state (military)	6. cause currently undetermined or unrecorded	—	3	7
		Russian Federation	Taly, KOM	30.03.1995	state (military)	6. cause currently undetermined or unrecorded	—	0	0
		Russian Federation	Vladivostok, PRI	31.03.1995	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	n/a	n/a
		Russian Federation	Elban, KEM	04.04.1995	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	n/a
		Russian Federation	Boyets Kuznetsov, PRI	25.06.1996	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	0	0
		Russian Federation	Grozny, CHA	12.11.1996	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	4
		Russian Federation	Bira, JEW	27.04.1997	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Russian Federation	Vladivostok, PRI	07.11.1997	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		Russian Federation	Engels, SAR	21.02.1998	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
		Russian Federation	Volgograd, VGG	21.02.1998	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	n/a	n/a
		Russian Federation	Pogranichny, PRI	03.04.1998	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		Russian Federation	Arzamas, NIZ	04.06.1998	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	91	1,000
		Russian Federation	Elk, SVE	19.06.1998	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	14	23
		Russian Federation	Dzerzhinsk, NIZ	17.08.1998	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0
		Russian Federation	Yekaterinburg, SVE	04.12.1998	state (military)	6. cause currently undetermined or unrecorded	—	3	n/a
		Russian Federation	Kotluban', VGG	11.06.1999	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	3	n/a
		Russian Federation	Rzhevskiy, LEN	18.05.2000	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	1	n/a
		Russian Federation	Vanino, KHA	21.05.2000	state (military)	5. poor security	5.1. criminal/deliberate act	0	n/a
		Russian Federation	St. Petersburg, SPB	26.06.2000	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
		Russian Federation	Ramenskoye, MOS	08.06.2001	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
EUROPE	Eastern Europe	Russian Federation	Nerchinsk, CHI	22.06.2001	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	5	1
		Russian Federation	Gusinoozersk, BUR	21.07.2001	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	3	17
		Russian Federation	Ulan-Ude, BUR	10.07.2002	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	3	11
		Russian Federation	Tayozhny, PRI	16.10.2002	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	26
		Russian Federation	Petropavlovsk-Kamchatsky, KAM	13.12.2002	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	0
		Russian Federation	Ulyanovsk, ULY	10.06.2003	state (military)	6. cause currently undetermined or unrecorded	—	5	0
		Russian Federation	—, AMU	18.06.2003	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		Russian Federation	Nadezhda district, PRI	12.07.2003	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	13
		Russian Federation	Babstovo, JEW	14.08.2003	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	2	8
		Russian Federation	Achkhoi-Martan, CHA	07.12.2004	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	3
		Russian Federation	Kronstadt Kotlin Island, SPB	17.05.2005	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	6
		Russian Federation	Yuzhnaya Koriakiya, KAM	30.09.2005	state (military)	5. poor security	5.1. criminal/deliberate act	1	0
		Russian Federation	Sergiyev Posad, MOS	28.04.2006	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	0
		Russian Federation	Lodeinoye Pole, SPB	23.05.2008	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	0	0
		Russian Federation	Fokino, PRI	30.09.2008	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	0
		Russian Federation	Karabash, CHE	14.09.2009	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	1	2
		Russian Federation	Ulyanovsk, ULY	13.11.2009	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	10	60
		Russian Federation	Ulyanovsk, ULY	23.11.2009	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	8	2
		Russian Federation	Ulyanovsk, ULY	19.02.2010	state (military)	6. cause currently undetermined or unrecorded	—	1	35
		Russian Federation	Ryazan, RYA	23.06.2010	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	30
		Russian Federation	Ulyanovsk, ULY	01.07.2010	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	2
		Russian Federation	Verkh-Katunskoye, ALT	03.07.2010	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	0
		Russian Federation	Sterlitamak, BAS	24.08.2010	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	0
		Russian Federation	Khabarovsk, KHA	28.10.2010	state (military)	2. inappropriate storage systems and infrastructure	2.1. falling objects	0	1
		Russian Federation	Kadinka, LIP	06.04.2011	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	4	1
		Russian Federation	Ashuluk, AST	11.04.2011	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	n/a
		Russian Federation	Urman, BAS	26.05.2011	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	12
		Russian Federation	Pugachevo, UDM	02.06.2011	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	2	95

