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TARGETING AMMUNITION

A PRIMER

A Small Arms Survey publication in cooperation with partners

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About the project partners

The **Centre for International Cooperation and Security (CICS),** located in the Department of Peace Studies at the University of Bradford, UK, is a centre for both academic and applied research aimed primarily towards policy communities. A principal research area is the development of cooperative responses to prevent and combat small arms proliferation and illicit trafficking. The Centre co-directs *Biting the Bullet*, a major international project to promote the implementation and development of the *UN Programme of Action* on small arms and light weapons. A briefing on the safe and secure storage and disposal of ammunition stocks was recently co-authored by CICS within the framework of this project. www.brad.ac.uk/acad/cics

GRIP (Groupe de recherche et d'information sur la paix et la sécurité), located in Brussels, is an independent Belgian research centre focusing on the study and dissemination of information and training on problems of peace, defence, and disarmament. GRIP works with the aim to contribute to improving international security in Europe and throughout the world by assisting in political decision-making processes. Its current work on small arms, light weapons, and related ammunition focuses on the thematic issues of transparency and restraint in arms transfers, controls on arms brokering, and tracing illicit arms. www.grip.org

SEESAC (South Eastern and Eastern Europe Clearinghouse for SALW Control) is a joint initiative of the United Nations Development Programme and the Stability Pact. SEESAC's mandate is to support all international and national stakeholders by strengthening national and regional capacity to control and reduce the proliferation and misuse of small arms and light weapons, and thus contribute to enhanced stability, security, and development in South Eastern and Eastern Europe. SEESAC focuses primarily on the development and delivery of strategic advice and operational capability to national governments and international and national stakeholders. SEESAC's work includes technical assistance and support, project development, monitoring and evaluation advice, resource mobilization activities, the development of operational support tools, and small arms and light weapons information management. www.seesac.org

The **Small Arms Survey** is an independent research project located at the Graduate Institute of International Studies in Geneva, Switzerland. It serves as the principal source of public information on all aspects of small arms and as a resource centre for governments, policy-makers, researchers, and activists. The Survey sponsors field research and information-gathering efforts, especially in affected states and regions. Established in 1999, the project is supported by the Swiss Federal Department of Foreign Affairs, and by sustained contributions from the governments of Belgium, Canada, Finland, France, the Netherlands, Norway, Sweden, and the United Kingdom. The project has an international staff with expertise in security studies, political science, law, economics, development studies, and sociology. It collaborates with a worldwide network of researchers, partner institutions, non-governmental organizations, and governments. www.smallarmssurvey.org

Since 1993, **Viva Rio,** an NGO based in Rio de Janeiro, has worked to combat a growing wave of urban violence—a problem that affects mainly young people—in Brazilian cities. Campaigns for peace and against the proliferation of small arms, as well as projects aiming to reduce criminal behavior and armed violence, are the hallmarks of the organization's work. Activities to confront problems associated with the proliferation and misuse of firearms are carried out at the local, national, and international levels. Viva Rio has three main objectives: to reduce the demand for guns (actions to sensitize civil society to the risks involved with using or carrying firearms and to respond to the gun industry lobby); to reduce the supply of guns (curb illicit arms trafficking and control the production, sales, exports, and imports of small arms and ammunition); and to improve stockpile controls (destruction of excess guns and improvement of secure storage facilities). www.vivario.org.br

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Foreword

Germany has long recognized that the issue of ammunition, along with the control of weapons, plays a key role in relation to human security. Illegal trafficking in ammunition can have equally devastating consequences as illicit trade in arms. Both are frequently obtained from the same sources, and are often sold by the same methods and by the same people. Combating illicit trade in ammunition can thus help to fight the illegal proliferation of weapons, and vice versa. As ammunition is needed in large quantities for military combat, the intensity of conflicts can be reduced by cutting off illicit supply channels.

Ammunition can be diverted from military stockpiles into zones of instability where it fuels conflicts. It can also fall into the hands of criminal gangs and terrorists. Poorly managed ammunition stockpiles can damage the environment and pose the risk of explosion. Explosive remnants of war constitute a threat to civilians as well as security personnel and hamper the recovery of post-conflict societies.

While pursuing efforts to fight the illicit proliferation of weapons, Germany has consistently borne in mind the elements that render firearms lethal: the bullets, grenades, mortar rounds, and rockets that maim and kill. During the recent negotiations on an agreement to identify and trace illicit small arms and light weapons, the German government pleaded strongly for the inclusion of ammunition. In 2005, France and Germany introduced a resolution in the UN General Assembly's First Committee entitled *Problems arising from the accumulation of conventional ammunition stockpiles in surplus*, formally putting the issue on the international agenda. Germany has also supported the efforts undertaken by the Organization for Security and Co-operation in Europe (OSCE) to promote best practices for stockpile management and destruction, with work on a comprehensive *Best Practice Guide on Conventional Ammunition* due to be completed in 2006. Germany has provided assistance to states in need, providing training and ammunition disposal facilities. The German support of a multi-year programme to facilitate the work of weapons and ammunition disposal teams in Afghanistan is a case in point.

Targeting Ammunition is an invaluable resource for all those involved in confronting the dangers associated with ammunition. This timely and user-friendly volume identifies the main challenges—such as the procurement and use of ammunition by groups engaged in crime and conflict, the ease with which it can be smuggled, and the need to develop an adequate mechanism to trace ammunition back to its origin or to its purchaser—and provides practical guidelines and tools with which to tackle these challenges. *Targeting Ammunition* confirms the need for national governments, civil society, and the international community to direct their attention not only to the challenges related to firearms but to ammunition as well.

Frank-Walter Steinmeier
Federal Minister for Foreign Affairs
Federal Republic of Germany

About the authors

Holger Anders is a researcher on small arms control at GRIP. He previously worked as regional information officer for the International Action Network on Small Arms (IANSA) as well as in technical cooperation projects in the fields of drug control and demobilization of ex-combatant in Egypt and Cambodia. His work on small arms has been published by various NGOs and institutions, and he frequently participates in inter-governmental meetings in global and regional arms control forums. He is a doctoral candidate in peace studies at the University of Bradford, UK, and holds a master degree in international relations from London University.

James Bevan is a researcher at the Small Arms Survey. He has authored and co-authored numerous chapters in the annual *Small Arms Survey* on subjects such as the arms industry, the use of weapons in contemporary conflict, and armed violence among young men. Most recently, he conducted field research into the use of small arms by the Lord's Resistance Army in northern Uganda, where he currently supervises a Uganda-wide small arms project. He holds a BSc in international relations and an MA in international politics with economics and law. He is currently a PhD candidate at the Graduate Institute of International Studies in Geneva, and he specializes in covert interventions in United States foreign policy.

Ilhan Berkol is head of GRIP's Small Arms Project and Arms Export Section. He earned a degree in chemical engineering from the Université Libre de Bruxelles and holds a diploma in international humanitarian aid from the Université catholique de Louvain. He has authored several publications on small arms issue and has done extensive work on marking and tracing, including the writing of a draft convention and participation in several expert studies. His work also focuses on advising policy-makers and helping political decision-making. Recently, he participated as an expert in the harmonization of arms legislation in the Great Lakes Region, and in the work of UNIDIR for the European Union Action on Small Arms and Light Weapons and Explosive Remnants of War. Currently he is one of the two experts drafting the ECOWAS Convention on the Moratorium on Small Arms and Light Weapons.

Mike Bourne is a research fellow at CICS, at the Department of Peace Studies, University of Bradford, UK. He is a coordinator of the *Biting the Bullet* project (a joint project of the University of Bradford, Saferworld, and International Alert). He has worked on numerous small arms-related projects over the past decade. His work has focused on the nature of small arms and light weapons flows to areas of conflict, illicit trafficking, and global and regional responses to small arms issues. He has authored numerous publications—including book chapters, policy reports (such as the Red Books), briefing papers, and training modules—on the issues of small arms, armed violence, poverty, security sector reform, and the privatization of security. He holds a PhD from the University of Bradford.

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Owen Greene is director of CICS and also of Research at the Department of Peace Studies, both at the University of Bradford, UK. He has a long-standing international reputation as a researcher, policy analyst, and adviser on small arms and light weapons and related issues. He was the UN Consultant on small arms and light weapons (particularly relating to the 1997–99 UN Group of Governmental Experts); contributed actively to the development and implementation of the *UN Programme of Action* (and subsequently to the 2003 and 2005 Biennial Meetings of States) and numerous regional and national agreements and programmes; served as co-director of the *Biting the Bullet* project; and was (co-)director or principal researcher/consultant for many other international small arms-related projects. He has published and presented widely on the subject and other conventional arms issues, including those relating to ammunition.

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Adrian Wilkinson has headed SEESAC since 2003. He holds an MSc in explosive ordnance engineering from Cranfield University and an MA in international conflict analysis from the University of Kent, Canterbury. He was a Senior Ammunition Technical Officer (SATO) in the British Army, where he gained operational bomb disposal (EOD) experience in Northern Ireland, Gulf 1991, Falkland Islands, Albania, Bosnia, and north-west Europe. He also established the UK Demilitarization Facility. In 2000–03, he was the head of Technology and Standards at the Geneva International Centre for Humanitarian Demining (GICHD), where he was responsible for the International Mine Action Standards (IMAS) and the provision of technical advice to the UN, EC, ICRC, and national governments on EOD and explosive engineering matters. He has published several articles and book chapters on disarmament and demilitarization issues.

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Stéphanie Pézard, Geneva
Holger Anders, Brussels

Part 1

PRODUCTS

With bullets draped over his head, a former militia man waits to hand in his weapons to the UN in Aru, Ituri region of the eastern Democratic Republic of the Congo, in April 2005.
© Guy Calaf/WPN

Introduction
Ammunition for Small Arms and Light Weapons: Understanding the Issues and Addressing the Challenges Owen Greene

Ammunition arguably constitutes the most lethal part of any weapon system. Used in conjunction with the weapons for which it was designed, ammunition plays a decisive role in escalating, prolonging, and intensifying armed conflict and crime, while also undermining security, development, and effective governance. Nevertheless, international efforts to control the damaging effects of trafficking, proliferation, and misuse of small arms and light weapons have generally sidestepped the issue of ammunition. Firearms have essentially been dissociated from their ammunition on the international agenda.

The predictable result is that the regulation and control of firearms have begun to take shape while ammunition remains relatively marginalized, even ignored, as an issue for international action.[1] Ownership, production, and transfers of firearms are today generally regulated by national legislation, although laws vary widely in their stringency and effectiveness. At the regional and international levels, a number of important agreements have been established since the mid-1990s to prevent and reduce the misuse, trafficking, and proliferation of small arms and light weapons. Ammunition is neglected, and often barely acknowledged, within this burgeoning legal and political framework on the regional and international levels.

Yet the policy imbalance engendered by the artificial separation of firearm and ammunition need not persist. *Targeting Ammunition* represents a timely step towards sensitizing the policy and research communities to the urgent need for effective regulation and control of the production, transfer, storage, and destruction of ammunition. In providing a comprehensive overview of the defining characteristics of ammunition, as well as related policy issues, this volume makes a robust case for treating the problem of ammunition as a vital aspect of a broader effort to prevent, reduce, and combat the uncontrolled and illicit flow of small arms and light weapons.

Targeting Ammunition features contributions by experts who identify and examine gaps and challenges in current policies and programmes, and highlight opportunities to enhance national and international controls on ammunition. The book is organized in three parts:

- Part I outlines some of the core issues relating to ammunition for small arms and light weapons, including technical characteristics, structures and processes of ammunition production, and authorized and illicit transfers.
- Part II addresses the significance and role of ammunition for small arms and light weapons in key contexts in which it is widely used or misused—situations of armed conflict and crime.
- Part III examines problems and issues in three areas where progress towards international cooperation and coordination on ammunition for small arms and light weapons is particularly necessary: marking and tracing, stockpile management and security, and destruction and disposal of confiscated or surplus stocks.

The section below clarifies and explores why ammunition represents a missed opportunity in the field of controlling the proliferation of small arms and light weapons. A review of how this particular issue has been framed and addressed on the international policy agenda is then undertaken to assess the current situation and how it can be improved.

Why ammunition matters

Against the backdrop of intense international debate on small arms and light weapons, small arms ammunition has tended to be sidelined. Yet there are numerous reasons why ammunition should move to the forefront of international scrutiny.

The most obvious reason is scale. While global annual production of military small arms and light weapons has been estimated at 1–2 million items, the number of cartridges produced each year undoubtedly runs into the billions (Small Arms Survey, 2003, p. 13). In the case of the United States alone, the

Lake City Arms Ammunition Plant produces around 1.2 billion small calibre cartridges each year for the US Army (Greene, Holt, and Wilkinson, 2005, p. 13). Even these quantities are insufficient to supply US forces in combat and millions more rounds of ammunition have been imported to cover the shortfall (Small Arms Survey, 2005, p. 20).

A second reason why ammunition is of paramount importance concerns the old axiom that 'a gun without ammunition is useless.' While the reality is more nuanced, high levels of ammunition consumption during periods of armed conflict mean that the continuing availability of supplies is particularly critical to combatants.

State armed forces and non-state armed groups change tactics or curtail fighting when faced with ammunition shortages, as exemplified by the cases of Liberia and Burundi (see Chapter 5).[2] In some parts of the world insufficient ammunition has brought about the near-disappearance of certain types of weapon. The case of the G3 assault rifle in a number of East African states is only one example.

Ammunition can be used only once, while weapons can function for decades with minimal maintenance. Controlling ammunition flows can help control the use of these durable weapons, even in cases where little can be done to control the proliferation and stockpiling of small arms and light weapons.

Nevertheless, ammunition remains a relative bastion of state secrecy even in contrast to small arms and light weapons. Because of its critical role in sustaining combat, armed forces have been particularly concerned to keep information about stock secret, and there are few reliable publicly-available indicators of the scale and mode of ammunition stockpiling at the national level. Not surprisingly, reliable information about holdings of non-state armed groups and criminals is also scarce.

Where the true extent and nature of ammunition stocks is hidden, the adequacy of arrangements for safe storage and security from theft, loss, or accident also remains largely out of public view. As international concern and awareness has increased, it has become clear that arrangements for secure and safe storage are very inadequate in many states. In numerous countries, for example in countries of the former Soviet Union, gigantic quantities of ammunition appear to be at risk. The potential for diversion, misplacement, and catastrophic incident are all too clear in these cases (Greene, Holt, and Wilkinson, 2005, p. 14). It seems likely that such problems exist in many countries across the world.

Framing the ammunition issue

Ammunition has received only tacit recognition in the small arms and light weapons debate. The gun has been squarely at the centre of debate and ammunition has remained a secondary consideration.

The 1997 Report of the UN Panel of Governmental Experts on Small Arms (UNGA, 1997) and the 1999 Report of the UN Group of Governmental Experts on Small Arms (UNGA, 1999) considered cartridges, missiles and rockets, and other projectiles (such as grenades and mortars) fired by small arms and light weapons to be part of the small arms and light weapons category (UNGA, 1997, para. 29; UNGA, 1999, para. I/11).[3] The explosives and ammunition listed by the 1997 UN Panel are the subject of this book.

Thus far, however, international norms, commitments, and programmes designed in relation to small arms and light weapons have rarely addressed these types of ammunition. Where international attention has focused on ammunition, it has been viewed as a corollary to small arms and light weapons issues. This has overshadowed the distinctive characteristics that justify addressing ammunition in its own right.

These characteristics, and the structures and processes of ammunition production, transfer, holdings, storage, use or misuse, and disposal, may mean that policy responses must be redesigned and refocused in order to be effective.

In terms of transfers, for instance, the fact that the 1997 UN Panel included explosives in its list of ammunition for small arms and light weapons has a number of consequences. In contrast to small arms and light weapons, the explosive qualities of ammunition make it a 'dangerous good'. Its packaging and transportation must fulfil specific standards. This can be particularly important, since requirements include appropriate markings on the ammunition packaging and a certain amount of paperwork, which can then be used to track transfers and, possibly, identify points of diversion (see Chapter 4). The requirements, costs, and techniques for the unique marking of all cartridges are also different to those for weapons such as pistols or automatic rifles.

A related distinguishing feature of ammunition, in contrast to small arms and light weapons, is the risk of explosion when improperly stored and handled. In January 2002, for instance, an ammunition dump located in a densely populated area of Lagos, Nigeria, exploded—killing more than 1,000 people.[4] Other explosive incidents linked to poor storage or unsafe handling of ammunition are numerous, and their effects on human security can be disastrous (see Chapter 8).

This explosive characteristic poses problems for destruction as well as storage. The often substantial quantities of ammunition handed in during weapons collection programmes pose special risks, requiring specialist management and storage. Destruction of ammunition for small arms and light weapons is a more demanding technical task than destroying the weapons themselves. It is nevertheless a necessary one.

Surplus stocks can represent a physical and environmental hazard once they deteriorate. They can fall prey to diversion (whether by loss or theft), ultimately falling into the hands of non-state armed groups and criminals. Ensuring the safe storage of ammunition, and the destruction of insecure surpluses, promises positive effects for public health, economic development, and reducing the illicit transfer of arms (Greene, Holt, and Wilkinson, 2005, p. 9).

The characteristics of ammunition that set it apart from small arms and light weapons suggest a number of specific priorities for action, of which the following are particularly urgent:

- Develop mechanisms for marking ammunition; keeping records of transfers; and enable cooperation in tracing, so as to enable points of loss or diversion to be identified (Chapter 7);
- Promote safe and secure storage of ammunition, including that for small arms and light weapons, particularly in transitional countries and conflict-prone regions (Chapter 8);
- Ensure the rapid destruction of a large proportion of the substantial stocks of surplus ammunition that currently exist (Chapter 9).