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
EUROPE	Eastern Europe	Russian Federation	Pugachevo, UDM	04.07.2011	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	100
		Russian Federation	Snegovaia Pad, PRI	12.07.2011	state (military)	5. poor security	5.1. criminal/deliberate act	7	12
		Russian Federation	—	17.10.2011	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	2
		Russian Federation	Nizhny Novgorod, NIZ	02.05.2012	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	6	3
		Russian Federation	Primorsky Krai, PRI	18.05.2012	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	n/a	2
		Russian Federation	Koltubanovka, ORE	11.06.2012	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	2
		Russian Federation	Donguz, ORE	09.10.2012	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	n/a	n/a
		Russian Federation	Chapayevsk, SAM	18.06.2013	state (military)	6. cause currently undetermined or unrecorded	—	0	48
		Slovakia	Nováky	02.03.2007	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	8	45
		Ukraine	Artemovsk, [region no.] 14	10.10.2003	n/a	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	0	2
		Ukraine	Novobogdanovka, [region no.] 23	06.05.2004	state (military)	3. handling errors and inappropriate working practices	3.2. inappropriate working practices	5	85
		Ukraine	Tsvitokha, [region no.] 68	06.05.2005	n/a	6. cause currently undetermined or unrecorded	—	9	11
		Ukraine	Novobogdanovka, [region no.] 23	23.07.2005	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	1	1
		Ukraine	Novobogdanovka, [region no.] 23	19.08.2006	state (military)	3. handling errors and inappropriate working practices	3.5. suspected	0	4
		Ukraine	Novobogdanovka, [region no.] 23	18.05.2007	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	1
		Ukraine	Lozovaya, [region no.] 63	11.04.2008	state (military)	6. cause currently undetermined or unrecorded	—	0	3
		Ukraine	Lozovaya, [region no.] 63	27.08.2008	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	3	2
		Ukraine	Hruzevystsya, [region no.] 68	13.03.2010	state (other)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	1
		Ukraine	Shostka, [region no.] 59	26.05.2011	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	1
	Northern Europe	Denmark	Jaegerspris	25.11.1988	n/a	6. cause currently undetermined or unrecorded	—	1	n/a
		Estonia	no incident recorded						
		Finland	Ähtäri	19.07.1999	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		Finland	Niinisalo	07.09.2006	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	0	0

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
EUROPE	Northern Europe	Iceland		no incident recorded					
		Ireland		no incident recorded					
		Latvia		no incident recorded					
		Lithuania		no incident recorded					
		Norway		no incident recorded					
		Sweden	Järna	26.11.1986	state (military)	5. poor security	5.1. criminal/deliberate act	0	0
		United Kingdom	Foulness	27.01.1986	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
	Southern Europe	Albania	Suc	20.02.1997	state (military)	5. poor security	5.1. criminal/deliberate act	1	2
		Albania	Qafe Shtame	28.02.1997	state (military)	5. poor security	5.1. criminal/deliberate act	23	3
		Albania	Kordhoce	11.03.1997	state (military)	5. poor security	5.1. criminal/deliberate act	1	2
		Albania	Laci	12.03.1997	state (military)	5. poor security	5.1. criminal/deliberate act	2	9
		Albania	Peshkopi	20.03.1997	state (military)	5. poor security	5.1. criminal/deliberate act	0	3
		Albania	Pilur-Vlore	20.03.1997	state (military)	5. poor security	5.1. criminal/deliberate act	2	0
		Albania	Gjegjan	—.03.1997	state (military)	5. poor security	5.1. criminal/deliberate act	30	3
		Albania	Shen Vasil/Sasaj	—.03.1997	state (military)	5. poor security	5.1. criminal/deliberate act	3	0
		Albania	Fushe-Kruje	05.04.1997	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Albania	Ura e Gjadrit	07.04.1997	state (military)	5. poor security	5.1. criminal/deliberate act	2	6
		Albania	Picar	13.04.1997	state (military)	5. poor security	5.1. criminal/deliberate act	5	19
		Albania	Gjeroven	18.04.1997	state (military)	5. poor security	5.1. criminal/deliberate act	1	5
		Albania	Malesia Lezhe	24.04.1997	state (military)	5. poor security	5.1. criminal/deliberate act	3	0
		Albania	Palikesht	27.04.1997	state (military)	5. poor security	5.1. criminal/deliberate act	2	14
		Albania	Burrel	30.04.1997	state (military)	5. poor security	5.1. criminal/deliberate act	27	n/a
		Albania	Picar	05.05.1997	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	3	14
		Albania	Gjirokaster	15.05.1997	state (military)	6. cause currently undetermined or unrecorded	—	1	n/a
		Albania	Mbreshtan	18.06.1997	state (military)	5. poor security	5.1. criminal/deliberate act	7	1
		Albania	Klos	26.06.1997	state (military)	5. poor security	5.1. criminal/deliberate act	3	1
		Albania	—	09.07.1997	n/a	6. cause currently undetermined or unrecorded	—	16	n/a
		Albania	Tepelena	06.05.2006	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	3
		Albania	Gërdec	15.03.2008	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	26	300