Tackling ammunition: missed opportunities

At the international level, the first substantial international debates and movements towards establishing international standards on the transfer and use of ammunition can be seen in the 1890s. In 1899, the First Hague Peace Conference adopted Declaration (IV,3) Concerning Expanding Bullets, by which 'the Contracting Parties agree to abstain from use of bullets which expand or flatten easily in the human body, such as bullets with a hard envelope which does not entirely cover the core or is pierced with incisions' (ICRC, 2005). The prohibition on the military use of such soft-nosed or semi-jacketed bullets is now widely accepted, has the status of international customary law, and is included in the definition of 'war crime' employed by the Rome Statute of the International Criminal Court (Coupland and Loye, 2003, p. 136; UN, 1998, Art. 8, no. 2 b xix).

It was not until the 1990s, however, that the debate progressed substantially on international and regional norms and programmes to control small arms and light weapons, including most types of ammunition for such weapons. As the issue emerged as a focus for international attention, it tended to be framed differently in different regions. Central and South American countries particularly focused on combating illicit trafficking, and were concerned with improvised explosive devices (such as the bombs used by non-state actors) as much as with ammunition and arms. Under their influence, the Inter-American Convention against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and other Related Materials, agreed by the Organisation of American States in 1997, explicitly addressed ammunition and explosives (OAS, 1997).

In contrast, in the Organization for Security and Co-operation in Europe (OSCE) context, small arms and light weapons, as well as ammunition and explosives, tended to be considered distinct areas for regional standard setting and cooperation. Concerns about improvised explosive devices led to agreements on restrictions and chemical marking of high-explosive materials, and to agreements on cooperation to combat and prevent terrorism. However, the main OSCE agreement on small arms and light weapons focuses on controls on arms, and explicitly addresses ammunition only in the context of post-conflict Disarmament, Demobilization, and Reintegration (DDR) programmes (OSCE, 2000, Section V, D, 5).

The report of the 1997 UN Panel of Governmental Experts on Small Arms included ammunition for small arms and light weapons as an intrinsic part of the small arms and light weapons category and recommended the specific study of such ammunition and the explosives issue (UNGA, 1997). This led in 1998 to the establishment of a UN Group of Governmental Experts on ammunition and explosives for this purpose. The report of this Group, issued in June 1999, examined what was known about the manufacture; legal and illicit transfer; marking and tracing; destruction and disposal; levels of stocks and surpluses; and existing legislative control of small arms and light weapons ammunition and explosives (UNGA, 1999). Its key conclusion was that relatively little was known about these questions, implying an urgent need for improved transparency and further research. At the same time, there was sufficient knowledge to support a series of recommendations for action through the UN and regional frameworks.

Most of these recommendations, however, went unheeded. Ammunition and explosives were an important focus of dispute in the second Group of Governmental Experts on Small Arms, the purpose of which was to review progress towards implementing the recommendations and consider how to develop and establish international norms and programmes on small arms and light weapons within UN frameworks. While there was little dispute in principle about the importance of including ammunition for small arms and light weapons as an integral part of small arms and light weapons problems and action programmes, key states were strongly divided about explosives. Some states, such as Colombia and Mexico, were strong advocates for including them (especially those relevant to improvised explosive devices), but countries such as China, Russia, the United States, and several European Union (EU) member states were opposed.

The issue could not be properly resolved and the result was that explosives were not substantially addressed in the new recommendations. This had an important impact on the drafting of those recommendations that explicitly referred to ammunition. If a draft included the word 'ammunition', it was feared that there would be strong pressure from some participants to add the phrase 'and explosives' or to include sections that explicitly addressed explosives. In this context, the Group's report tended only to refer to 'small arms and light weapons' as a generic category, which all participants could accept on the basis of different understandings of what it encompassed.

The resulting Report (UNGA, 1999) formed the basis for preparations for the 2001 UN Conference on small arms and light weapons and the UN Programme of Action (PoA) that resulted, which now provides the main international framework for action on small arms and light weapons (UNGA, 2001a). Although most participants in the UN Conference understood ammunition to be an integral part of the small arms and light weapons category, this was not specifically addressed in the PoA. Ammunition was, however, included in the 2001 UN Firearms Protocol of the UN Convention against Transnational Organized Crime, an international agreement of more limited scope (UNGA, 2001b).

Since 2001, much of the international community has remained aloof regarding the issue of ammunition for small arms and light weapons.[5] The recently adopted *International Tracing Instrument*, for instance, does not include ammunition (UNGA, 2005, Section VI, 27), despite the easy steps that could be taken to improve ammunition marking and the positive consequences this could have in establishing responsibilities in cases of misuse or diversion to illicit recipients (Carle, 2005–06, pp. 51–52; see also Chapter 7). Similarly, cooperative programmes to promote and support the collection of small arms and light weapons, stockpile security, and the destruction of surplus or confiscated stocks have generally included ammunition as well as weapons, although often without adequate attention to the specific challenges posed by ammunition. It is therefore fair to say that ammunition has received only scant attention, being considered at best as an accessory to the weapons, and at worse as a 'complex' issue that should be detached from the 'small arms and light weapons' debate and policy agenda.

This book

This book aims to provide a systematic review of the characteristics, processes, and challenges relating to ammunition for small arms and light weapons. Even more than for small arms and light weapons, there are substantial gaps in knowledge and understanding. This book is an attempt to fill these gaps and to open the way to more research on ammunition-related matters. Some useful initial studies have been published (see, for instance, DeClerq, 1998; Stohl, 1998; UNGA, 1999; Anders, 2005; Greene, Holt, and Wilkinson, 2005; Small Arms Survey, 2005), and substantial information is dispersed among various professional and practitioner communities. This book provides (to the knowledge of the authors) the first book-length study of key dimensions of the issue area. It is necessarily incomplete, however, and it is hoped that it will inspire other researchers to study in turn this important topic.

A key consideration in writing this book is the urgent need for a reliable 'primer' to enable relevant international policy communities to engage with this central topic. Many of the obstacles to progress on international and regional agreements in this area appear to stem from a lack of basic knowledge and understanding in large sections of the policy community of the key characteristics of ammunition for small arms and light weapons; its production and proliferation; the distinctive questions and challenges posed in the key contexts of misuse; and the immediate priorities for international action. These therefore form the three main sections of this book.

Part I on core issues begins with a chapter by James Bevan and Stéphanie Pézard introducing the basic characteristics of the range of types of ammunition for small arms and light weapons. After a brief overview of the history of the development of such ammunition, Bevan and Pézard review the different types of ammunition currently in use as well as their effects and characteristics, and examine emerging developments—some of which tend to blur the distinction between small arms and light weapons.

Chapters 2, 3, and 4, respectively, address production, authorized transfers, and illicit transfers of ammunition for small arms and light weapons. Systematic and reliable information is scarce in each of these areas, but the authors bring together what exists to examine key characteristics, processes and structures. In Chapter 2, Holger Anders and Reinhilde Weidacher review key characteristics of the production of small arms and light weapons and examine the structures and trends in ammunition industries. These include a discussion of the prospects for improving international controls on ammunition production, including controls on transfers of production capacities and of ammunition components.

Chapter 3 by Anne-Kathrin Glatz on authorized transfers of small arms ammunition uses UN Comtrade data to identify the major exporters and importers of ammunition for small arms and light weapons. The chapter also includes a discussion of authorized ammunition transfers to countries in conflict or with a record of major human rights abuses, and to their neighbours—cases in which authorized transfers of ammunition can be particularly problematic.

The characteristics and processes of illicit trafficking in ammunition for small arms and light weapons are examined by Mike Bourne and Ilhan Berkol in Chapter 4. The chapter identifies four relatively distinct modalities for illicit trafficking—the 'ant-trade', covert sponsorship by governments, diversion of legal supplies, and international black market transfers.

Part II of the book examines the significance and specific features of ammunition for small arms and light weapons in key contexts of misuse: armed crime and armed conflict. In Chapter 5, Stéphanie Pézard examines demand for ammunition in contexts of armed conflict, how ammunition reaches theatres of conflict, how it affects conflict, and what happens to ammunition when the armed conflict ends.

Chapter 6 by Pablo Dreyfus focuses on ammunition misuse in the context of crime, particularly organized crime in states where controls are relatively weak. The chapter adopts a case study approach to illustrate some of the key questions and national efforts being made to tackle the problem, focusing on recent experience in Brazil. The chapter examines in detail the processes of ammunition supply and procurement by criminal gangs as well as some recent responses, particularly those associated with the new Federal Statute of Disarmament which came into force in 2004.

Part III of this book examines three issue areas for which international action on small arms and light weapons is particularly urgent: marking and tracing; stockpile security and safety; and stockpile destruction and disposal. In Chapter 7, Holger Anders examines the specific challenges posed by developing effective international standards for marking, record keeping, and tracing ammunition for small arms and light weapons. Anders examines existing standards and practices, particularly for marking the range of types of ammunition for such weapons, and discusses the implications for developing international standards on marking and cooperation in tracing.

Management and security of small arms and light weapons stockpiles is the subject of Chapter 8, by Adrian Wilkinson. The chapter systematically examines each of the key dimensions of this task, such as stockpile safety, best practice guidelines, and minimum standards. Stockpile safety is an important issue because of the explosive components of ammunition, and many inadequately managed stocks pose substantial risks to people in and around the storage areas. Chapter 9, also by Wilkinson, reviews techniques for ammunition destruction and recent international efforts to promote and support the destruction of surplus stocks.

Policy-makers, researchers, and other readers will easily identify the two recurring themes of *Targeting Ammunition*: first, contributors make repeated calls for further research on and greater international understanding of ammunition issues; and second, they stress the need for rapid progress towards the development of national, regional, and international standards and programmes that address ammunition. The 2006 United Nations Conference to Review Progress Made in the Implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects will review the achievements made by the *Programme of Action* since 2001 and provide directions for the future. This represents an major opportunity to address these issues and to build momentum towards sustained national, regional, and international action. Whether ammunition is considered to be an integral part of the small arms and light weapons it fuels or an entity in its own right, it is high time that the international community increased its efforts to control ammunition proliferation and misuse. This volume provides it with an impetus to do so.

Endnotes

1 Some countries nevertheless recognize the importance of the issue of ammunition and have attempted to promote it on the international stage; a French–German contribution entitled 'Food for Thought for Possible Draft Elements on Ammunition for a Final Document on the UN SALW Programme at Action Review Conference 2006' was presented on 17 January 2006 at the Preparatory Committee of the UN Conference to Review Progress Made in the Implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects (France and Germany, 2006).

2 This is the case unless groups can switch weapons and use those for which ammunition is available, but most armed groups—and indeed state armed forces—do not have this luxury.

3 'Small arms' are understood to include all conventional weapons that can be carried and operated by an individual combatant. The category of 'light weapons' constitutes conventional arms that can be carried and operated by a small unit of 2–4 personnel, and could, for example, be mounted on the back of a Jeep. 'Small arms' include: revolvers and self-loading pistols; rifles and carbines; assault rifles; sub-machine guns; and light machine guns. 'Light arms' include: heavy machine guns; hand-held under-barrel and mounted grenade

launchers; portable anti-tank and anti-aircraft guns; recoilless rifles; portable launchers of anti-tank and anti-aircraft missile systems; and mortars of less than 100 mm calibre (UNGA, 1997, paras. 26–27). In principle, anti-personnel land mines are also included as small arms and light weapons. However, since these are the focus of separate international agreements and policies, they were placed in a category of their own.

4 As noted by the UN mission that reported on this incident: 'The majority of fatalities occurred not from the actual explosion, but due to the subsequent panic which followed the incident' (UNDAC, 2002, p. 3).

5 A number of states opposed this, arguing that ammunition for small arms and light weapons was beyond the scope of the instrument and should therefore be addressed in other frameworks.

Bibliography

Anders, Holger. 2005. *Scope for International Minimum Standards on Tracing Illicit SALW Ammunition: Recommendations to the UN Open-Ended Working Group on Tracing Illicit SALW, 6–7 June 2005.* Note d'Analyse. Brussels: Groupe de Recherche et d'Information sur la Paix et la Sécurité (GRIP), 6 June. <http://www.grip.org/bdg/g4575.html>

Carle, Christophe. 2005–06. 'Small arms ammunition: light at the end of barrel?' *Disarmament Forum.* No. 4, 2005, and No. 1, 2006, pp. 49–54. <http://www.unidir.org/pdf/articles/pdf-art2430.pdf>

Coupland, Robin and Dominique Loye. 2003. 'The 1899 Hague Declaration Concerning Expanding Bullets: A treaty effective for more than 100 years faces complex contemporary issues'. *International Review of the Red Cross*, Vol. 85 No. 849. March, pp. 135–42.

DeClerq, David. 1998. 'The Role of Ammunition Controls in Addressing Excessive and Destabilizing Accumulations of Small Arms'. Unpublished background paper. Department of Foreign Affairs and International Trade, Canada.

France and Germany. 2006. 'Food for Thought for Possible Draft Elements on Ammunition for a Final Document on the UN SALW Programme at Action Review Conference 2006'. Non-paper presented at the Preparatory Committee for the United Nations Conference to Review Progress Made in the Implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects, New York, 9–20 January. Reproduced in United Nations document A/CONF.192/2006/PC/CRP.12. 17 January. <http://www.un.org/events/smallarms2006/pdf/CRP.12.pdf>

Greene, Owen, Sally Holt, and Adrian Wilkinson. 2005. *Ammunition Stocks: Promoting Safe and Secure Storage and Disposal*. Biting the Bullet Briefing 18. London and Bradford: International Alert/Saferworld/CICS. February. <http://www.international-alert.org/pdfs/btb_brf_18.pdf>

ICRC (International Committee of the Red Cross). 2005. Declaration (IV,3) concerning Expanding Bullets. The Hague, 29 July 1899. <http://www.icrc.ch/ihl.nsf/FULL/170?OpenDocument>

OAS (Organization of American States). 1997. Inter-American Convention against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials ('Inter-American Convention'). Adopted in Washington, DC, on 14 November. Entered into force on 1 July 1998. <http://www.oas.org/juridico/english/treaties/a-63.html>

OSCE (Organization for Security and Co-operation in Europe). 2000. *OSCE Document on Small Arms and Light Weapons.* 24 November. FSC.DOC/1/00. <http://www.fas.org/asmp/campaigns/smallarms/osce-sa.pdf>

Small Arms Survey. 2003. *Small Arms Survey 2003: Development Denied*. Oxford: Oxford University Press.

—. 2005. *Small Arms Survey 2005: Weapons at War.* Oxford: Oxford University Press.

Stohl, Rachel. 1998. *Deadly Rounds: Ammunition and Armed Conflict*. BASIC Research Report No. 98.4. Washington, DC: British American Security Information Council (BASIC). May. <http://www.basicint.org/pubs/Research/1998deadlyrounds.htm>

UN (United Nations). 1998. Rome Statute of the International Criminal Court. <http://www.un.org/law/icc/statute/english/rome_statute(e).pdf>

UNDAC (United Nations Disaster Assessment and Coordination Team). 2002. UNDAC Mission to Lagos, Nigeria: Report. <http://ochaonline.un.org/GetBin.asp?DocID=1699>

UNGA (United Nations General Assembly). 1997. *Report of the Panel of Governmental Experts on Small Arms.* Reproduced in UN document A/52/298 of 27 August. <http://www.un.org/Depts/ddar/Firstcom/SGreport52/a52298.html>

—. 1999. *Report of the Group of Experts on the Problem of Ammunition and Explosives.* Reproduced in UN document A/54/155 of 29 June.

—. 2001a. *Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects ('UN Programme of Action').* Reproduced in UN document A/CONF.192/15 of 20 July.

—. 2001b. Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, supplementing the United Nations Convention against Transnational Organized Crime ('UN Firearms Protocol'). UN Document A/RES/55/255. 8 June. <http://www.unodc.org/pdf/crime/a_res_55/255e.pdf>

—. 2005. International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons ('International Tracing Instrument'). 27 June. Reproduced in UN Document A/60/88 of 27 June. <http://disarmament2.un.org/cab/oewg/Report.pdf>

Part 1

PRODUCTS

Ammunition collected during the disarmament process following Burundi's civil war. From left to right: a 7.62 mm x 39 mm cartridge, a 7.62 mm x 51 mm cartridge, a 12-gauge shotgun shell, and a 12.7 mm x 108 mm cartridge.
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1

Basic Characteristics of Ammunition: From Handguns to MANPADS

James Bevan and Stéphanie Pézard

Introduction

In policy-relevant small arms research ammunition receives far less attention than weapons. Most researchers and policy makers are more familiar with pistols, rifles, or machine guns than with the different types and calibres of projectiles fired by each weapon. One reason for this is the sheer diversity of ammunition, ranging from the basic pistol cartridge to sophisticated explosive projectiles for man-portable air defence systems (MANPADS). In order to understand the issues surrounding the use and misuse of small arms and light weapons it is necessary to understand the roles and characteristics of ammunition as well as the factors affecting its production and distribution. Without this knowledge it is difficult to develop effective policies—both domestic and international—to address the problems associated with the unchecked proliferation and use of small arms.

Many authors have provided comprehensive studies of the technical characteristics of ammunition (e.g. Courtney-Green, 1991; Allsop et al., 1997; Ness and Williams, 2005). This chapter presents the broad categories of ammunition for small arms and light weapons and is intended as an introduction to its diverse technical characteristics in order to provide a basic understanding of ammunition in the context of historical, current, and possible future developments. It is therefore a starting point for those who wish to understand how ammunition functions, and how it may potentially be targeted by national and international initiatives.