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
EUROPE	Southern Europe	Albania	Polican	06.01.2009	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	1
		Albania	Polican	27.04.2011	state (military)	6. cause currently undetermined or unrecorded	—	1	3
		Andorra		no incident recorded					
		Bosnia and Herzegovina	Bihac	—.—.2000	state (military)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Bosnia and Herzegovina	Rabic	20.06.2003	state (military)	6. cause currently undetermined or unrecorded	—	2	0
		Croatia	Zagreb	07.04.1994	state (military)	6. cause currently undetermined or unrecorded	—	n/a	17
		Croatia	Osijek	23.08.2001	state (police)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	3
		Croatia	Paðene	14.09.2011	state (police)	4. failure to take into account external, environmental influences and events	4.2. external fire	0	0
		Greece	Malakasa	25.12.1987	state (military)	5. poor security	5.1. criminal/deliberate act	1	4
		Greece	Dervenohoria	02.08.1991	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	0
		Holy See		no incident recorded					
		Italy	Ghedi	14.08.1998	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	2
		Italy	Baiano di Spoleto	10.04.2005	state (military)	6. cause currently undetermined or unrecorded	—	0	5
		Macedonia		no incident recorded					
		Malta		no incident recorded					
		Montenegro	Vir	08.07.2006	non-state (company)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	0	50
		Montenegro	Niksic	07.03.2010	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	3
		Portugal		no incident recorded					
		San Marino		no incident recorded					
		Serbia	Lisičji	—.—.1994	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
		Serbia	Baric	21.06.1996	state (other)	3. handling errors and inappropriate working practices	3.5. suspected	3	3
		Serbia	Čačak	22.01.2003	state (military)	6. cause currently undetermined or unrecorded	—	0	3
		Serbia	Baric	29.05.2006	state (other)	6. cause currently undetermined or unrecorded	—	3	1
		Serbia	Paracin	19.10.2006	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	23
		Serbia	Paracin	24.08.2007	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	0	0
		Serbia	Užice	03.09.2009	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	7	15
		Serbia	Valjevo	10.05.2010	non-state (company)	2. inappropriate storage systems and infrastructure	2.3. suspected	0	2

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
EUROPE	Southern Europe	Serbia	Čačak	27.12.2010	non-state (company)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	0
		Serbia	Čačak	16.12.2013	non-state (company)	5. poor security	5.1. criminal/deliberate act	2	2
		Slovenia	Grgar	—.—.1986	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	13	n/a
		Spain		no incident recorded					
	Western Europe	Austria		no incident recorded					
		Belgium	Seneffe	07.09.2010	non-state (company)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Belgium	Jéhonville	01.07.2011	state (military)	3. handling errors and inappropriate working practices	3.1. mechanical damage	0	2
		France	Toulon	19.06.1985	n/a	6. cause currently undetermined or unrecorded	—	4	n/a
		France	Le Crotoy	18.12.1996	state (military)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	0	2
		France	Saint Martin de Crau	02.06.2002	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	n/a	n/a
		France	Vimy	29.07.2002	state (military)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
		France	Pontfaverger Moronvilliers	15.04.2003	state (military)	4. failure to take into account external, environmental influences and events	4.2. external fire	n/a	n/a
		France	Vimy	18.09.2004	n/a	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
		France	Vimy	20.06.2005	state (police)	4. failure to take into account external, environmental influences and events	4.1. extreme weather	n/a	n/a
		France	Bellerive-sur-Allier	14.06.2006	non-state (company)	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		France	Ressaincourt	18.04.2007	state (military)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	2	1
		Germany	Schwerin	30.06.1984	foreign (intervention)	6. cause currently undetermined or unrecorded	—	n/a	n/a
		Germany	Torgau	17.09.2002	non-state (company)	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	1
		Germany	Lubben	12.11.2002	non-state (company)	3. handling errors and inappropriate working practices	3.5. suspected	4	0
		Germany	Hunxe	17.06.2008	n/a	3. handling errors and inappropriate working practices	3.4. during demilitarization/explosive ordnance disposal (EOD)	1	n/a
		Germany	Priort	15.06.2011	state (military)	1. lack of surveillance leading to ammunition deterioration	1.4. suspected	0	1
		Liechtenstein		no incident recorded					
		Luxembourg		no incident recorded					
		Monaco		no incident recorded					
		Netherlands		no incident recorded					
		Switzerland	Saignelegier	10.10.1987	state (military)	5. poor security	5.1. criminal/deliberate act	n/a	n/a
		Switzerland	Steingletscher	02.11.1992	state (military)	2. inappropriate storage systems and infrastructure	2.2. internal fire	6	0