Section 2 of this chapter is an overview of the history of ammunition. Section 3 presents the different types of ammunition that are in contemporary use. Section 4 describes the various damaging effects that each type of ammunition may have on human beings and infrastructure. Section 5 is a brief overview of recent developments in ammunition technologies, and Section 6 analyses how international attitudes and responses to the proliferation of ammunition may change in the near future. Section 7 presents conclusions. The chapter's most salient conclusions can be summarized as follows:

- Ammunition that requires sophisticated technology, such as guided missiles, is only produced in a small number of countries but traditional cartridge-based ammunition producers are far more widespread.
- The accuracy and destructive capacity of ammunition, and of light weapons in particular, are continuously increasing.
- The latest developments in ammunition tend to blur current understandings of the distinction between small arms and light weapons.
- These developments seem set to bring yet more firepower and accuracy to the battlefield, thereby increasing the destructive potential of war and necessitating new approaches to controlling the proliferation and use of ammunition.

A brief history of ammunition

Small arms ammunition

Propellant and primers

Gunpowder (also known as 'black powder') is a mixture of charcoal, sulphur, and potassium nitrate. It was originally produced in ancient China and was first developed as a propellant for use in cannons in Europe around the 14th century (Krause, 1995, pp. 36–37; Folly and Mäder, 2004, p. 374).

Gunpowder was originally very easy to ignite, a problem that was mitigated by the development of corned powder in the 1420s, which made the different components of the mixture more stable (White, 1964, pp. 100–01). Black powder remained very susceptible to moisture, however, and its very low rate of combustion made storage hazardous. In addition, it produced a lot of residue on firing, which tended to foul the barrel of the weapon. The heavy smoke it produced limited shooting accuracy and revealed the shooter's position (Folly and Mäder, 2004, p. 374).

Black powder nevertheless remained in use until the late 19th century, when it was replaced by nitrocellulose-based smokeless powder (Allsop et al., 1997, p. 8). In addition to being more powerful, the smokeless powder left the barrel relatively clean and had better storage and transportation properties. The switch to smokeless powder facilitated the development of more complex weapons, notably machine guns, which required a powder that would not foul complicated firing mechanisms (Headrick, 1981, pp. 99–100).

Important improvements were made to the stability and functioning of ammunition in the early 19th century. Primers, which are used to ignite the propellant, had previously been made from fulminate of mercury—a substance that is particularly unstable when stored. Chlorate mixtures had been tried in the early 1800s but these resulted in severe corrosion and rusted the weapon's chamber. When alternative lead styphnate mixes were developed, they proved more stable and did not harm the weapon (Drury, 1999).

Projectiles

Early projectiles were made of stone, then iron, and later of the more dense metals such as lead (Krause, 1995, p. 37). Lead bullets were at first spherical and loaded through the muzzle of unrifled smoothbore weapons.[1] Rifles were developed early in the history of military small arms but took much longer to load than smoothbore weapons because the bullet had to be wrapped in a piece of leather to allow it to grip the rifling of the barrel. One consequence of this loose fit was that rifles suffered from fouling in the barrel (Headrick, 1981, p. 87).

In 1848, however, the development of the Minié bullet made possible the large-scale adoption of rifles as a military small arm. This new bullet was conical in shape with a hollow base, and it was easy to load. Moreover, it expanded on firing to fit the rifling of the barrel, thereby providing greater accuracy and reducing fouling (McNeill, 1983, p. 231).

Throughout the 19th century the calibre of guns and ammunition progressively reduced, from the 19 mm ball of the Brown Bess musket of the first quarter of the century, to the less than 8 mm rounds used in some repeater rifles in the 1890s (Headrick, 1981, p. 99). The last quarter of the 19th century also saw the development of steel- or copper-jacketed bullets with a lead core. These were harder and more resistant to the heat in the barrel (DeClerq, 1999).

Cases and cartridges

The first cartridges appeared in the first half of the 17th century but were more of a 'shooting kit' than a real cartridge. Cartridges combined both powder and bullet in a tube of thick paper. The shooter tore the paper apart, poured the powder into the muzzle of the weapon, and then inserted the bullet. The paper was used as a wad to prevent the bullet from falling out of the barrel (Allsop et al., 1997, pp. 11–12). Paper cartridges allowed quicker loading (Allsop et al., 1997, p. 11) and, by regulating the amount of powder used in every firing, more consistent and predictable shooting. They also reduced jamming and exploding barrels.

The next step was the invention of the self-contained cartridge in the mid-19th century. This consisted of a single case holding a primer, propellant, and bullet. The cartridge was designed to be inserted whole into the breech of a weapon; a characteristic which defines breech-loading weapons. Made of brass, the cartridge allowed a tighter seal within the weapon's barrel, which better contained the propellant gases and consequently improved the weapon's range (DeClerq, 1999).

Smokeless powder, lead styphnate primers, steel- or copper-jacketed bullets, and brass breech-loading cartridges are all features of contemporary ammunition and the technology has not changed much in recent decades (Small Arms Survey, 2005, p. 10). For instance, the 9 mm Parabellum round developed 100 years ago is still a favourite of contemporary armies—although it is worth noting that powders and primers have improved in quality since that time (Marchington, 1997, p. 8).

Light weapons ammunition

The evolution of explosive light weapons ammunition has followed a different path to that of small arms ammunition. Man-portable, direct-fire, rocket-propelled munitions only appeared in the mid-20th century—after the development of sufficiently small rocket motors.

The Russian RPG-2 anti-tank grenade launcher (which is technically a recoilless rifle) was adopted by the Soviet army in 1949. The PG-2 High Explosive

Anti-Tank (HEAT) grenade used in the RPG-2 contained a charge of propellant and six stabilizing fins that opened during flight (Modern Firearms and Ammunition, 1999). The weapon was replaced in 1962 by the much higher performance, and now ubiquitous, shoulder-fired anti-tank rocket launcher, the RPG-7 (Jones and Cutshaw, 2004, pp. 432–33; Modern Firearms and Ammunition, 1999).

The development of guided weapons came much later than weapons such as the RPG-7 and other anti-tank rocket launchers. MANPADS, for instance, were first mass-produced at the end of the 1960s. The earliest models included the US FIM-43 Redeye (1967), the British Blowpipe (1968), and the Russian SA-7 (1968) (Small Arms Survey, 2004, p. 82).

There were also major technical developments in indirect-fire munitions, such as those for mortar rounds, in the 20th century. A significant impetus for these developments was trench fighting in the First World War, which required a weapon that could be fired from one trench to another in a high arc trajectory. The Stokes trench mortar, for instance, combined powerful shells and a long range. The evolution of mortar rounds was marked by a reduction in calibre, which made the weapons more mobile. Mortars developed from heavy weapons used primarily for siege warfare into man-portable weapons (Canfield, 2000).

The First World War also encouraged new developments in grenade technology. Grenades had been used for centuries but were more or less abandoned in the 18th century. Most of the earlier designs consisted of a simple metal container filled with gunpowder. They had increasingly been regarded as dangerous in this form, and as of little use on the battlefield. However, the requirements of trench warfare, combined with newly developed mechanical ignition systems, reintroduced grenades as a practical infantry weapon in close-quarter fighting.

Basic categories of ammunition for small arms and light weapons

The 'Small arms and light weapons' listed in the *Report of the Panel of Governmental Experts on Small Arms* by the Expert Group of 1997[2] encompasses a variety of weapon types that, in turn, employ very different types of ammunition. One possible way of analysing small arms and light weapons ammunition is to divide it into two categories, based on the distinction between traditional cartridge-based and non-cartridge-based ammunition. These categories can be further subdivided by calibre and according to whether projectiles are guided or unguided (Figure 1).

The distinction between cartridges and explosive projectiles is important for a number of reasons. There are distinctions between the level of technology required to produce 'traditional' cartridge-based ammunition, and more sophisticated ammunition (Small Arms Survey, 2005, pp. 45–46). It is also a distinction that broadly follows the division between small arms and light weapons (Table 1). While all small arms use cartridge-based ammunition, the majority of currently available light weapons fire explosive ammunition.

Table 1
Small arms and light weapons in *United Nations Report of the Panel of Governmental Experts on Small Arms*

Type of weapon*	Cartridge-based	Guided projectile	Explosive projectile
Small arms:			
Revolvers and self-loading pistols	Yes	No	No
Rifles and carbines	Yes	No	No
Assault rifles	Yes	No	No
Sub-machine guns	Yes	No	No
Light machine guns	Yes	No	No
Light weapons:			
Heavy machine guns	Yes	No	No**
Hand-held under-barrel and mounted grenade launchers	Yes	No	Yes
Portable anti-tank and anti-aircraft guns	No	No	Yes
Recoilless rifles	No	No	Yes
Portable launchers of anti-tank and anti-aircraft missile systems	No	Yes	Yes
Mortars of less than 100 mm calibre	No	No	Yes

* **Source:** *United Nations Report of the Panel of Governmental Experts on Small Arms* (UN, 1997, section III, para. 26)
** Explosive ammunition for some large-calibre machine guns is available but remains very rare.

Cartridge-based ammunition can be divided into categories by calibre. The distinction between calibres below 12.7 mm and those of 12.7 mm and above broadly respects the small arms–light weapons distinction.[3] This distinction matters for several reasons. In practical terms, it reflects the higher proportion of small arms to light weapons in service across the world. Small-calibre assault rifles constitute the personal weapon of individual combatants, while light weapons may be distributed only one or two per squad or section. This fact, in turn, affects the type and number of rounds of ammunition manufactured because of the disparity in the number of weapons in service in any armed force. Also, the 12.7 mm distinction serves as a rough guide to whether the weapon is used predominantly by civilians or military personnel. With a few exceptions, such as .50 calibre pistols and rifles, most weapons of 12.7 mm or greater calibre are designed explicitly for military use—and used as such.

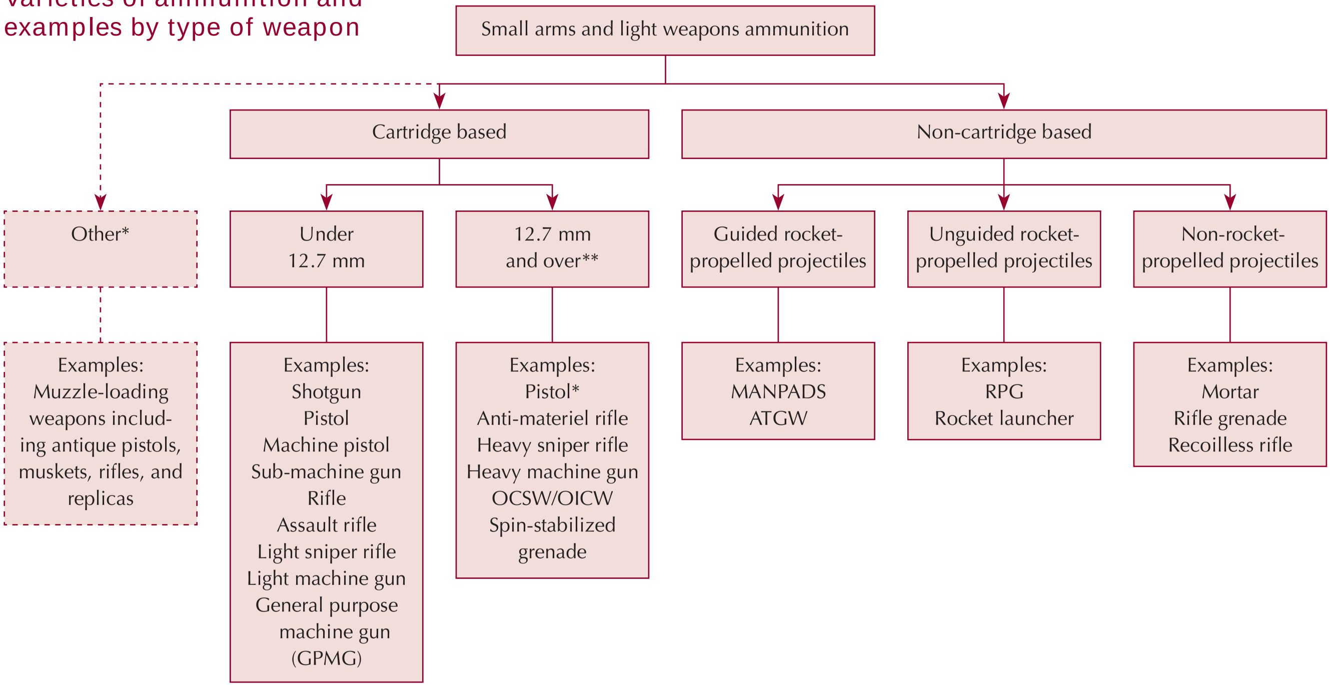
Grenades, explosives, and landmines are also included in the UN definition of ammunition. Anti-personnel and anti-tank grenades are functionally similar to small arms and light weapons ammunition, such as cartridge-based ammunition and missiles, because they are also designed to project force (see Box 1). Explosives (including improvised explosive devices) and landmines have different characteristics that distinguish them from small arms and light weapons ammunition (see Box 1).

Box 1 Explosives and landmines

The UN defines explosives and landmines as weapons 'manufactured to military specifications' (UN, 1997, section III, para. 24). Improvised explosive devices, therefore, are outside this definition. The inclusion of explosives, which are contained in such devices but also in all types of small arms and light weapons ammunition, is problematic on a number of counts: their applications are many and military explosives do not differ greatly from explosives used for civilian applications—such as for demolition or blasting. Furthermore, explosives can exist simply as pure condensed explosives—such as Semtex-H or C4—or they can be integral parts of a larger weapons system—such as the charge in a grenade or artillery shell. Explosives designed for use in combat usually belong to the second category. Most are fused to explode either on impact or after a period of time determined by the operator.

Landmines are self-contained explosive devices just like grenades. There is, however, one qualitative difference between grenades and landmines with regard to their use. Grenades are designed to enable an individual to project firepower onto a designated target, while landmines are essentially passive and do not discriminate between targets. They form a study area in their own right.

Figure 1
Varieties of ammunition and examples by type of weapon



* Very limited production and use

** Generally less than 40 mm

Note: Hand grenades fall under the United Nations definition but differ markedly from the ammunition shown above in that they are self-contained, comprising both ammunition and weapon. They are not included in the current classification.

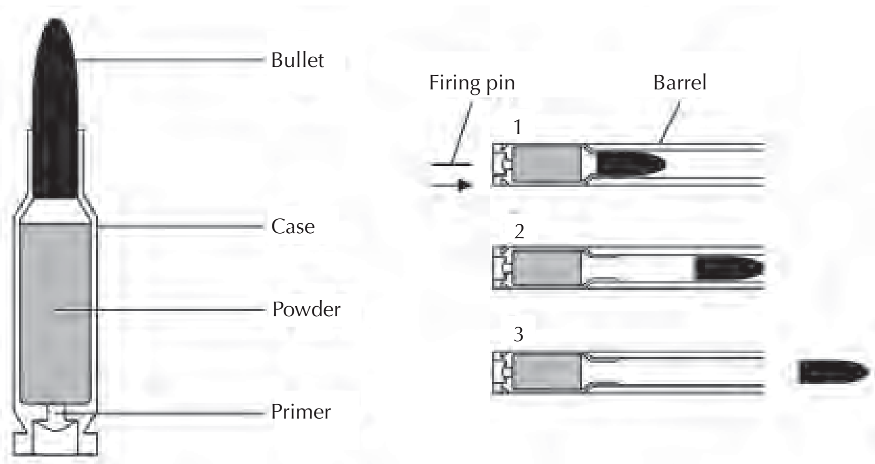
Cartridge-based ammunition

The cartridge is a self-contained unit comprising the cartridge case, the primer, the propellant (powder), and the projectile or 'bullet' (Figure 2). All weapons that fire cartridge-based ammunition have a barrel, which is integral to the process of delivering energy, momentum, and direction to the bullet.

The operating principles of all weapons firing cartridge-based ammunition are the same (Figure 2). The cartridge partially seals the firing chamber of the weapon. On firing, a pin strikes the primer at the base of the cartridge (1) and ignites it. This ignites the powder, which burns rapidly and generates expanding gases. The gases are forced down the length of the barrel, pushing the bullet in front of them (2) and eventually out of the barrel (3). Simultaneously, the cartridge case expands, thereby completing the firing chamber seal. The momentum imparted by the process propels the bullet but there is no process within the bullet that sustains movement. As a consequence, the bullet begins to lose velocity shortly after it leaves the barrel.

Cartridge size differs from weapon to weapon not only in the calibre (i.e. diameter) of the bullet, but also in the overall length of the case (e.g. 5.56 x 45 mm denotes a round of calibre 5.56 mm with a case length of 45 mm). Longer cases contain more powder, which can give more energy and thus higher velocities

Figure 2
Anatomy and operation of cartridge-based ammunition

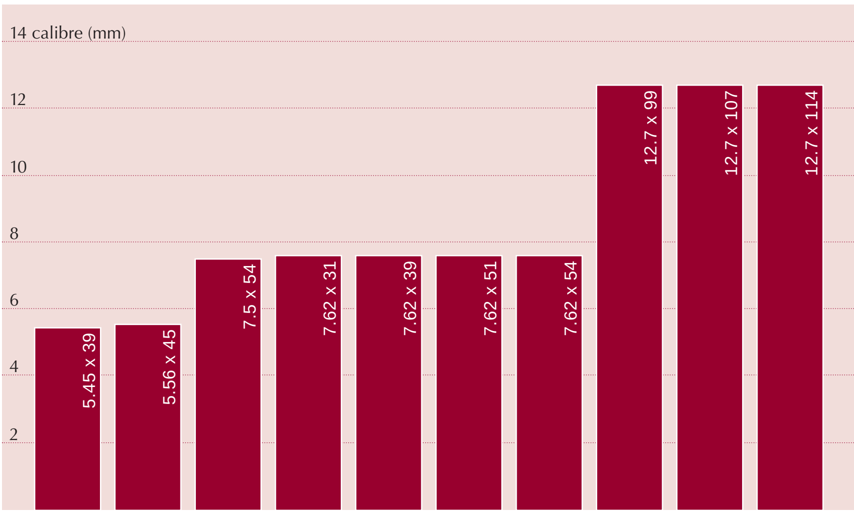


to the bullet. A given calibre can be employed in different types of weapons. Calibre .50 bullets, for instance, can be used in the Browning M2 heavy machine gun or in a pistol, but the .50 bullets used in heavy machine guns are around twice the length and weight of the pistol bullets, and they have around twice the muzzle velocity. In the United States cartridges are usually designated by a name or acronym. For instance, a .45 'Auto Colt Pistol' (ACP) round is 0.45 inches (11.43 mm) in calibre and has a case length specific to ACP ammunition of 22.79 mm (Ness and Williams, 2005, pp. 36–37).

Small calibre cartridge-based ammunition

Small calibre cartridge-based ammunition ranges from the smallest cartridges to those of just under 12.7 mm calibre. This cut-off point is a simple interpretation of the United Nations definition quoted above that places heavy machine guns (which fire ammunition of 12.7 mm calibre or above) in the category of light weapons. There is, moreover, a clear discontinuity in military calibres between 12.7 mm and the next smallest cartridge. Figure 3 shows the ammunition used in the 66 most commonly stocked assault rifles, light machine guns, and heavy

Figure 3
The most common calibres of cartridge-based ammunition



Collated data from Jones and Cutshaw (2004).

Table 2
Ammunition standards

Types of weapons	NATO standards	Warsaw Pact standards
Assault rifles, light support weapons	5.56 x 45 mm	7.62 x 39 mm
Assault rifles, self-loading rifles, sniper rifles, light machine guns	7.62 x 51 mm	7.62x 54 mm
Pistols	9 x19 mm Parabellum	7.62 x 25 mm, 9 x 17 mm
Heavy machine guns, sniper rifles, anti-materiel rifles	12.7 x 99 mm	12.7 x 107 mm, 12.7 x 114 mm

Collated data from Jones and Cutshaw (2004).

machine guns in the world. It demonstrates the discontinuity between assault rifle and light machine gun calibres up to 7.62 mm, and heavy machine gun calibres of 12.7 mm and over. There are very few military long-arms that fire calibres between 7.62 mm and 12.7 mm.

The data in Figure 3 also suggests that, in military ammunition at least, there is a very small range of calibres in frequent use throughout the world. This is linked to the legacy of the polarization of armament sources during the cold war between NATO and Warsaw Pact standards (Table 2). This is particularly true of assault rifles and machine guns—the primary infantry weapons for which standardization into as few calibres as possible is essential from a logistical perspective. However, across the globe, military pistol ammunition is far more diverse in its range of calibres than other ammunition. Many soldiers carry pistols as backup weapons and can choose from a wide range of products and calibres available on the civilian market.

Non-military ammunition is generally more varied in calibre. This is because it fulfils a wider range of functions including: small cartridges for concealed-carry pistols; specialist large-calibre pistol ammunition for hunting; match-grade rifle ammunition for target shooting; ammunition for marksmen in security forces; soft-nosed, low-velocity ammunition for law enforcement; armour-piercing and other larger calibres for big game hunting; and even rubber or plastic rounds for riot and crowd control (Box 2).

Box 2 Non-lethal ammunition

Non-lethal (or, more accurately, 'less than lethal') anti-personal weapons use a wide range of technologies that include kinetic energy, electricity, acoustics, directed energy, chemicals, or a combination of the above (Lewer and Davison, 2005, pp. 38–39). Weapons using kinetic energy replace the usual metal bullet with other impact projectiles such as rubber bullets, plastic baton rounds, or beanbags. Rubber bullets are made of plain rubber or are coated with steel; plastic baton rounds are made of tube shaped PVC (BBC, 2001); beanbags are nylon pockets containing pellets. Although these blunt projectiles are not meant to penetrate the skin, all of them have the capacity to cause serious injury and even death. Police or military forces using these rounds must maintain a long firing distance (20 metres for plastic baton rounds). They must also aim for lower limbs: a medical study on injuries attributable to plastic baton rounds in Northern Ireland showed that they had been the result of head or chest traumas (Hughes et al., 2005, p. 112). However, the low ballistic coefficient of these projectiles results in low levels of accuracy, especially at long range, and this means that they can cause unintended injuries even when properly used (Mahajna et al., 2002, p. 1799).

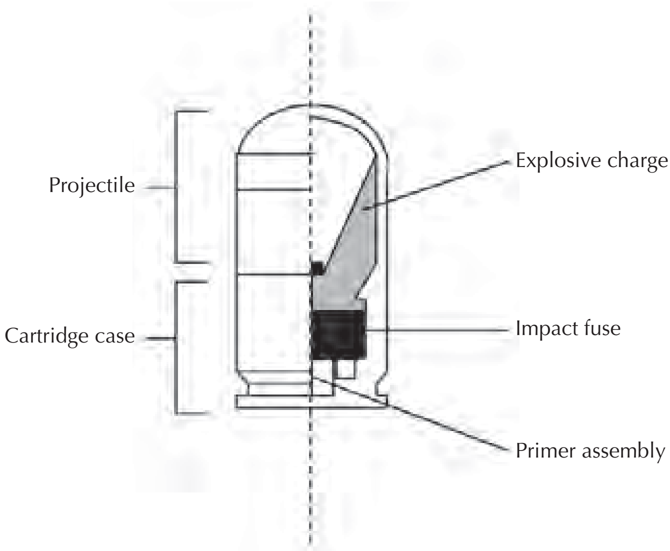
These rubber bullets and live ammunition were used by the Bolivian authorities in a confrontation with coca growers on a road between Chipiriri and Eterazama. © Lucian Read/WPN

Large calibre cartridge-based ammunition

Calibre .50 (12.7 mm) cartridges were formerly used only in medium and heavy machine guns, including those designed for anti-aircraft use. However, in the latter half of the 20th century a number of sniper rifles and anti-materiel rifles appeared on the market that use ammunition of 12.7 mm to 20 mm in calibre (the majority of these weapons use the military .50 BMG cartridge). Brands that use the .50 BMG cartridge, such as Barrett and Truvelo, have also appeared on the civilian market in the United States and South Africa, respectively.[4]

For the most part these large calibres differ very little from smaller calibre cartridge-based ammunition. However, weapons are increasingly being designed to fire explosive rounds using the cartridge system. These include spin-stabilized grenades (Figure 4) and recently developed smaller explosive munitions. Calibres for explosive munitions have tended to be far larger than other types of cartridge-based ammunition. Spin-stabilized grenades, for instance, are usually of 30 mm or 40 mm calibre, although recent developments suggest that calibres may decrease to around 25 mm (Jones and Cutshaw, 2004, pp. 394–95).

Figure 4
Anatomy of a spin-stabilized grenade



The latest versions of spin-stabilized grenades are being developed for the Objective Crew Served Weapon (OCSW) and the smaller Objective Individual Combat Weapon (OICW). The ammunition is conventional, in that it is fired from a cartridge in a barrelled weapon, but the round, which is 25 mm in diameter, is far larger than most cartridges yet smaller than previous spin-stabilized grenades. It is, moreover, fused to explode in the air over targets, an effect that is called 'airbursting' (see Figure 10). It is predicted that the OCSW will replace both heavy machine guns and automatic grenade launchers in the US armed forces (Jones and Cutshaw, 2004, pp. 394–95).

Non-cartridge-based ammunition

In contrast to cartridge-based ammunition, many varieties of non-cartridge based ammunition contain their means of propulsion within the projectile. These weapons are commonly referred to as rocket or missile systems. They also include categories of ammunition such as rocket-propelled grenades. Small arms do not operate in this way, but the majority of light weapons in the United Nations definition operate according to some variation of this principle. The basic configuration of this ammunition differs from system to system but, in all cases, the projectile consists of an explosive warhead and a rocket motor. Propulsion

Figure 5
The two main types of rocket-propelled ammunition

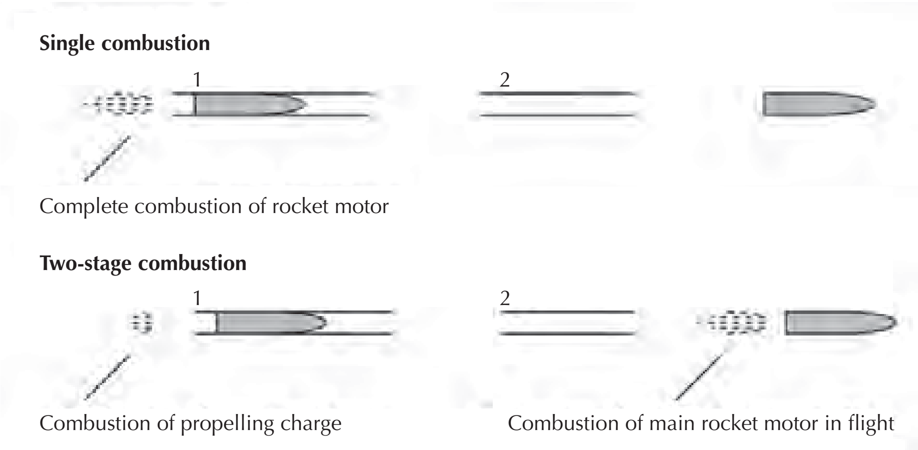
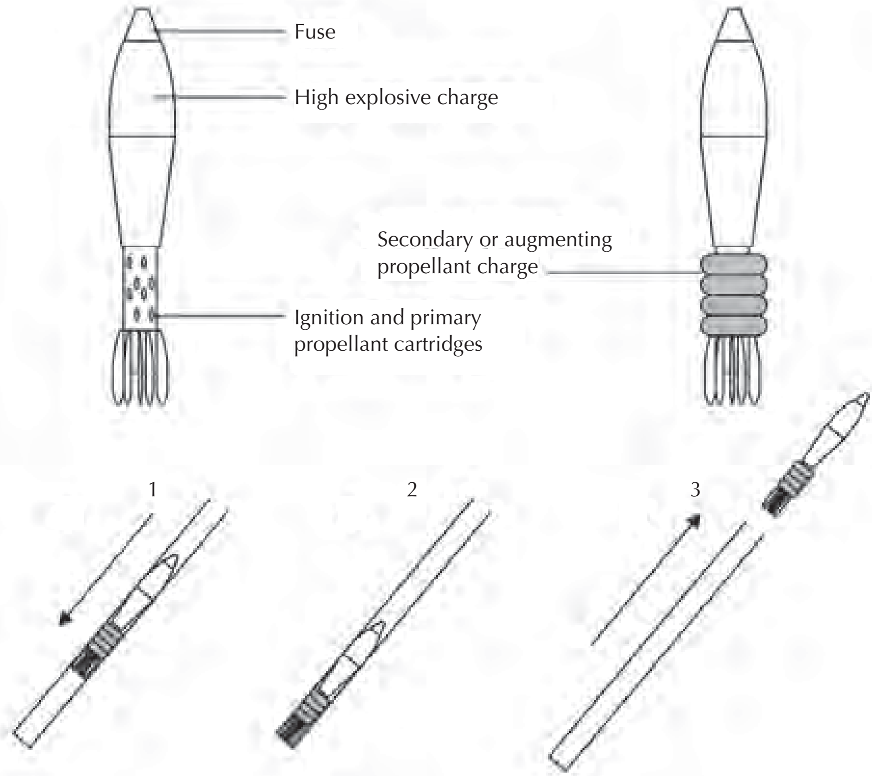


Figure 6
Anatomy and operation of a mortar



can be of two types, depending on whether the combustion of gases occurs while the projectile is in the tube or whether it is launched from the tube by a small propelling charge prior to combusion of the main rocket motor (Figure 5).

Mortars are different in that they operate in a similar way to firearms by using an integral charge (single combustion) but are not strictly cartridge based. As Figure 6 illustrates, the mortar bomb is dropped into the tube (1). It strikes a firing pin at the base of the tube (2), which ignites the ignition cartridge and the primary propellant cartridge. This, in turn, ignites the augmenting or secondary propellant charge (if used), which is arranged in bands around the base of the mortar bomb (shown in grey). The expansion of gases in the tube forces the bomb out of the tube (3).

Unguided ammunition

Unguided ammunition simply follows the trajectory assigned by the firer. Their trajectory cannot be adjusted once they have left the barrel, or launch tube, of the weapon. Unguided weapons are a common feature in most conflicts and include mortars, rocket launchers, RPGs, recoilless rifles, and rifle grenades.

Unguided rocket-propelled light weapon ammunition can be divided into two groups—weapons that are designed to fire along the firer's line of sight, and those that are intended to fire indirectly. The former comprise weapons commonly referred to as 'rocket launchers' or 'missile systems', while the latter are mortars. Mortars fire ammunition in high arc trajectories designed to hit targets beyond the sight of the firer or behind obstacles (Figure 7).

The basic design of a direct-fire projectile includes a warhead section and a propellant section (Figure 8). This type of direct-fire weapon was developed to meet the need for a weapon to defeat armoured vehicles. The weapons and ammunition are now designed for many different roles, including targeting armoured and light vehicles, destroying hard targets such as bunkers or houses, and anti-personnel roles. Because such rocket-propelled ammunition is launched from an unrifled tube, rather than a rifled barrel, no spin is imparted to the projectile on launch. For this reason, stability is achieved through stabilizing fins, which produce a slow rate of roll in flight (Figure 8).

Indian army personnel display seized rocket-propelled grenades (RPGs) in Srinagar, 2005. © Danish Ismail/Reuters

Figure 7
The high arc trajectory of a mortar bomb

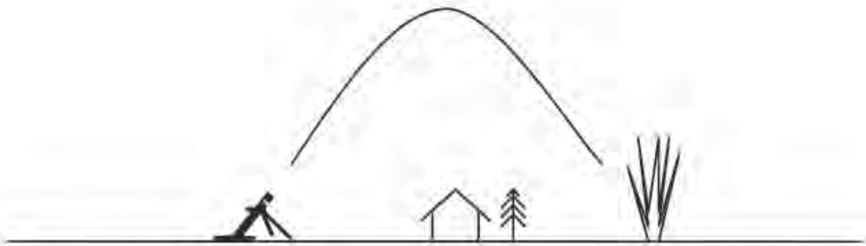
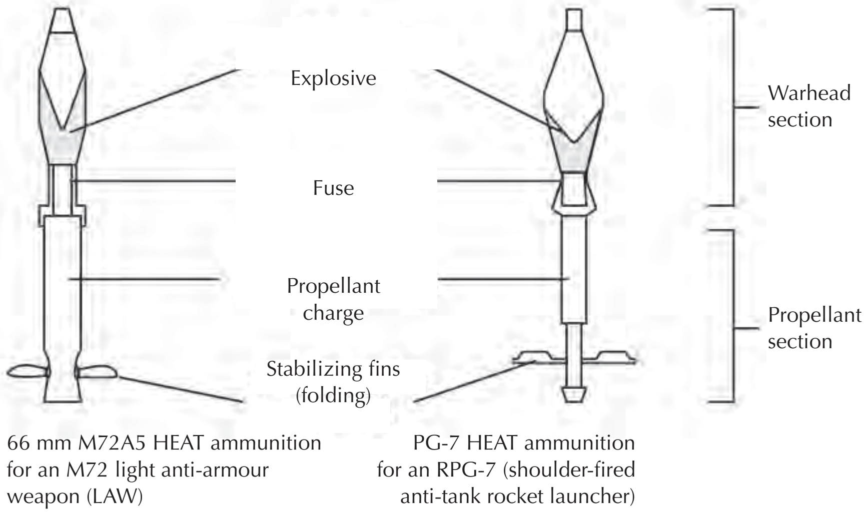


Figure 8
Two examples of unguided rocket-propelled ammunition

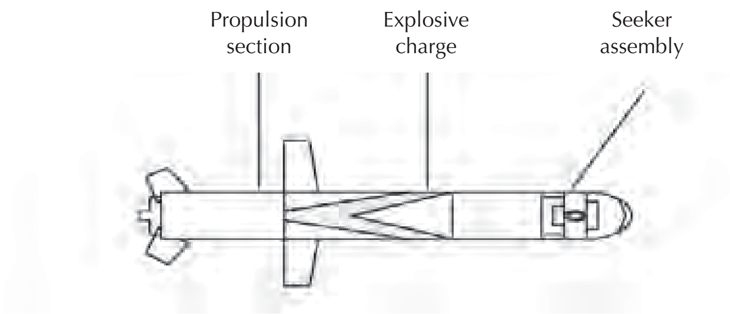


Guided ammunition

In contrast to unguided ammunition, guided ammunition is designed expressly to hit mobile targets, including tanks, lighter vehicles, and aircraft. Guided weapons can be directed towards the target while in flight, which allows the firer to make adjustments to compensate for the target's movement.

Types of guidance system differ greatly. In the early guided weapons, the trajectory of projectiles was adjusted in flight by wire guidance. This relied on

Figure 9
Diagram of an infrared seeking anti-tank missile



Note: A rough representation of a Javelin missile. Adapted from Raytheon and Lockheed Martin (2005).

the operator being in visual contact with the target and making adjustments while the missile flew towards it. Wire guidance is still common in some anti-tank systems, such as the Russian 9M14 Malyutka and the French Matra Eryx.

More recent types of guidance system include radar, infrared seeking, beam riding, image matching, and sensors that analyse a broad spectrum of energy sources. These do not rely on directions given by the operator after firing. They use sophisticated sensors and electronics to recognize the target, calculate its trajectory and that of the missile, and make adjustments to ensure that the two meet. The most modern systems incorporate a number of such methods, most notably, MANPADS such as the British Starstreak and the Japanese Type 91.

Figure 9 illustrates that ammunition which contains a seeker has propulsion and warhead sections that are common to unguided weapons but the warhead is set back behind the seeker, which is positioned at the front of the projectile.