n/a = data unavailable or unrecorded

Region		Country	Location	Date	Owner/Manager	Root cause	Primary cause	Fatalities	Injuries
OCEANIA	Australia and New Zealand	Australia	Mulwala	—.11.1982	—	1. lack of surveillance leading to ammunition deterioration	1.1. auto-initiation	n/a	n/a
		New Zealand	no incident recorded						
	Melanesia	Fiji	no incident recorded						
		Papua New Guinea	no incident recorded						
		Solomon Islands	no incident recorded						
		Vanuatu	no incident recorded						
	Micronesia	Kiribati	no incident recorded						
		Marshall Islands	no incident recorded						
		Micronesia	no incident recorded						
		Nauru	no incident recorded						
		Palau	no incident recorded						
	Polynesia	Samoa	no incident recorded						
		Tonga	no incident recorded						
		Tuvalu	no incident recorded						

n/a = data unavailable or unrecorded

Annexe D. SAS PSSM Best-practice Cards

Recognizing the need to draw national and international attention to the problems associated with ineffective PSSM practices in many states, the Small Arms Survey elaborated a set of cards to outline, in a simple, easy-to-read format, a range of basic stockpile management principles (including destruction), procedures, and best practices. This card set is modelled on the Survey's much in-demand Weapons Identification and the International Tracing Instrument Implementation Support cards were developed subsequently. The cards contain images and data depicting best practice on a range of issues, including types of storage, quantity–distance principles, perimeter security, and record keeping. Technical advice, photographic material, and translations were kindly contributed by the Defense Threat Reduction Agency (DTRA), the NATO Support Agency (NSPA), the Swiss Armed Forces Verification Unit, the Organization for Security and Co-operation in Europe (OSCE), and the Spanish Armed Forces Verification Unit.

The PSSM Best-practice Cards were launched and disseminated during the Third RASR Workshop held in Sarajevo in November 2010.

The cards are available in:
Albanian, BCMS, English, Russian, and Spanish.

1. Physical security

These cards illustrate low-cost, low-technology features which can enhance the physical security of stockpiles.

DOORS

- Door made of steel (or 4.5 cm wood with 12 gauge steel plate)
- Frame anchored to building at 8 places
- Hinges welded to prevent pin removal
- Marked with UN Fire Division symbol
- Doors open OUTWARDS – cannot be rammed
- Light gauge handles break off easily – cannot be used to pull off door
- Door seam covered with metal strip – prevents lever from fitting inside

FIREFIGHTING EQUIPMENT

- Easily seen and accessed
- Only fight fires to save lives
- Conduct periodic checks

SIGNS

- List forbidden items (cell phones, flame-producing items, etc.)
- Identify restricted areas

FENCES AND BARRIERS


- A barrier within a barrier
- For Category I and II items barriers are WITHIN the installation boundaries
- Clear zones with unimpeded visibility:
  - 4 m inside
  - 10 m outside

LOCKS


- Must protect against manual manipulation (hammers, bars, etc.) for at least 15 minutes
- Must protect against powered tools (drills, saws, etc.) for at least 5 minutes

AISLES


- Aisles free of obstructions
- Wall clearances (15 cm minimum)
- Aisle widths (46 cm minimum)

STACKS


- Store away from hot lights (OSCE: allow 15 cm between box and ceiling)
- Store away from walls – allows checking and air circulation (OSCE: allow 15 cm between stack and wall)
- Banded for security – too heavy to pick up

LOT NUMBERS


- Lot # segregation by date
- Oldest lot # in front (issue first)
- Newest lot # in back
- Segregate lot # by similar storage history
- Use to manage lot testing

DUNNAGE


Wood or metal

- Provides air circulation
- Allows equipment access
- Improves stability of stack

SECURITY POST



- Armed attendant
- Entrance only to approved staff with a legitimate reason
- Maintain full records of authorizations and access
- Requires communications with safety personnel
- Alert system in place

RACKS

- Bolted or welded together to form a unit too heavy to easily move
- Made of metal
- Lockable
- Easy to see weapon serial numbers

BOXES

- Inventory card on top of stack
- Loose rounds in brightly colored box
- Stored together by lot #

2. Stockpile management

These cards illustrate basic weapons and ammunition stockpile management actions and principles as well as risk categorizations.

CUSTODY AND RECEIPT

EQUIPMENT RECEIPT (DA PAM 710-2-1)

1. UNIT: Defense Threat Reduction Agency	2. RECEIPT NO.: 0012345
3. STOCK NO.: 1365-00-0876-2232	4. SERIAL NO.: 0012345
5. ITEM DESCRIPTION: Pistol, 9mm, Beretta, M9	
6. I hereby acknowledge receipt of the equipment from the unit arms room (Building 2345, room 123) of this unit.	
7. NAME: SMITH, John P.	8. SOCIAL SECURITY NO.: 000-00-0000
9. SIGNATURE: Johnny P. Smith	10. GRADE: PFC

DA FORM 3749, JAN 82 Edition of Aug 71 is obsolete.