Systems that employ guided rocket-propelled projectiles include anti-tank guided weapons (ATGW) and MANPADS. These are the most sophisticated light weapons in production and their manufacture is confined to a relatively small number of countries with well developed defence industries (Small Arms Survey, 2004, pp. 81–82; 2005, pp. 58–62). Because they are designed to destroy modern, rapidly moving targets, guided weapons present technological, financial, and political barriers to their acquisition, which control their proliferation to a greater extent than unguided weapons.

Hitting the target: a review of effects

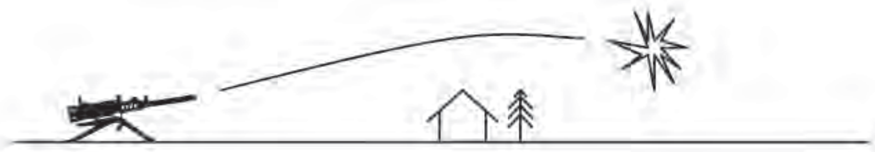
The types of small arms and light weapons ammunition vary greatly and so too do their effects. Differences in effect result from variations in the range and trajectory of the weapons, and the type of impact they are designed to have on their target.

Flight ballistics

The term ballistics refers to the behaviour of a projectile in flight. Most cartridge-based small arms and light weapons are designed to fire a projectile, with a relatively flat trajectory, at a target that is within the firer's line of sight. However, there are a number of small arms and light weapons that are expressly designed to engage targets beyond the sight of the firer. These are termed 'indirect fire' weapons and are designed so that the projectile either follows a high arc trajectory before striking the target (Figure 7), or follows a flatter trajectory before exploding over the target.

In either case, the rationale behind developing such munitions is that the firer can engage the enemy without entering the enemy's line of sight—and ultimately the enemy's line of fire. However, the fact that indirect-fire weapons enable the firer to engage targets he or she cannot see has a number of potentially grave consequences in modern conflict. Primarily, this is because the firer is unable to determine what effect they have. Moreover, from a purely psychological perspective, the firer is disconnected from the target (Grossman, 1995, pp. 107–08). The 2003 siege of Monrovia, Liberia, demonstrated the effect of using mortars in built-up areas. Fighters from both sides of the conflict were unable, or unwilling, to hit purely military targets to the detriment of the local civilian population (Small Arms Survey, 2005, pp. 182–83).

Figure 10
Airburst munitions



The latest developments in airburst munitions (Figure 10) are worrying for exactly this reason. Unlike mortars, which are only sporadically used, some of these weapons are intended to replace standard assault rifles. This means that this ammunition could be among those most commonly used in any future infantry encounter. One fear is that combatants may use airburst munitions not only when they are certain of targets, but also when they are in doubt as to what is happening out of sight.

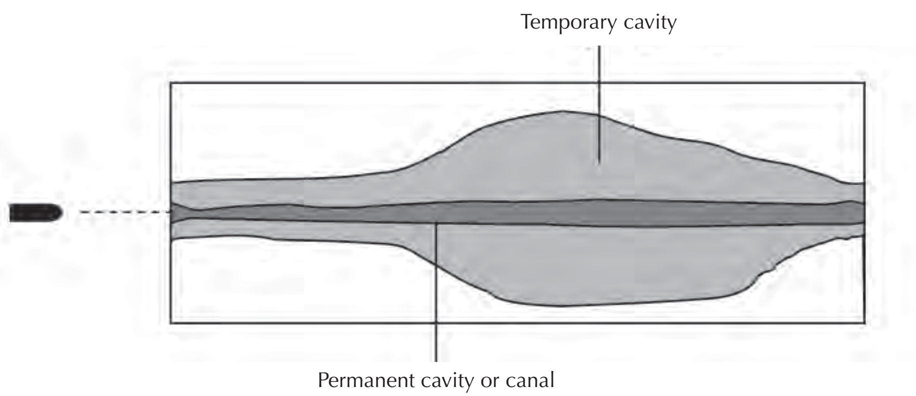
Wound ballistics

The different categories of ammunition (non-explosive or explosive) have important implications for the type and severity of wounds that they cause.[5]

Non-explosive projectiles

Wound ballistics is the study of the motion and effect of bullets and fragments on tissue (Di Maio, 1999, p. 53). The penetration of a bullet first creates a temporary cavity that corresponds to a very fast implosion of tissue. It leaves a permanent canal (see Figure 11). Most of the tissue is destroyed by the effect of the distension of the temporary cavity, rather than by the contact between the bullet and the tissue. It is worth noting, however, that the size of the temporary cavity does not determine the extent of the damage to the tissue because a large part of it is only distended rather than destroyed. The amount of kinetic energy

Figure 11
Permanent and temporary cavities



An anthropologist examines a skull shattered by a high-velocity bullet at the Guatemalan Forensic Anthropology Foundation (FAFG) in Guatemala City. FAFG devotes most of its time to exhuming bodies killed by the Guatemalan military during the country's 36-year civil war. © Victor James Blue/WPN

that is transferred to the body when hit determines the size of the permanent and temporary cavities (Di Maio, 1999, p. 55). Kinetic energy (KE) is a function of the mass and velocity of the projectile ($KE=1/2.m.v^2$).

Other factors affect the extent of the damage done by a bullet. Of these factors, the most notable is the characteristic (type, elasticity, density) of the organ hit. Organs that have a certain amount of elasticity, such as lungs or muscles, are better able to sustain a gunshot wound than solid organs such as the liver (Fackler, 1987; Di Maio, 1999, p. 55).

Fragmentation of the bullet can also increase the gravity of the wound. The breaking behaviour of a bullet depends on the distance it is fired from—there is more chance of fragmentation for a projectile shot from close range—and on other factors such as the type of metal of which it is made.

Another important factor in wound ballistics is the type of projectile used. Semi-jacketed bullets, such as soft-point and hollow-point bullets, have part of their core exposed at the top. These usually expand when they hit the target to assume a 'mushroom' shape (Di Maio, 1999, pp. 292–96).[6] Semi-jacketed bullets are usually used for hunting because they increase the chances of a kill, and in law enforcement because they tend to ricochet less, presenting less of a hazard to innocent bystanders in urban surroundings. Only fully jacketed bullets, however, are permitted for military use under international law (Small Arms Survey, 2005, pp. 22–23).

Explosive munitions

Explosive munitions launched by light weapons affect the human body in a different way to cartridge-based ammunition. Many light weapons use explosive munitions. They have three distinct effects: a ballistic effect, produced by fragments and sometimes referred to as the fragmentation effect; a blast effect; and a thermal effect.

It is important to note that a number of light weapons, such as portable anti-tank and anti-aircraft launchers, are intended to be used against materiel (vehicles, small buildings, and aircraft) rather than humans. In practice, however, humans can be—and often are—hit by such munitions, and are part of the collateral damage caused by the use of light weapons against materiel (Covey, 2004).

Explosive munitions produce metallic fragments that cause ballistic injuries. The resulting injuries depend on the characteristics of the fragment (velocity, mass, and shape) and those of the tissues hit (elasticity, density, and type). In contrast to bullets, fragments are often smaller and irregularly shaped, and can cause multiple wounds (VNH, 2004, p. 1.4). The impact of both thermal and blast effects depends on the distance between the body and the epicentre of the explosion (see Figure 12).

A thermal effect occurs when an individual is closest to the epicentre of the explosion, in which case he may be severely burned by the heat generated. These burns usually seriously complicate the treatment of other (ballistic) wounds (VNH, 2004, p. 1.4). The blast effect, which comes from the blast overpressure waves (also called sonic shock waves) created by the explosion, usually affects ears, lungs, and the digestive tract. These injuries increase in severity with the level of pressure and the length of exposure to them. Thermobaric weapons augment this blast effect by increasing the duration of the explosion, which is enhanced when it occurs in an enclosed space (such as a bunker). It should also be noted that the blast effect can cause further injuries by forcing individuals into nearby solid and sharp objects (VNH, 2004, p. 1.4).

Figure 12
Probability of injuries sustained from the detonation of explosive munitions

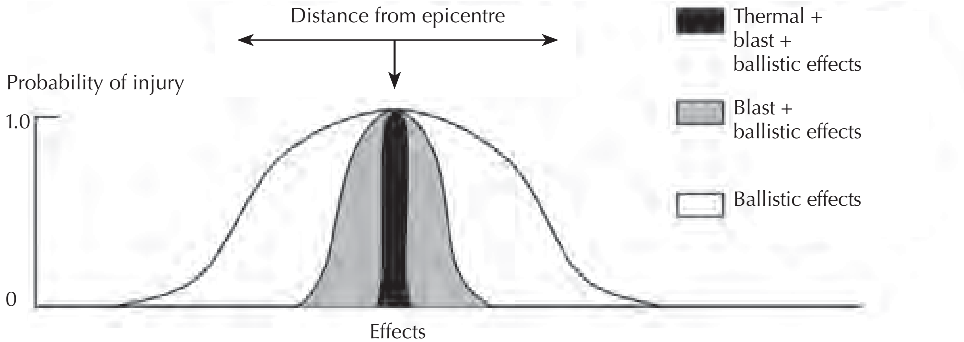


Figure adapted from Virtual Naval Hospital (2004), p. 1.3.

Recent developments in ammunition technology

There have been recent technological developments in ammunition in several fields. Of particular note are changes to the mass of rounds and to their destructive capacity.

Making ammunition lighter?

Caseless cartridges are 50 per cent lighter than traditional rounds of the same calibre. Their main advantage is to allow soldiers or law enforcement officers to carry larger amounts of ammunition, maintaining the same terminal ballistic effect. Caseless cartridges consist of a block of propellant with a bullet embedded inside. They have thus far been manufactured in 4.7 x 33 mm calibre and are currently used only in the Heckler & Koch G11 rifle, which is mainly used by the German Army special forces (Hogg and Weeks, 2000, p. 13; Hogg, 2002, p. 309).

Concerns about the weight of ammunition are not confined to small-calibre rounds. The United States is attempting to reduce the weight of mortar rounds and is testing composite materials (Cutshaw and Ness, 2004, p. 15). The trend towards ever lighter ammunition should, however, not be overstated. It is worth noting that recent combat experience in Iraq and Afghanistan has convinced many that the mass of the current 5.56 mm NATO round is insufficient on the battlefield, prompting the development of heavier and more powerful rounds. The American firm Remington has developed a 6.8 x 43 mm Special Purpose Cartridge, which fits the current M-16 and M-4 rifles if the weapons are equipped with a special calibre adapting device (Richardson, Richardson, and Biass, 2005, p. 12). Because of the cost of re-equipping an entire army, however, this change has so far been limited to Special Forces and some front-line combat units (Richardson, Richardson, and Biass, 2005, p. 12; Alpo, 2005, p. 64).

The destructive capacity of ammunition

Increased magazine capacity is a logical consequence of the process by which high-powered rifles have been progressively replaced by automatic rifles in military forces. Automatic rifles are designed to fire at a high cyclical rate, and to engage targets at relatively close ranges. Because of this, they fire smaller and lighter cartridges, which also enable a higher magazine capacity (Hogg and Weeks, 2000, p. 221). Magazine capacity for handguns is now frequently 13–14 rounds (Marchington, 1997, p. 8).

A single magazine can have up to 100 rounds for a light machine gun, and some weapons have double or triple side-by-side magazines, to enable them to be changed more quickly (DeClerq, 1999).

The destructive capability of light weapons ammunition has also increased. RPG rockets can now be equipped with 'tandem' warheads to produce double detonations (Small Arms Survey, 2004, p. 36). These warheads are designed to penetrate the explosive reactive armour (ERA) that normally provides additional protection to tanks against ATGWs.

Another important technological development, which has been employed in different types of projectiles, is the use of fuel-air explosives. In this case, the exploding device liberates particles of a volatile substance which reacts with the oxygen in the air to produce a second explosion of long duration (VNH, 2004, p. 1.4; Cutshaw and Ness, 2004, p. 15). Thermobaric weapons work in a similar fashion. They are mostly used in enclosed spaces, such as caves, where the overpressure waves they create prove particularly lethal. These weapons are being developed for infantry use in grenade form. A 40 mm grenade with a thermobaric warhead was tested in Afghanistan by US soldiers in 2003 (Burger Capozzi, 2003).

It should also be noted that ammunition has improved in terms of range and accuracy. To some extent these developments have been made necessary by the increasingly destructive power of ammunition because without the higher levels of accuracy these weapons could hurt friendly troops and cause undesirable collateral damage. The improvements may also be related to the growing cost of advanced ammunition, which makes every failed shot more expensive.

The Swiss company RUAG, for instance, is currently developing modular explosive penetrator (MEP) warheads that are adaptable to most RPG rockets and are used to defeat defensive features such as walls or piled sandbags. Their kinetic energy allows them to penetrate defences and explode in the space behind them, ensuring both 'wall-breaking' and limiting collateral damage (Jane's Information Group, 2005; Richardson, Richardson, and Biass, 2005, p. 18). Grenades are equipped with precision time-fuses and programming that allow them to explode exactly when needed (Cutshaw and Ness, 2004, p. 15).

Future developments in small arms and light weapons ammunition

A number of recent developments in small arms and light weapons ammunition suggest that its use and effects will change quite markedly in the coming decades. These new developments will also affect the way ammunition is categorized and studied.

Three new developments are of particular note. The first development is the introduction of airburst munitions that, as noted above, differ considerably from standard cartridge-based ammunition because they are fused to explode over targets. The most recent application of the technology is the OICW, which is still being tested in the United States (Small Arms Survey, 2006, p. 24). This weapon is small and light enough to fit into the small arms category, but has the explosive potential of some current light weapons. If it becomes widely available as a personal infantry weapon, it would blur the distinction between the existing categories.

A second development is the rapidly decreasing size of guided mortar bombs. At present, most guided mortar ammunition is larger in calibre than 120 mm.

For this reason it falls outside the United Nations definition of small arms and light weapons. Nonetheless, the fact that guided munitions have decreased in calibre over the past two decades—in some cases, such as the British Royal Ordnance Merlin, to 82 mm—suggests that this trend may well continue. If this occurs, another type of 'smart' (i.e. guided) munition will become commonplace in the small arms and light weapons category alongside such weapons as ATGWs and MANPADS.

The third development departs entirely from conventional principles of small arms and light weapons operation. Metal Storm is an Australian- and US-based initiative to replace the usual mechanical firing mechanism of small arms and light weapons with electronic impulses in order to achieve unprecedented rates of fire (Hiscock, 2003; Jane's Information Group, 2004). Inside the barrel, the conventional cartridge case is replaced by a series of bullets separated by a propellant load. While the technology is still at the developmental stage, its envisaged applications include a range of small arms and light weapons from handguns to grenade launchers. A 36-barrel gun of this type would be able to fire one million rounds per minute (Hiscock, 2003; BBC, 2004). The implications of this new technology are an increased lethality and, once again, a blurring of the division between small arms and light weapons.

Conclusions: the research and policy implications of ammunition characteristics

The physical attributes of ammunition have fundamental research and policy relevance. The United Nations definition of small arms and light weapons covers a range of weapons and ammunition that differs markedly in technology and in the effects they are capable of producing. These differences affect both the global distribution of weapons and the measures that can be taken to alleviate their unchecked proliferation.

While the technology involved in producing some small arms and light weapons ammunition is closely guarded, other types of ammunition have proliferated so widely and for so long that there are few technical barriers to their production and trade (see Chapter 2). This is the case, for instance, for cartridge-based ammunition and unguided missiles for light weapons. Countries that host production of guided systems, however, usually control the proliferation of knowledge as well as the proliferation of the weapons themselves. The small Stinger Missile Project Group (SPG), which attempted to limit the export of MANPADS to selected NATO countries, is a good example of this behaviour (Small Arms Survey, 2004, p. 92).

Some forms of ammunition for small arms and light weapons, including MANPADS and mortars over 75 mm, feature in international reporting mechanisms such as the United Nations Register of Conventional Arms. Others are not deemed a sufficient threat to international stability to warrant such scrutiny.

The revolution in military affairs has not significantly altered small arms and light weapons ammunition to date. The vast majority of ammunition currently used in conflicts around the world has changed little in several decades. Recent developments, particularly of light weapons, suggest, however, that the issues surrounding ammunition should not be expected to remain static in the future.

List of abbreviations

ACP	Auto Colt pistol
ATGW	Anti-tank guided weapon
BMG	Browning machine gun
GPMG	General purpose machine gun
ERA	Explosive reactive armour
HEAT	High explosive anti-tank
KE	Kinetic energy
LAW	Light anti-armour weapon
MANPADS	Man-portable air defence system
MEP	Modular explosive penetrator
NATO	North Atlantic Treaty Organisation
OCSW	Objective crew-served weapon
OICW	Objective individual combat weapon
RPG	Shoulder-fired anti-tank rocket launcher
SPG	Stinger Project Group

Endnotes

1 The shift from muzzle-loaded to breech-loaded weapons did not occur until the 1860s (Headrick, p. 85).

2 Another international definition of 'small arms and light weapons' can be found in UNGA, 2005, Section II, para. 4.

3 It should be noted, however, that there is disagreement about the definition of small-calibre ammunition; Ness and Williams define it as 'up to 14.5 mm calibre' (Ness and Williams, 2005, p. 3), and Courtney-Green as 'ammunition for weapons such as pistols, rifles and machine guns below 20 mm in calibre' (Courtney-Green, 1991, p. 24).

4 Research conducted at the 2004 *Eurosatory* Arms Exhibition, Villepinte, France, 14 June.

5 This section relies on Sellier and Kneubuehl (1994) for most of its information.

6 Semi-jacketed bullets may also not expand; it depends on their construction (the type of metal they are made of) and their velocity at the time of impact.

Bibliography

Allsop, Derek et al. 1997. *Brassey's Essential Guide to Military Small Arms: Design Principles and Operating Methods*. London: Brassey's.