- Requires daily sight counts
- Facilitates serial number inventories
- Use of receipt cards for each weapon
- Proper record keeping promotes good inventory management

INVENTORY

- Serial Number Inventory
- Conduct monthly inventory
- Use an independent party
- Recorded, filed, and audited by higher command

SECURITY SYSTEMS

- Change codes regularly
- Conduct periodic testing
- Ensure back-up power in case of electrical failure

MAINTENANCE


- Establish and enforce a maintenance program
- Clean debris
- Cut vegetation (15 m)
- Prevent vermin from entering

RISK MANAGEMENT

When evaluating materiel for storage or destruction, prioritize items into risk categories such as:

- Degree of utility
- Potential casualty or damage effect
- Adaptability
- Portability and potential for theft

RISK CATEGORY 1 (Recommended)



- ONLY man portable 'ready-to-fire' missiles and rockets
- Replacement rockets and missiles for the above

RISK CATEGORY 2 (Recommended)



- Light automatic weapons, to include medium machine guns
- Hand or rifle grenades
- Mines

RISK CATEGORY 3 (Recommended)


- Grip stocks for MANPADS
- Guidance or trackers for missiles
- Mortar tubes
- Rocket and missile launchers > 50 kg
- Flame throwers
- Explosive-filled projectiles
- Incendiary grenades

RISK CATEGORY 4 (Recommended)



- Semi-automatic rifles
- Handguns
- Recoilless rifles
- Ammunition
- Fuzes
- Illumination grenades
- Riot-control agents

QUANTITY-DISTANCE PRINCIPLES

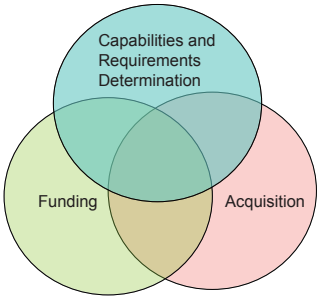
Determine size and location of stockpiles based on three factors:

- Amount of explosive
- Separation distance
- Type of explosive

AMMUNITION SURVEILLANCE

- Inspect visually
- Consider disassembly requirements
- Conduct chemical analysis
- Perform functional testing of components
- Live-fire a representative sample by lot number

STOCKPILE MANAGEMENT



Assess current capabilities, projected goals, and where to improve first

3. Storage considerations

These cards illustrate UN Hazard Classifications, storage facility markings, and other storage considerations.

MASS DETONATION

- UN Hazard Classification
- Ensure items properly marked
- Damage from mass-detonating hazard materials is caused by concussion or blast or by sympathetic detonation

FRAGMENTATION

- UN Hazard Classification
- Ensure items properly marked
- Principle hazards are fragment and blast, either individually or in combination, depending on storage configuration, type of packing, and quantity

MASS FIRE

- UN Hazard Classification
- Ensure items properly marked
- Items burn vigorously
- Little or no possibility for extinguishing them in a storage situation

MODERATE FIRE

- UN Hazard Classification
- Ensure items properly marked
- Fire hazard with no blast hazard and virtually no fragmentation or toxic hazard beyond the fire hazard clearance specified for high-risk materials

FIRE DIVISION 1 MASS DETONATION

- UN Hazard Classification Storage Facility Markings
- Ensure items properly marked
- Damage from mass-detonating hazard materials is caused by concussion or blast or by sympathetic detonation

FIRE DIVISION 2 FRAGMENTATION

- UN Hazard Classification Storage Facility Markings
- Ensure items properly marked
- Principle hazards are fragment and blast, either individually or in combination, depending on storage configuration, type of packing, and quantity

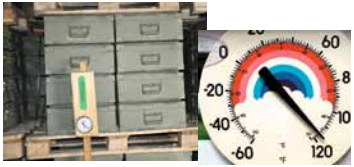
FIRE DIVISION 3
MASS FIRE

- UN Hazard Classification Storage Facility Markings
- Ensure items properly marked
- Items burn vigorously
- Little or no possibility for extinguishing them in a storage situation

FIRE DIVISION 4
MODERATE FIRE

- UN Hazard Classification Storage Facility Markings
- Ensure items properly marked
- Fire hazard with no blast hazard and virtually no fragmentation or toxic hazard beyond the fire hazard clearance specified for high-risk materials

TEMPERATURES



- Avoid extreme high or low temperatures
- Avoid wide temperature variations
- Avoid high or low humidity
- Avoid vibration
- Avoid shock

STANDARD OPERATING PROCEDURES

Should contain:

- Emergency response
- Security procedures
- Accountability
- Inventories
- Training requirements
- Storage information
- Safety
- Surveillance
- Risk assessment

TRANSPORT CONSIDERATIONS

- Technically safe to transport
- Inspect equipment and personnel
- Check documents
- Vehicle marking
- Original packaging, if possible
- Vehicles should be 50 m apart
- Provide security en route
- Coordinate with law enforcement if needed

Note:
14% of all ammunition accidents occur during movement or handling

EXPLOSION CAUSES

- Deterioration
- Carelessness
- Improper storage conditions
- Poor training
- Enemy action, terrorism, or sabotage
- Movement and handling
- Fire
- Lightning

4. Destruction methods

These cards provide an overview of methods for the dismantling and destruction of weapons and ammunition.