Alpo, Paul V. 2005. 'Assault Rifle Update'. *Armada International*, No. 4. August–September, pp. 64–72.

BBC (British Broadcasting Corporation). 2001. 'The Trouble with Plastic Bullets'. Web edition, 2 August. <http://news.bbc.co.uk/1/low/northern_ireland/1460116.stm>

—. 2004. 'US Hopes Fire Gun Maker's Shares'. Web edition, 20 April. <http://news.bbc.co.uk/1/hi/business/3641921.stm>

Burger Capozzi, Kim. 2003. 'US Enthusiasm for Thermobaric Weapons Grows'. *Jane's Defence Weekly*. 3 December.

Canfield, Bruce N. 2000. *US Infantry Weapons of the First World War*. Lincoln, R.I.: Andrew Mobray Inc. Accessed February 2006. <http://www.worldwar1.com/dbc/smortar.htm>

Courtney-Green, P. R. 1991. *Ammunition for the Land Battle*. Land Warfare: Brassey's New Battlefield Weapons Systems and Technology Series, Vol. 4. London: Brassey's.

Covey, Dana C. 2004. 'Musculoskeletal War Wounds During Operation BRAVA in Sri Lanka'. *Military Medicine*. January.

Cutshaw, Charles Q. and Leland Ness (eds.). 2004. *Jane's Ammunition Handbook 2004–2005*. Coulsdon: Jane's Information Group.

DeClerq, David. 1999. 'Trends in Small Arms and Light Weapons (SALW) Development: Non-Proliferation and Arms Control Dimensions'. Department of Foreign Affairs and International Trade, Canada.

Di Maio, Vincent J. M. 1999. *Gunshot Wounds: Practical Aspects of Firearms, Ballistics, and Forensic Techniques*. Second edition. Boca Raton, Fla: CRC Press.

Drury, Alton G. 1999. 'A primer on primers'. *American Rifleman*. March.

Fackler, M. L. 1987. 'What's Wrong With the Wound Ballistics Literature, and Why'. Letterman Army Institute of Research, Division of Military Trauma Research. Institute Report No. 239, July. < http://www.rkba.org/research/fackler/wrong.html>

Folly, Patrick and Peter Mäder. 2004. 'Propellant Chemistry'. *Chimia.* Vol. 58, No. 6.

Grossman, Dave. 1995. *On Killing: The Psychological Cost of Learning to Kill in War and Society*. Boston, New York, London: Little, Brown and Company.

Headrick, Daniel R. 1981. *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century*. New York and Oxford: Oxford University Press.

Hiscock, Geoff. 2003. 'Gun whips up a Metal Storm'. CNN (Cable News Network). 27 June. Accessed February 2006. <http://www.cnn.com/2003/BUSINESS/06/26/australia.metalstorm/>

Hogg, Ian V. 2002. *Jane's Guns Recognition Guide*. Glasgow: HarperCollins.

— and John S. Weeks. 2000. *Military Small Arms of the 20th Century*. 7th edition. Iola, Wis.: Krause Publications.

Hughes, D. K. et al. 2005. 'Plastic Baton Rounds Injuries'. *Emergency Medicine Journal*. Vol. 22. February. <http://emj.bmjjournals.com/cgi/reprint/22/2/111>

Jane's Information Group. 2004. 'Metal Storm Multibarrel Pod System Progresses'. *International Defense Review*. 1 February.

—. 2005. 'RUAG Develops Anti-structure Munitions'. *International Defence Review*. 1 September.

Jones, Richard D. and Charles Q. Cutshaw. 2004. *Jane's Infantry Weapons 2004–2005*. Coulsdon: Jane's Information Group.

Krause, Keith. 1995. *Arms and the State: Patterns of Military Production and Trade*. Cambridge: Cambridge University Press.

Lewer, Nick and Neil Davison. 2005. 'Non-lethal Technologies: An Overview'. *Disarmament Forum*. Issue 1. <http://www.unidir.ch/pdf/articles/pdf-art2217.pdf>

Mahajna, Ahmad et al. 2002. 'Blunt and Penetrating Injuries Caused by Rubber Bullets During the Israeli–Arab Conflict in October, 2000: A Retrospective Study'. *The Lancet*. Vol. 359, Issue 9320. 25 May.

Marchington, James. 1997. *Handguns and Sub-Machine Guns*. Brassey's Modern Military Equipment. London: Brassey's.

McNeill, William H. 1983. *The Pursuit of Power: Technology, Armed Force, and Society Since AD 1000*. Oxford: Basil Blackwell.

Modern Firearms and Ammunition. 1999. Accessed February 2006. <http://world.guns.ru/grenade/gl01-e.htm>

Ness, Leland and Anthony G. Williams (eds.). 2005. *Jane's Ammunition Handbook 2005–2006*. Coulsdon: Jane's Information Group.

Raytheon and Lockheed Martin. 2005. 'Fire-and-Forget Multi-Purpose Combat System.' Dallas: Lockheed Martin Corporation, Missiles and Fire Control. Company Web site. Accessed February 2006. <http://www.lockheedmartin.com/data/assets/2993.pdf>

Richardson, Doug, Linda Richardson, and E. H. Biass. 2005. 'The Vertical Battlefield'. *Armada International*, No. 4. Supplement on Urban Warfare. August–September.

Sellier, Karl G. and Beat P. Kneubuehl. 1994. *Wound Ballistics and the Scientific Background*. Amsterdam: Elsevier.

Small Arms Survey. 2004. *Small Arms Survey 2004: Rights at Risk*. Oxford: Oxford University Press.

—. 2005. *Small Arms Survey 2005: Weapons at War*. Oxford: Oxford University Press.

—. 2006. *Small Arms Survey 2006: Unfinished Business*. Oxford: Oxford University Press.

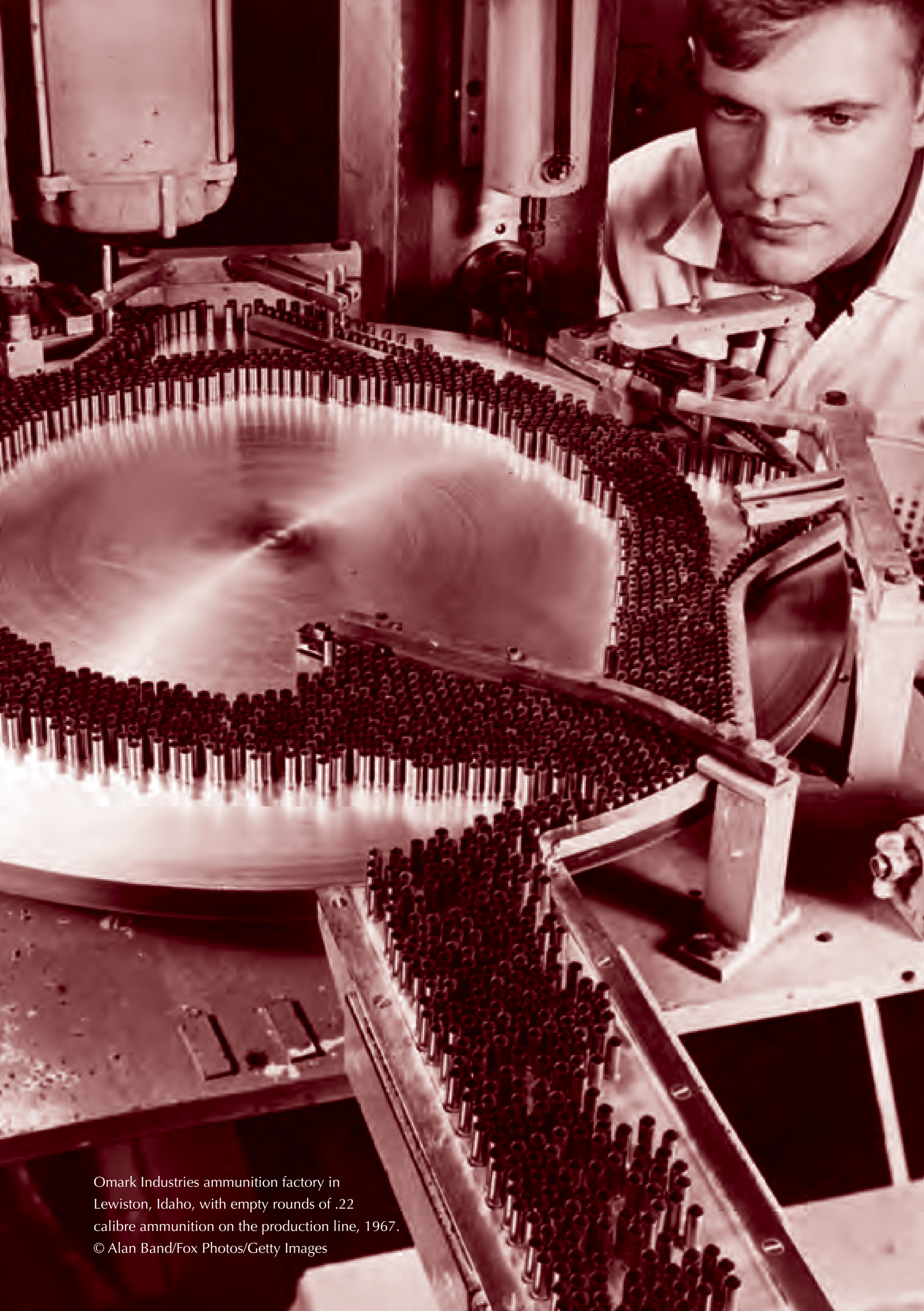
UNGA (United Nations General Assembly). 1997 Report of the Panel of Governmental Experts on Small Arms. 27 August. Reproduced in UN doc. A/52/298 of 27 August. Accessed February 2006. <http://disarmament2.un.org/cab/salw.html>

—. 2005. *International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons* (*'International Tracing Instrument'*). 27 June. Reproduced in UN doc. A/60/88 of 27 June (annexe).

UNROCA (United Nations Register of Conventional Arms). 2005. 'Standardized form for reporting international transfers of conventional arms (exports)'. UN Department of Disarmament Affairs. Accessed February 2006. <http://disarmament2.un.org/cab/register.html> <http://disarmament2.un.org/cab/salw-oewg.html>

VNH (Virtual Naval Hospital). 2004. 'Emergency War Surgery'. Third United States Revision. Borden Institute, Walter Reed Army Medical Center. <http://www.bordeninstitute.army.mil/emrgncywarsurg/default.html>

White, Lynn. 1964. *Medieval Technology and Social Change*. Oxford: Oxford University Press.



Omark Industries ammunition factory in Lewiston, Idaho, with empty rounds of .22 calibre ammunition on the production line, 1967.

2

The Production of Ammunition for Small Arms and Light Weapons

Holger Anders and Reinhilde Weidacher

Introduction

The availability of ammunition for the small arms and light weapons used by armed groups and criminals is a crucial determinant of the ability of these actors to use lethal force. The control of the production of such ammunition can have an important impact on this availability. This chapter clarifies key aspects of the production of ammunition for small arms and light weapons and the roles of those involved.[1] It examines global ammunition production, including industrial and craft production, the number of producers and production volumes, and the production of high-quality ammunition. This chapter also provides an overview of structures and trends in the industry for small arms ammunition, guided light weapons ammunition, and relevant production technology and equipment. A last section looks at the scope for controls, particularly on transfers of production capacities and ammunition components; because of risks of diversion, tight control of ammunition production is an important element in combating illicit trade. The conclusion argues that states should apply responsible standards in authorizing transfers of production capacities and ammunition components in order to limit the proliferation of illicit ammunition.

An overview of global ammunition production

Ammunition commonly in use today, with the exception of guided ammunition for light weapons, does not differ significantly in its basic design or production techniques from the ammunition that was used 100 years ago (see Chapter 1). The production of unguided small arms and light weapons ammunition need not require a sophisticated technology infrastructure. Many of the machines used in the production process, such as those for the production of cartridge cases and bullets, are similar to those used in other types of metal processing activities.[2] This low technological entry-barrier for small arms ammunition production has contributed to the widespread establishment of ammunition manufacturing capacities around the world (UNGA, 1999, p. 6, paras. 22–23).

As an illustration, research suggests that there are currently some 76 states that produce small arms ammunition for pistols, revolvers, rifles, carbines, submachine guns, and light- and heavy-machine guns (Small Arms Survey, 2005, p. 13). These producing states are principally located in Europe and the Commonwealth of Independent States (36 per cent); North and Central America (34 per cent); and Asia and the Pacific (13 per cent) (Small Arms Survey, 2005, p. 14). The fact that there can be significant differences in the quantity and quality of the output of ammunition production facilities, however, should not be overlooked.

Industrial production of ammunition

Global production of ammunition is dominated by industrialized mass manufacturing (UNGA, 1999, p. 6, para. 18). For small arms ammunition (defined as ammunition with a calibre smaller than 12.7 mm) industrial machinery will manufacture the empty cartridge cases, the bullets, the primers, and the propellant or explosive. In addition there are machines for heat- and surface-treatment of the relevant components as well as loading machines and assembly lines that bring together the individual ammunition components.[3] Modern production processes are based on automated production lines that may consist of 15 or more interlinked machines (Mast Technology, 2006a). Modern manufacturers operate fully automated and computer-controlled production lines 'with raw material flowing in at one end and fully assembled ammunition emerging at the other' (UNGA, 1999, p. 5, para. 17).

At the same time, there can be important differences between industrial production facilities. At one end of the spectrum there are modern manufacturers (mostly in the United States and Europe) competing in markets for high-quality ammunition for sale to state actors in NATO member states. In order to compete in international markets, a prime concern for modern manufacturers is the cost-efficient production of the high-quality ammunition ordered by these state actors.[4] At the other end of the spectrum are small-scale, state-owned production facilities that are exclusively operated to meet, at least partially, the domestic demand of state actors. In many developing countries these facilities are not necessarily profit-oriented or profitable enterprises. They may rely on outdated machinery and remain idle between orders for ammunition from domestic actors.[5] An example of such a facility is the Mzinga Corporation in Tanzania (see below).

In addition, there can be important differences between the range of products that are manufactured and processed at industrial facilities. Some production facilities may both produce and assemble the components required to produce a fully assembled ammunition round. Such facilities need only purchase the raw materials required to produce the components. In contrast, assembly facilities must buy completed components from other companies. It is frequent practice in the ammunition industry for a producer to subcontract the manufacture of cartridge cases and other components to another production facility. This may be done when, for example, acquiring completed components for use in later assembly is cheaper for the facility than producing them in-house.[6]

The number of industrial producers

It is difficult to determine how many ammunition production and assembly facilities currently exist around the world. Not all states publish information on the number and production capacities of their domestic ammunition facilities (UNGA, 1999, p. 6, para. 22). Secrecy by some states, including China, about their domestic production capacities is based on a perceived strategic need to prevent potentially hostile states from calculating the amount of ammunition available to national armed forces in the case of an armed conflict.[7] The number of ammunition facilities is also difficult to quantify because of the high level of diversity between production facilities for components and facilities for assembly, as well as a lack of differentiation in public sources between small-scale producers and large conglomerates with many production facilities (UNGA, 1999, p. 6, para. 22). There are also frequent changes in the number of ammunition companies that are active in production at any given time because of consolidations and closures (UNGA, 1999, p. 6, para. 23).

It is not always possible to make an accurate distinction between producers of ammunition for military forces, law enforcement agencies, and other state actors, on the one hand (state actor markets), and producers of ammunition for private security forces and civilians for sport shooting, hunting, and personal defence, on the other (non-state actor markets). This is because many modern ammunition facilities have the capacity to produce ammunition for both markets.[8] Certain calibres of small arms ammunition can also be used in arms employed both by military and police forces, and by sport shooters and hunters. For example, 9 mm ammunition for pistols is used by both state and non-state actors.[9]

Furthermore, there are certain types of ammunition that, although produced for different purposes, have the same dimensions, that is, the same calibre and length. These types may be used in both 'military' and 'civilian' small arms, albeit not necessarily at optimum levels of performance for the given military or civilian purpose.[10] An example here is 7.62 x 51 mm ammunition for assault rifles used by armed forces in NATO member states. The dimensions, although not the propellant load and bullet characteristics, are the same as the .308 Winchester ammunition sold on civilian markets for use in game hunting rifles

A bullet is manufactured in Dara, Pakistan, near the border with Afghanistan, March 2006.
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(McKee and Kuleck, 2006). In the same way, 5.56 x 45 mm NATO ammunition for assault rifles used by armed forces has the same dimensions as .223 Remington ammunition for hunting purposes.[11]

Available research does provide information about the relative distribution of different types of companies in the ammunition producing industry. For example, an investigation in 1998 into the US small arms ammunition industry revealed that while only a few companies are involved in the production of primers and propellants, many more produce cartridge cases and bullets (Stohl, 1998a, p. 9). Research further indicates that there are more companies producing small arms ammunition than companies producing ammunition for light weapons and, in particular, sophisticated guided missiles. Of particular interest is the fact that only a limited number of companies specialize in the transfer of modern production capacities for the mass production of high-quality ammunition components and fully assembled ammunition rounds.

Production volumes of small arms ammunition

In the light of the difficulty in determining the number of ammunition facilities, it is not surprising that there is no reliable information about the global annual volume of ammunition production. Moreover, it is usually not even possible reliably to determine the potential or actual ammunition output of a particular company—unless this information is made public by the company. The production capacity of a small arms ammunition production line is typically calculated in the industry on the basis of the maximum output of the assembly line. For a typical assembly line available from providers of such equipment, this figure amounts to 120–130 rounds per minute.[12] The potential annual output of such a line is calculated in the industry to be in the region of 7–12 million rounds (Mast Technology, 2006a).

These figures do not necessarily give a clear determination of the actual annual output of a particular production facility. Actual output by the facility will depend on a variety of factors, including the levels of training and efficiency of the engineers operating the machines, the maintenance of the production plant, the availability of required raw materials or ammunition components, and the output aims of the facility.[13] To illustrate, one Belgian provider of an assembly line for 7.62 mm ammunition indicated that the line allows its clients in Europe to produce 120 rounds per minute for 1,750 hours annually with the machines operating at 75 per cent capacity. This allows these clients to attain an actual annual output of 9 million rounds.[14] The provider, however, voiced strong doubts that a potential client in a particular country in sub-Saharan Africa, who had recently sought to acquire such a line, would, in the light of the technical expertise of this client, have the capacity to achieve a similar output. The provider estimated that an output no greater than 6.3 million rounds per year was more realistic in this case.[15]

Apart from the factors outlined above, production volumes can differ significantly between individual facilities because of the number of production lines that are operated in the facilities. Specifically, while small-scale producers may have and operate only a single production line, large-scale producers may operate several production lines simultaneously. For example, a facility operating eight standard assembly lines for small arms ammunition in parallel may produce up to 1.5 million rounds each day (UNGA, 1999, para. 20). The parallel operation of lines allows large-scale producers annually to produce tens of millions of rounds and more of small arms ammunition.[16] Indeed, the US Lake City Army Ammunition Plant, driven by the increased demand from the US Department of Defense in the light of the military operations in Afghanistan and Iraq, achieved an output in 2004 of 1.2 billion rounds of small arms ammunition (Alliant TechSystems, 2006).

In other words, even if the total number of small arms producing facilities was known, this would not necessarily allow for reliable information on global annual production volumes because of the lack of transparency by many companies and countries about their potential and actual annual ammunition output. This observation notwithstanding, there are estimates that global production in 2005 of small arms ammunition produced for military forces amounted to about 13 billion rounds (Forecast International, 2005).[17]

Production of high-quality ammunition

It is also important to clarify the different levels of quality of small arms ammunition. Specifically, high-quality small arms ammunition is understood by Western ammunition producers to be ammunition that is produced and performs according to NATO design and safety standards.[18] These standards stipulate the exact measurements and propellant loads of ammunition to ensure optimal performance and safety when used by the military forces of NATO member states. Manufacturers producing ammunition that fulfils the requirements of the NATO standards can mark their ammunition on the cartridge case with a cross within a circle to indicate that this ammunition meets the NATO standards.[19]

Western manufacturers argue that the mass production of such ammunition requires modern production technology and equipment that is available only from Western sources.[20] This is, of course, not to say that reliable and safe ammunition cannot be mass-produced with technology and equipment from non-Western sources. Nonetheless, Western manufacturers indicate that, in their experience, each round derived from such production would not necessarily fulfil the strict design and safety standards required of ammunition used by NATO member state armed forces.[21]

Craft production of ammunition

Alongside industrial production there is also small-scale craft production of ammunition. It is possible to assemble small-calibre ammunition at home with simple tools and materials that are easily available in some countries, such as the United States, where 'hand-loading' is a widespread practice of civilian gun owners.[22] Hand-loading involves the assembly by hand of rounds for sporting and hunting purposes by (re-)filling empty cartridge cases (with primer and propellant) and by fitting either a newly purchased or a home-made bullet (Small Arms Survey, 2005, p. 15). One advantage of the self-assembly and hand-loading of ammunition by civilian gun owners is that a completed round will be cheaper than if bought fully assembled in a shop (RCBS, 2006). In addition, hand-loading can be a hobby for shooters and hunters who want to 'fine-tune' ammunition 'to fit a specific gun and certain type of shooting' (RCBS, 2006).

An overview of the ammunition industry

As indicated above, a useful distinction can be made in the ammunition industry between profit-oriented manufacturers competing for customers in ammunition markets and state-owned producers that produce exclusively for domestic armed forces. Following on from this, a distinction can also be made between the trends and developments that have affected the two types of manufacturers. While there appears to have been little change in the operation and structure of small-scale, state-owned facilities, noticeable changes have taken place over the past decade or so to the ammunition industry in the Western world. Reduced military spending in the United States and Europe after the end of the cold war led to mergers, consolidations, and other measures taken by manufacturers to ensure their continued profitability.[23] In developing countries there are also examples of recent efforts to upgrade and modernize existing production facilities.

The small arms ammunition industry

One noticeable development in the small arms ammunition industry in the Western world is the emergence of fewer—albeit larger and sometimes transnational—producers. For example, in 2002 the Swiss arms and ammunition producer RUAG bought the German small arms ammunition producer Dynamit Nobel to create RUAG Ammotec (RUAG, n. d., a). RUAG Ammotec, which produces small arms ammunition and ammunition components for military forces, law enforcement agencies, and sport and hunting purposes, currently operates production facilities in Germany, Sweden, and Switzerland (RUAG, n. d., b).

Similarly, the Nordic Ammunition Company (Nammo) was established in 1998 as a result of the merger of the ammunition manufacturing activities of Raufoss Technologies in Norway, Celsius in Sweden, and Patria Industries in Finland (Nammo, 1999). Nammo operates production facilities in Finland, Germany, Norway, Sweden, and the United States (Nammo, 2006).

There has been a parallel trend towards the consolidation of small arms ammunition producers at the national level. For example, the Canadian SNC Technologies has, through mergers over the past decades, established itself as the only domestic producer for the Canadian military market of small-, medium-, and large-calibre ammunition, as well as hand and rifle-grenades.[24] Similarly, US production of military small calibre ammunition is currently concentrated in a single facility, the Lake City Army Ammunition Plant, down from five facilities at the time of the Vietnam War (Merle, 2004).

Licensed production and cooperation agreements

There is a notable absence of licensed production agreements in the small arms ammunition industry. Design standards for small arms ammunition are often available to producers without any need to enter into a contract and pay royalties to the manufacturer, which may have developed the original design of what later became a widely accepted standard for a particular calibre. The Belgian arms and ammunition producer FN Herstal, for instance, was the original manufacturer of 5.56 x 45 mm ammunition, which was later adopted as a NATO standard.[25] However, the adoption by NATO of FN Herstal technical designs did not imply exclusive rights for FN to produce this ammunition. NATO regulations require its design standards to be made public to allow production by other manufacturers.[26] Instead, the adoption by NATO of the FN design implied an 'image boost' for FN Herstal, as well as several service contracts between FN and other producers under which FN assisted these producers to adjust and optimize their production lines for the manufacture of the 5.56 mm NATO ammunition.[27]

Similarly, design standards for other small arms ammunition such as 7.62 mm NATO ammunition or 9 mm ammunition are set by various manufacturers around the globe without any licensed production deals underpinning the production.[28] At the same time, cooperation agreements and, as indicated above, service contracts do exist between producers who otherwise operate independently from one another. An example, again involving FN Herstal, is the cooperation agreement announced in September 2005 between FN and the Italian Fiocchi Munizioni for production by Fiocchi at its facilities in Italy and the United States of 5.7 x 28 mm ammunition (FN Herstal, 2005). This calibre has been developed by FN for exclusive use in certain of its small arms such as FN Herstal 'P90' sub-machine guns.[29] The advantage to FN from the deal is that it will help ensure that there are sufficient ammunition supply capacities for military and law enforcement clients using these small arms in Europe, and the United States and Canada.[30]

Rehabilitation, modernization, and establishing production facilities

It is normal in the small arms ammunition industry for production machinery to experience a fall in output quantity over time.[31] Consequently, producers are often interested in mechanisms that will help them to maintain or modernize production capacities.[32] For example, the Mzinga Corporation in Tanzania was set up in 1971 with Chinese equipment to produce 7.62 x 39 mm ammunition for use in Kalashnikov-type assault rifles.[33] Because of its ageing machinery, current annual output (of this calibre) by Mzinga is alleged to have dropped from 7 million rounds to little more than 1 million rounds.[34] This amount falls significantly short of the estimated annual domestic consumption of 10 million rounds of ammunition of this calibre used for tactical and training purposes by the military, police, prison services, and national park services.[35]

In order to restore its capacities, the Mzinga Corporation concluded a deal in 2004 with the Belgian New Lachausée for a EUR 12 million production line producing 7.62 x 39 mm ammunition and auxiliary equipment.[36] In the end, this deal did not lead to the transfer of the production line because the export authorities in Belgium denied it an export licence in June 2005 (Gouvernement Wallon, 2005, point 3). The reason for the denial was the perceived incompatibility of the transfer 'with the foreign policy and international obligations of Belgium' as well as concerns about the enforceability of the end-user conditions that had been placed on the transfer (Gouvernement Wallon, 2005, point 3).[37] These had included that the ammunition produced with the transferred equipment would only be used for domestic purposes, that the existing production line would be dismantled and destroyed, and that any ammunition produced would be adequately marked. The conditions had been sought in order to limit the risk of diversions or undesirable exports of ammunition produced by the transferred equipment (Gouvernement Wallon, 2005, point 1; Mwakisyala, 2005).

There are examples of recently established production centres. The United Arab Emirates (UAE), for instance, set up Adcom Manufacturing, its first small-calibre ammunition factory, in 1997. The company uses modern production technologies from France, Germany, and the United States and specializes in the production of high-quality small arms ammunition for military and law enforcement markets. According to company information, Adcom Manufacturing was also the first producer in the region to market its products internationally (United Arab Emirates Interact, 1998). Another recently established production centre is the Lithuanian state enterprise the Giraites Armament Factory (Giraites Ginkluotes Gamykla, GGG). The plant was set up in 2000 and specializes in the production of NATO-standard 5.56 mm and 7.62 mm ammunition for military markets as well as bullets for these calibres (GGG, 2005a and b).

Providers of small arms ammunition production capacities

A small but important sector in the small arms ammunition industry is the provision of modern production equipment for high-quality ammunition. Industry insiders claim that the vast majority of existing production facilities for small arms ammunition for state-actor markets are equipped with machines from the two traditional market leaders in this sector.[38] These two long-established companies are the German company Fritz Werner, which was merged in 2002 into the German provider of industrial plants MAN Ferrostaal (MAN Ferrostaal, n. d.), and the French Manurhin Equipment.[39] The Belgian company New Lachaussée entered the market at a later stage.[40] According to information published by New Lachausée it exports 95 per cent of its products, which are marketed in 86 countries in *inter alia* Latin America, Africa, the Middle East, and Asia (New Lachausée, n. d., a and b).

In addition to these main providers specializing in ammunition production equipment, there are also smaller-scale providers. These include the Belgian FN Herstal, which helped establish the Kenya Ordnance Factory at Eldoret in the 1990s. The Eldoret plant is alleged to have an annual output capacity of 20 million rounds of 7.62 mm ammunition (Stohl, 1998a, p. 14). Other small-scale providers of production equipment in the West include the US company Mast Technology, which markets new and second-hand small arms ammunition production equipment. According to company information, the customers for this machinery include 'all major US producers as well as other manufacturers in Mexico, Central and South America, Europe, Africa, Australia and Asia' (Mast Technology, 2006b).

There are also a number of non-Western providers of production plants and equipment for small arms ammunition. China, for instance, is reported to have provided ammunition production machinery to several states in sub-Saharan Africa, including Tanzania, Uganda, and Zimbabwe (Mlambo, 1998; Ochieng et al., 1999; Mwakisyala, 2005). Iran is reported to have offered in 2005 to provide Sri Lanka with a small arms ammunition production plant for 7.62 mm ammunition at a cost of USD 1.1 million (Karniol, 2005). Other non-Western states that have allegedly exported production equipment for small arms ammunition include Brazil, India, Israel, Pakistan, Singapore, and South Korea (Stohl, 1998a, p. 12).

The production of sophisticated ammunition for light weapons

In contrast to the production of small arms ammunition, the production of sophisticated ammunition such as guided missiles for man-portable air defence systems (MANPADS) and anti-tank guided weapons (ATGWs) is restricted to those states with an advanced national arms industrial base. Preliminary research has identified 25 countries that manufacture MANPADS and ATGWs, using either indigenous or imported designs: Bulgaria, China, Egypt, France, Germany, India, Iran, Israel, Italy, Japan, North Korea, Pakistan, Poland, Romania, the Russian Federation, Serbia and Montenegro, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, the UK, the United States, and Vietnam. Of these countries, ten (Bulgaria, Egypt, North Korea, Pakistan, Poland, Romania, Singapore, Slovakia, Switzerland, and Vietnam) produce copies of MANPADS and ATGWs based on foreign designs (Small Arms Survey, 2004, p. 82; Jones and Cutshaw, 2005).

One reason for the restricted number of producers of guided light weapons ammunition is that the number of customers for such ammunition and the quantities required by these customers are lower than for small-arms ammunition.[41] Production of guided ammunition also presents technological challenges. Such challenges are exemplified by the programme delays in India to the development of the 'Nag' ATGW. While Nag was first test-fired in 1990, full-scale production had not started by mid-2005 because of several problems, including one related to the development of the sensor-based infrared seeker guidance system for the missiles (Pandit, 2005).

Cooperation agreements can also be found among producers of guided light weapons ammunition. For example, it was reported in early 2004 that the Polish state-owned Zaklady Metalowych Mesko SA had signed a co-production deal with the Israeli producer Rafael Armament Development Authority (Rafael) for the production of the 'Spike' ATGW. The original basis of the deal was a defence contract concluded in 2003 between Israel and Poland for the production and supply of Spike missiles by Rafael to the Polish Army (Hancock, 2004). From 1989 until late 2004, a consortium of Western European companies, the Stinger Project Group, also produced 13,500 'Stinger' MANPADS under contract with the United States for end-users in Germany, Greece, the Netherlands, and Turkey (Preylowski, 2004, p. 2).

The scope for controls on ammunition production

Strict controls on the industrial manufacture of ammunition, and on the transfer of such ammunition, must be a key aspect of efforts to combat the illicit trade in small arms and light weapons ammunition in order to prevent ammunition diversions into the illicit sphere. Such efforts should also include strict controls on the transfer of production capacities for small arms and light weapons ammunition, including controls on transfers of ammunition components for assembly abroad.

Controls on transfers of production capacities

A responsible attitude towards the transfer of production technology and equipment is essential to any controls on the ammunition trade. Such transfers can lead to the establishment of future sources of potential ammunition proliferation. Germany, for instance, in the 1960s and 1970s helped to establish indigenous small arms ammunition production capacities in newly independent states by granting export licenses to Fritz Werner for transfers of production technology and equipment. One purpose of these deals was to help these states meet their national defence needs.[42] Authorization by Germany for these exports was tied to end-user undertakings by the recipient governments that the ammunition produced would be used only by state actors and for domestic consumption.[43]

Some of the transfers authorized by Germany have had undesirable consequences, underlining the long-term risks involved in authorizing transfers of production equipment. For example, recipients of production equipment from Fritz Werner in the 1960s and 1970s included the governments of Iran and Pakistan.[44] Regime changes in these countries led to the emergence of governments that do not consider themselves bound by the end-user undertakings of their predecessors. Both Iran and Pakistan now export small arms ammunition that, according to industry insiders, is produced in the domestic production centres that Fritz Werner once helped to establish.[45] Moreover, the German government has very few means at its disposal to verify that other states that gave end-user undertakings in relation to their imported ammunition production equipment are in compliance with those undertakings.[46]

A more recent example that has raised concerns is the authorization by the Belgian government in 1997 for FN Herstal to export production equipment for small arms ammunition to the Kenyan Eldoret facility (Stohl, 1998a, p. 14). The authorization is reported to have been conditional on 'written assurances that ammunition from the Eldoret plant would not be exported to neighbouring Great Lakes countries' (Stohl, 1998a, p. 14). While there is no proof that Kenya is in violation of its end-use assurances, there have been allegations that ammunition produced at Eldoret was transferred to regional conflicts (reported in Berkol, 2002, p. 11, fn. 10). These allegations persist partly because of the continuing absence of transparency on the part of the Kenyan authorities about the annual output and the range of calibres, as well as about transfers and their recipients, of ammunition produced at Eldoret (Kwayera, 2003).

Another important area for the control of ammunition is a responsible attitude towards transfers of the components required for the assembly of ammunition. Strict controls on transfers of primers for small arms ammunition are of particular relevance because there are fewer producers of primers than of cartridge cases and bullets (see above). It has been suggested that regulating the production and transfer of ammunition components that are produced by only a small number of companies could be a possible choke point for control (Stohl, 1998b). It seems fair to say that, in order to be effective, controls on the ammunition trade would need to apply not only to transfers of fully assembled ammunition, but also to transfers of components required for the assembly of ammunition. Nonetheless, targeted controls on components would not affect production at facilities known or suspected to be sources of undesirable ammunition proliferation which have an in-house capacity to manufacture ammunition components.

Existing standards on transfers of production capacities

Explicit controls on transfers of production capacities, including on transfers of components for small arms and light weapons ammunition, currently exist only in the Wassenaar Arrangement (WA)[47] and the EU.[48] The arms export control lists agreed in these forums encompass fully assembled ammunition as well as components for ammunition used in light weapons and 'military' small arms (WA, 2005, category ML3; EU, 2003a). They also include equipment required for the production, as well as technology required for the development and production, of products included on the control lists (WA, 2005, categories ML18 and ML 22; EU, 2003a).

Smooth-bore weapons and their ammunition used only for hunting and sporting purposes (WA, 2005, category ML1, note 1; EU, 2003a) are excluded from the scope of the WA and EU control lists.

States parties to the WA and EU member states make a political commitment not to authorize exports of controlled small arms and light weapons ammunition and related production equipment and technology if there is an unacceptable risk that 'the equipment will be diverted within the buyer country or re-exported under undesirable conditions' (EU, 1998, criterion 7; WA, 2002, point I.1.j). It would be desirable for these EU and WA standards to be adopted as common minimum standards applied by all states from which production capacities for small arms and light weapons ammunition could be exported. Importantly, EU member states have also agreed to consider at the export licensing stage 'the potential use of the finished product in the country of production and of the risk that the finished product might be diverted or exported to an undesirable end-user' (EU, 2003b, p. 5, point II.5). This is critical because, although a production line would be an unlikely instrument to be used in, for example, human rights violations, ammunition derived from the machinery could certainly be used in such violations.