TEMPORARY DISABLEMENT

Remove and secure:

- Bolts
- Breech blocks
- Grip stocks
- Trackers
- Guidance units
- Firing mechanism
- Critical components

MECHANICAL DISMANTLING

- Stockpile disposal
- Verify destruction of EVERY weapon
- Requires special equipment
- Maintain records of parts
- Recycle or safely dispose of residue

CLOSED BURNING

- Stockpile disposal
- Requires specialized equipment; can be field fabricated
- Address environmental concerns
- Best for small arms ammunition
- Recycle or safely dispose of residue

TORCH CUTTING


- Stockpile disposal
- Typically requires minimum of two cuts per weapon
- Removes metal in the process
- Cut all similar weapons in the same pattern
- Remaining parts should be unusable as spare parts
- Recycle or safely dispose of residue

OPEN BURNING


- Stockpile disposal
- Relatively inexpensive
- Requires high-intensity heat over prolonged period
- Address environmental concerns
- Monitor for security and safety throughout
- Field expedient technique
- Recycle or safely dispose of residue

MECHANICAL CUTTING


- Stockpile disposal
- Requires special equipment
- Typically requires minimum of two cuts per weapon
- Removes metal in the process
- Cut all similar weapons in the same pattern
- Recycle or safely dispose of residue

HYDRAULIC SHEARING OR BENDING


- Stockpile disposal
- Requires special equipment
- Can achieve high throughput rates
- Maintain destruction records
- Recycle or safely dispose of residue

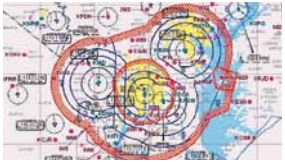
INVENTORY CONTROL

- Identifies unserviceable stocks
- Tracks lot numbers
- Traces suspect lots
- Tracks malfunctions
- Improves reliability
- Reduces accidents
- Enables forecasting
- Manages chemical testing program

MELTING OR SHREDDING


- Stockpile disposal
- Remove non-metal parts
- Furnace reduces weapons to molten steel
- Suitable only if equipment exists
- Destruction is absolute
- Maintain destruction records
- Recycle or safely dispose of residue

FLIGHT RESTRICTIONS



- Flight altitude (200 m minimum)
- Used primarly for open detonation
- Establish process to report violations
- Ensure public safety

RESOURCE RECOVERY

- Stockpile disposal
- Disassemble ordnance to use components
- New infrastructure can be cost-prohibitive
- Industrial capacity and infrastructure required
- High explosive has commercial use
- Address environmental concerns
- Recycle or safely dispose of residue

OPEN DETONATION

- Stockpile disposal
- Address environmental concerns
- Ensure perimeter security
- Survey after operation to confirm destruction
- Effective for larger caliber and unstable munitions
- Requires highly trained personnel
- Requires large land area

Annexe E. Background and Data Analysis

This annexe explains the background to the Handbook, the manner in which data was sourced and validated, and how information was categorized. A detailed explanation of the methodology for determining missing information on casualties appears online as Annexe F: Methodology for Ascertaining Fatalities and Injuries in the UEMS Database, at

www.smallarmssurvey.org/?UEMS-tools

Background to the project

The concept of unplanned explosions at munitions sites has been on the 'radar' of the Small Arms Survey since 2005. The project's publication, *Targeting Ammunition: A Primer* (Pézard and Anders, 2006), emphasized the importance of addressing ammunition as one aspect of efforts to counter the illicit proliferation of small arms, and it introduced non-specialists to new concepts, such as the life-cycle of ammunition. The book included a list of accidental explosions at munitions sites. A subsequent Survey publication, *Conventional Ammunition in Surplus: A Reference Guide* (Bevan, 2008), focused specifically on the storage phase of the ammunition life-cycle. It addressed issues ranging from basic stockpile management—including surveillance of stock, accounting procedures, and surplus destruction—to the threat of illicit diversion, dangers posed by liquid propellants, and man-portable air defence systems (MANPADS). While this publication provided a greater overview on the issue of accidental explosions at munitions depots, a more comprehensive and systematic approach to documenting such events was still needed. The goals of future work were to improve assessment of the problem, raise an agenda and inform it, and provide pertinent analysis.

Over the next three years, 2009–2011, the Survey participated in important multilateral initiatives aimed at encouraging the

international community to produce a long-term and coordinated response to the problems stemming from poorly managed stockpiles of excess ammunition. In 2009 the Survey participated in the first two Regional Approach to Stockpile Reduction (RASR) workshops with a focus on South-east Europe. In 2010 it undertook several research projects in support of RASR and formally became a member of a Steering Committee (SC) established to help direct that process, subsequently referred as 'the RASR Initiative'. (For more information, see www.rasrinitiative.org.) The project's RASR-related research, collaboration with fellow SC members, and interaction with government officials and experts from the nine countries participating in the RASR Initiative all contributed significantly to the UEMS Database and to this Handbook.

In a related development, in 2010 Survey staff visited the offices of the NATO Maintenance and Supply Agency (NAMSA, now called the NATO Support Agency, or NSPA), a fellow RASR SC member, which provided further valuable research assistance. The Survey's engagement with the Multinational Small Arms and Ammunition Group (MSAG) also warrants mention. MSAG, serving as a platform for more than a dozen member states of the Organization for Security and Cooperation in Europe (OSCE) to share their expertise in physical security and stockpile management (PSSM), was established in 2005 (see Part III, p. 104). The Survey was privileged to engage MSAG formally as of May 2011. Through the course of the year the relationship became firmly established, such that MSAG members have provided substantial and substantive contributions to the Survey's work on explosions at munitions sites and the understanding thereof.

Over this period the foundation for this Handbook was laid. The Survey set about developing a more comprehensive and systematic approach to recording these incidents, securing commitment from relevant experts and stakeholders, and identifying key audiences and the tools needed to engage and support them meaningfully. The Survey coined the term 'Unplanned Explosions at Munitions Sites (UEMS)', honed a definition (identifying what was under scrutiny and what would be excluded, or reviewed elsewhere or subsequently), and developed the Small Arms Survey UEMS Database. In addition to collaborating with colleagues from the RASR Initiative and MSAG, the Survey held a workshop in November 2011 to discuss the project and review definitions and criteria for the database,[1] and took part in meetings with the NATO Ammunition Safety Group (in June 2012 and then April 2013).

Sources and validation of data

Through various channels, the Survey learns of accidental explosions at ammunition storage areas (both UEMS and non-UEMS). A network of contacts, including governments, NGOs, and international organizations and experts (primarily from the humanitarian demining, explosive ordnance disposal [EOD], and PSSM communities) may draw attention to events shortly after they occur—or retrospectively, as such contacts appreciate the project's attempts to create a historical record of such events. Internet searches set up with key words, for example with Google Alerts, provide automatic notifications of pertinent news stories in the global media, and social media, especially YouTube, is an important source of information. In researching for this study and developing the UEMS Database, the Survey has searched online in numerous languages, including Arabic, English, French, German, Portuguese, Spanish, and Russian.

The Survey benefits from research already conducted on explosions at munitions sites. Two individuals stand out for providing an important foundation. Adrian Wilkinson, formerly with Geneva International Centre for Humanitarian Demining (GICHD) and the South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC), and now head of Explosive Capabilities Limited (ExCap), collated a list of incidents over about two decades. In his last update from May 2011, his catalogue listed 246 events from 60 countries (Wilkinson, 2011). George Zahaczewsky, formerly with DynCorp International, had also amassed a compilation of major ammunition accidents dating back to the First World War, which he made available (Zahaczewsky, 2012). Not all the recorded events in these two useful and impressive registers met the Survey definition of a UEMS incident, however. NATO Munitions Safety Analysis Center (MSIAC) also makes data available—data which is neither limited to its 28 members nor contributed to by all these members, but is nevertheless useful.

Open-source reporting on UEMS events tends to be lacking in detail.[2] This weakness underscores the importance of engaging people with access to unpublished and authoritative information. In addition to the above-mentioned network, officials with access to national databases—one in France and one in the UK—as well as access to an industry-wide database, were of great assistance. The French Ministry of Ecology, Sustainable Development, and Energy developed a database known as ARIA (Analyse, Recherche et Information sur les Accidents—meaning Analysis, Research, and Information on Accidents) containing information on accidents that 'have or could have damaged health or public safety, agriculture, nature, or the environment' (ARIA, n.d.). ARIA mostly documents events in France. While ARIA's database of 40,000-plus incidents is available online to the public, the Survey benefited from expert advice from a French official on how to make the most of this tool. SAFEX International, a non-profit organization established in 1954 that works with manufacturers of civil and military explosives (see Part III, p. 100), has developed and maintains an international information platform on

explosives incidents in collaboration with the UK Health and Safety Executive (HSE) and its Explosives Incidents Database Advisory Service (EIDAS). Although EIDAS possesses more than 20,000 records dating back to the beginning of the 20th century, it is open only to its members. The Survey was not able to draw directly and fully on the SAFEX dataset or on EIDAS for this study, but individuals with access to them participated in the handbook peer-review process (although it is not clear to what extent this engagement captured relevant incidents contained in these databases).

Despite efforts to capture UEMS events across the globe comprehensively, biases in reporting are likely to prevail. Part I of this Handbook (see Box 4, p. 11) explores why reporting bias may favour more recent UEMS data, resulting in better coverage of the last 15 years of this 35-year review than of the first 20. Despite the facts that research was conducted in many languages, that the Internet arguably allows events to be captured more comprehensively than ever before, and that the Survey's network of informants and colleagues is broad, there can be no masking the fact that relationships and the likely recording of events are not evenly distributed between the Survey and all the 195 countries that it seeks to cover. Coverage of Europe, North America, and Oceania tends to be more thorough.

Before a potential UEMS incident is entered into the database, it first must be analysed to ensure that it is fit for inclusion. The UEMS definition (see Part I, Box 1, p. 3) provides the criteria to assess whether an incident qualifies as a UEMS. Only those incidents that fit the definition are added to the database. Should credible information subsequently become available, thereby calling into question the basis on which an entry has been established, the incident is removed from the database.

The Survey takes the information that it collects and collates and subjects it to a rigorous internal and external review process. The above-mentioned network of experts not only provides information on events but also reviews incidents reported by others. The Survey keeps records of all documentation received, along with notes from people with first- or second-hand knowledge that calls elements of reports into question, or augments existing information from open sources or interviews with key informants. These events are catalogued and, if an incident is subsequently called into question, it is logged separately in case better or fuller information becomes available at a later date.

Entering data

The UEMS Database has about 50 fields of information which help to answer the questions *when*, *where*, *who*, *why*, *what*, and *how* (see Part I, Box 11, p. 49). These questions are addressed in detail in Part II and in the UEMS Incident Reporting Template (Annexe A). Information is entered into the UEMS Database according to the UEMS codebook, which the Survey developed in order to standardize the data entry. Most of the information sought is self-evident, and drop-down menus for many categories facilitate data entry and reduce errors. What follows are explanations of four ways in which data is entered which may not be self-evident.

The location of a UEMS event

Events are entered on the basis of *current* political boundaries of the 195 countries that comprise the database. As noted in the Handbook, the Survey examines activities in 193 UN member states and two states to which the UN General Assembly has accorded Permanent Observer Status (the Holy See and the Palestinian Territories). Names for these 195 countries are entered in accordance with established Small Arms Survey style, which may differ from those used by the United Nations, regional organizations, and the countries themselves. However, the 22 sub-regions that the Survey uses are taken from categories and lists established by the UN Statistical Division. Three examples illustrate this:

- The 9 January 1991 UEMS event in the town of Teplice occurred when it was part of Czechoslovakia. Today Teplice is in the Czech Republic and is entered accordingly into the database. (Czechoslovakia ceased to exist on 31 December 1992.)
- UEMS events located in what is today South Sudan—before the country formally became the 193rd UN member state in July 2011—are recorded, accordingly, as having occurred in South Sudan.
- Events that took place in Taiwan are listed as having occurred in China. (In 1971 the UN recognized Taiwan as a province of a China.)

Similarly, the current name of a location of a UEMS event is used. The 1981 explosion near Salisbury, Zimbabwe is thus entered as having taken place near Harare. (The name change took effect in 1983.)

For events that took place in Kazakhstan, the Russian Federation, the UK, Ukraine, and the United States, additional information on the location of the event is provided. For Kazakhstan and the Russian Federation, the three-letter code of the oblast is included; for the Ukraine, the region number; for the UK, the county is named; and for the United States, the two-letter code of the state is supplied.

Non-state entities and ownership

The Survey defines those groups that possess arms but operate outside formal state control as 'armed actors'. Examples would include the Hezbollah, RENAMO, and the Taliban. If the UN General Assembly does not recognize a government, then the military unit of that political force is deemed an armed group.

Governments sometimes entrust private companies with various tasks related to ammunition life-cycle management. If the ammunition explodes while in storage under the care of a private company, then that company is recorded as the Owner/Manager.

Casualty figures

Open-source documentation on UEMS events tends to focus on casualties reported in the first 12–24 hours after the explosion. Such data is often partial—reportage on fatalities is more common than on injuries—and sometimes contradictory. As noted above, the Survey strives to provide the most accurate information possible. When two sources are deemed equally reliable and authoritative, the larger figure is captured. When no information is available, an entry of 'n/a' is recorded.

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Endnotes

1 The UEMS concept was refined through further analysis of previous work done by Adrian Wilkinson (see Bevan, 2008, pp. 129–35). The current UEMS definition was discussed and benefited from the contributions made by recognized technical experts from different international organizations such as GICHD, MAG, NSPA (NATO), and a former SAFEX consultant. The definition was formalized at a workshop run by the Small Arms Survey in 2011.

2 Some events resulting in extremely large numbers of casualties have benefited from greater scrutiny and reporting, often involving the humanitarian aid community. Examples include explosions in Brazzaville, Gërdec, and Lagos.

PART VI

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