At the same time, it should be pointed out that there are potential loopholes in these existing standards. For example, there are, as indicated above, no explicit standards in these forums on the transfer of production capacities for 'civilian' small arms ammunition used exclusively for hunting and sporting purposes. This represents a potential loophole because certain types of 'civilian' small arms ammunition are very similar to 'military' small arms ammunition. This means that a manufacturer with a capacity to produce, for example, .308 Winchester or .223 Remington ammunition will generally be able to use the same production equipment for the manufacture of 7.62 x 51 mm and 5.56 x 45 mm ammunition for 'military' small arms.[49]

Furthermore, multilateral standards on ammunition production capacities should clarify that they apply not only to the export of physical equipment and other items such as blueprints, but also to service contracts and the provision of technical training to ammunition producers located abroad.

The need for adequate control standards at the export licensing stage is further underlined by the fact that, as suggested above, once production capacities have been exported and established, the exporting state may have little leverage over the policies of the producing state regarding future use and transfer of the ammunition. Moreover, adequately trained technicians will often be in a position to copy and duplicate existing production equipment in order to increase domestic output capacities.[50] South Africa, for instance, is alleged to have increased national output capacities for small arms ammunition when the UN arms embargoes were in place between the 1960s and the early 1990s[51] by the use of reverse engineering on previously imported production equipment.[52]

Conclusion

A survey of existing information about the production of small arms and light weapons ammunition shows that production capacities have been transferred from a limited number of original designers to a large number of manufacturers across the globe. Small arms ammunition is now manufactured at numerous locations in all regions of the world. Production of guided ammunition for light weapons is less widespread. An important control measure in relation to future global production is the strict control of transfers of ammunition production capacities that can be used to establish, maintain, or upgrade ammunition production and assembly facilities.

As a minimum, states should ensure that export authorizations for transfers of ammunition production capacities, including ammunition components, are denied if there is a clear risk that the ammunition produced with the imported equipment or components would be diverted into the illicit sphere, transferred to undesirable end-users, or employed in undesirable end-uses. Furthermore, states should be more transparent about the number of small arms and light weapons ammunition producers on their territory. Ammunition production facilities should be more transparent about their levels of output and their range of products, as well as internal industry transfers of components and capacities. Such transparency is essential to the development of better targeted controls on the production of small arms and light weapons ammunition as a means to combat illicit transfers of this ammunition.

List of abbreviations

ATGW	Anti-tank guided weapons
EU	European Union
GGG	Giraites Ginkluotes Gamykla (Lithuania)
GRIP	Groupe de Recherche et d'Information sur la Paix et la Sécurité (Belgium)
MANPADS	Man-portable air defence systems
NATO	North Atlantic Treaty Organisation
SACDI	Southern African Centre for Defence Information
UAE	United Arab Emirates
UNGA	UN General Assembly
WA	Wassenaar Arrangement

Endnotes

1 This chapter is based on a draft by Rheinhilde Weidacher. It is complemented by research undertaken by the Groupe de Recherche et d'Information sur la Paix et la Sécurité (GRIP) in 2005 that included interviews with representatives of producers of ammunition for small arms and light weapons conducted at international defence market fairs in London (September 2005) and Paris (November 2005), personal visits to production sites in Belgium (April 2005) and Germany (May 2005), as well as contacts by phone and email. In total, 17 ammunition producing and trading companies responded to questions. The interviewees included representatives from three companies that are global providers of small arms ammunition production machinery The interviewed companies are located in Austria; Belgium; Brazil; China; Finland; France; Germany; Italy; Pakistan; Russia; South Africa; and Switzerland.

2 Interviews (note 1).

3 Interviews (note 1).

4 Interviews (note 1).

5 Interviews (note 1).

6 Interviews (note 1).

7 Interview in Geneva in September 2005 with a member of the 1999 UN Group of Experts on the problem of ammunition and explosives.

8 Interviews (note 1).

9 Interviews (note 1).

10 Interviews (note 1)

11 For a discussion by civilian shooters about the advantages and disadvantages of using 5.56 mm NATO or .223 Remington ammunition for specific purposes see <http://www.thenationofriflemen.org/oldnor/index.php/forums/viewthread/5848/>.

12 See, for instance, the 'PCX' cartridge load and assembly machine available from Manurhin Equipment at <http://www.manurhin-mre.com/english/produits.htm>.

13 Interviews (note 1).

14 Interviews (note 1).

15 Interviews (note 1).

16 Interviews (note 1).

17 The figure of 13 billion rounds was calculated by adding figures produced by Forecast International for production in Europe, the United States, and by non-US and non-European producers (Forecast International, 2005). Forecast International includes in its figures ammunition of 12.7 mm to 15.5 mm calibre. The global annual figure for production of small arms ammunition as defined in this chapter is therefore likely to be lower than 13 billion rounds.

18 Interviews (note 1). There is a list of relevant NATO Standardization Agreements on ammunition for small arms and light weapons at <http://otan.w3sites.net/OTAN/cgi-bin/motcle.pl?motcle=ammunition&critere=Num%E9ro+de+stanag+dans+l%27ordre+croissant>.

19 Interviews (note 1).

20 Interviews (note 1).

21 Interviews (note 1).

22 Interviews (note 1).

23 Interviews (note 1).

24 Interview with SNC Technologies at a London trade fair, September 2005.

25 Interview with FN Herstal, Belgium, April 2005.

26 Interview with FN Herstal, Belgium, April 2005.

27 Interview with FN Herstal, Belgium, April 2005.

28 Interviews (note 1).

29 Interview with FN Herstal, Belgium, April 2005.

30 Interview with FN Herstal, Paris, November 2005.

31 Interviews (note 1).

32 Interviews (note 1).

33 Interview in Brussels in September 2005 with a member of the expert mission that went to Tanzania on 6–10 June 2005 to verify information that had been submitted by the Tanzanian authorities to the Walloon government in Belgium in the context of an application to export small arms production equipment to Tanzania (GRIP, 2005, p. 8, box 2).

34 The figure of 1 million rounds was cited by the Tanzanian authorities to the expert mission to Tanzania in June 2005 (see note 33).

35 This figure of 10 million rounds was cited by the Tanzanian authorities to the expert mission to Tanzania in June 2005 (see note 33).

36 Interview with member of the expert mission to Tanzania in June 2005 (see note 33).

37 In its original language the relevant passage in the decision by the Walloon government reads: 'le Gouvernement estime que l'octroi de la licence n'est pas opportun dans le contexte actuel d'analyse […] pour motifs d'incompatibilité avec la politique étrangère et les engagements internationaux de la Belgique et impraticabilité de l'imposition de conditions supplémentaires à l'octroi de la licence' (Gouvernement Wallon, 2005, point 3; translation by the author).

38 Interviews (note 1).

39 Interviews with Fritz Werner Industrieanlagen (visit to site, May 2005) and Manurhin Equipment (by telephone, May 2005); interviews (note 1).

40 Interviews (note 1).

41 Interviews (note 1).

42 Interview by GRIP with German arms export official, Federal Ministry of Economics, Berlin, 14 June 2004.

43 Interview by GRIP with German arms export official, Federal Ministry of Economics, Berlin, 14 June 2004.

44 Interview by GRIP with German arms export official, Federal Ministry of Economics, Berlin, 14 June 2004; interview with Fritz Werner Industrieanlagen (visit to site, May 2005).

45 Interview with Pakistan Ordinance Factories at a London trade fair (September 2005); interview with Fritz Werner (visit to site, May 2005); interviews (note 1). For volumes of ammunition exports by Iran and Pakistan and export destinations see for instance the database of authorized transfers of small arms and light weapons at the Norwegian Initiative on Small Arms Transfers: <http://www.nisat.org/methodology/TDB_home.htm>.

46 Interview by GRIP with German arms export official, Federal Ministry of Economics, Berlin, 14 June 2004.

47 The 40 participating states in the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies are: Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom, and the United States. <http://www.wassenaar.org/participants/index.html>

48 The 25 member states of the European Union are Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the Netherlands, and the United Kingdom. <http://www.europa.eu.int/abc/governments/index_en.htm#members>

49 Interviews (note 1).

50 Interviews (note 1).

51 The UN Security Council first imposed a voluntary arms embargo on the South African Apartheid regime in 1963. This became a mandatory arms embargo in 1977. The embargo was lifted in 1994 (see UN, 2002).

52 Interview with representative of ammunition machinery provider who visited production sites in South Africa in the mid-1990s (May 2005).

Bibliography

Alliant TechSystems. 2006. 'Small-Calibre Ammunition.' Company Web site. Accessed March 2006. <http://www.atk.com/ProductsSolutions/conventionalammo_smallcaliber.asp>

Berkol, Ilhan. 2002. *Marking and Tracing Small Arms and Light Weapons: Improving Transparency and Control*. GRIP Report. Brussels: GRIP. March. <http://www.grip.org/pub/rapports/rg02-hs1_alg.pdf>

EU (European Union). 1998. *EU Code of Conduct on Arms Exports*. Document 8675/2/98 Rev. Brussels, June. <http://europa.eu.int/comm/external_relations/cfsp/sanctions/codeofconduct.pdf>
—. 2003a. *Common Military List of the European Union*. Official Journal C 314/1, 23 December. <http://europa.eu.int/comm/external_relations/cfsp/sanctions/common-list.pdf>
—. 2003b. *Fifth Annual Report According to Operative Provision 8 of the European Union Code of Conduct on Arms Exports*. Official Journal C320, 31 December. <http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/c_320/c_32020031231en00010042.pdf>
FN Herstal. 2005. '5.7 x 28mm Ammunition, Part of an Agreement Between FN Herstal and FIOCCHI.' *FN Herstal News*. Announcement made by FN Herstal on 14 September. <http://www.fnherstal.com/html/NEWS.htm#FIOCCHI>
Forecast International. 2005. *Ordnance & Munitions Forecast 2005: Small Arms Ammunition, United States, Europe, International*. Newton, Conn.: Forecast International, October.
GGG (Giraites Ginkluotes Gamykla). 2005a. 'About GGG.' Company Web site. Accessed March 2006. <http://www.ggg-ammo.lt/en/about.php>
—. 2005b. 'Components'. Company Web site. Accessed March 2006. <http://www.ggg-ammo.lt/en/components.php>
Global Security. n. d.. 'South African Defence Industry'. Accessed March 2006. <http://www.globalsecurity.org/military/world/rsa/industry.htm>
Gouvernement Wallon. 2005. *Communiqué du Gouvernement wallon du 23 Juin 2005.* <http://gov.wallonie.be/code/fr/comm_detail.asp?Primary_Key=1655>
GRIP (Groupe de Recherche et d'Information sur la Paix et la Sécurité). 2005. *Export Controls on production Capacities for Military Equipment: Strengthening the EU Approach*. Note d'Information de Groupe de recherche et d'information sur la paix et la sécurité (GRIP). Brussels: GRIP, July. <http://www.grip.org/bdg/g4580.html>
Hancock, Joseph. 2004. 'General News and European Affairs: Monday 29 December.' In British–Polish Chamber of Commerce and Factiva. Weekly News Digest. No. 2004/01. <http://www.bpcc.org.pl/en,0,1119.html>
Jones, Richard D., and Charles Q. Cutshaw (eds.). 2005. *Jane's Infantry Weapons 2004–2005*. Alexandria, Va.: Jane's Intelligence Group.
Karniol, Robert. 2005. 'Sri Lanka, Iran Agree Provisional Arms Deal.' *Jane's Defence Weekly*. 14 September.
Kwayera, Juma. 2003. 'Kenya Will Not Close Eldoret Bullet Factory.' *East African*, Web edition. Regional News, 20 October. Accessed March 2006. <http://www.nationaudio.com/News/EastAfrican/20102003/Regional/Regional35.html>
MAN Ferrostaal. n. d.. 'History of Industrial Plant Division.' Company Web site. <http://www.man-fs.com/en/corporate/our-company/73728/history-of-industrial-plants-division.html>
Mast Technology. 2006a. 'FAQ: Machines.' Company Web site. Accessed March 2006. <http://www.masttechnology.com/faqmachines.htm>
—. 2006b. 'Machinery Sales.' Company Web site. Accessed March 2006. <http://www.masttechnology.com/serv02.htm>
McKee, Clint and Walt Kuleck. 2006. 'What's the Difference between .308 Winchester and 7.62x51mm NATO?' Fulton Armory. Accessed March 2006. <http://www.fulton-armory.com/308.htm>
Merle, Renae. 2004. 'Running Low on Ammo: Military Turns to Overseas Suppliers to Cover Shortages.' *Washington Post*, 22 July. <http://www.washingtonpost.com/wp-dyn/articles/A4044-2004Jul21.html>
Mlambo, Norman. 1998. *The Zimbabwe Defence Industry, 1980–1995*. Defence Digest. Working paper No. 2. Southern African Centre for Defence Information (SACDI). <http://ccrweb.ccr.uct.ac.za/archive/defencedigest/defdigest02.html#small>

Mwakisyala, James. 2005. 'Britain Denies Financing Mzinga Bullets Factory.' *East African*, Web edition. Regional News, 25 April. <http://www.nationmedia.com/eastafrican/25042005/Regional/Regional5.html>

Nammo. 1999. 'New Nordic Ammunition Company'. Announcement by Nammo on 14 July. <http://www.nammo.com/templates/page.aspx?id=304>

—. 2006. Nammo Group. Company Web site. Accessed March 2006. <http://www.nammo.com/templates/GroupIntro.aspx?id=143>

New Lachaussée. n. d. (a). 'Highlights.' Company Web site. Accessed March 2006. <http://www.lachaussee.com/en/societe.html>

—. n. d. (b). 'Presence.' Company Web site. Accessed March 2006. <http://www.lachaussee.com/en/presence.html>

Ochieng, Levi, Michael Wakabi, and Erich Ogoso-Opolot. 1999. 'Uganda Military Turns to Home Plants for Parts.' *East African.* Regional News, 3–8 April. <http://www.nationaudio.com/News/EastAfrican/030499/Regional/Regional20.html>

Pandit, Rajat. 2005. '15 Years After First Test, Army Yet to Get its "Nag."' *The Times of India,* Web edition. 15 September. Accessed March 2006. <http://timesofindia.indiatimes.com/articleshow/msid-1231551,prtpage-1.cms>

Preylowski, Peter. 2004. 'Stinger-Produktion abgeschlossen.' *Soldat und Technik*, December, p. 71. <http://www.strategie-und-technik.de/12-2004/industrie.pdf>

RCBS. 2006. *Reloading Guide: Handloading Basics*. Accessed March 2006. <http://www.rcbs.com/default.asp?menu=1&s1=5&s2=12>

RUAG. n. d. (a). 'History of RUAG Ammotec.' Company Web site. Accessed March 2006. <http://www.ruag.com/ruag/juice?pageID=92259>

—. n. d. (b). 'RUAG Ammotec.' Company Web site. Accessed March 2006. <http://www.ruag.com/ruag/juice?pageID=93685>

Small Arms Survey. 2004. *Small Arms Survey 2004: Rights at Risk*. Oxford: Oxford University Press.

—. 2005. *Small Arms Survey 2005: Weapons at War*. Oxford: Oxford University Press.

Stohl, Rachel. 1998a. *Deadly Rounds: Ammunition and Armed Conflict*. Research Report 98.4. London and Washington, DC: British American Security Information Council.

—. 1998b. *Ammunition: A Choke Point for Light Weapons Control?* Washington, DC: Centre for Defence Information, 10 September. <http://www.cdi.org/friendlyversion/printversion.cfm?documentID=560>

United Arab Emirates Interact. 1998. 'Adcom in Talks to Bag Gulf Deals'. Ministry of Information and Culture in the UAE. Abu Dhabi, UAE. 16 March. <http://www.uaeinteract.com/news/viewnews.asp?NewsFileName=19980316.htm>

UN (United Nations). 2002. *Use of Sanctions under Chapter VII of the UN Charter: South Africa*. Office of the Spokesman for the Secretary-General. <http://www.un.org/News/ossg/safrica.htm>

UNGA (United Nations General Assembly). 1999. *Report of the Group of Experts on the problem of ammunition and explosives.* Reproduced in UN doc. A/54/155 of 29 June. <http://disarmament.un.org/cab/salw-sggarep.htm>

Wassenaar Arrangement. 2005. 'Control Lists'. Accessed March 2006. <http://www.wassenaar.org/controllists/index.html>

—. 2002. *Best Practice Guidelines for Exports of Small Arms and Light Weapons*. Accessed March 2006. <http://www.wassenaar.org/docs/best_practice_salw.htm>

Small arms ammunition is often traded separately from the weapons for which it is manufactured.
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3

Buying the Bullet: Authorized Small Arms Ammunition Transfers

Anne-Kathrin Glatz

Introduction

In 2003 Uganda paid the Croatian state agency responsible for arms transfers, Alan, a little more than USD 1 million for the manufacturing technology for 40 mm RGB-6 grenades. This was in spite of the fact that Uganda was involved indirectly in the conflict in the Democratic Republic of the Congo (DRC) by supporting non-state armed groups fighting there (HRW, 2003). This and other transfers from Croatia to Uganda in 2002 and 2003 led to accusations by Amnesty International and others that Croatia was acting in contradiction of the *European Union Code of Conduct on Arms Exports* (EU, 1998).[1] It thus became possible for Uganda to transfer locally produced light weapons ammunition to non-state armed groups fighting in DRC (SEESAC, 2005).[2]

Transfers of ammunition for small arms and light weapons often take place separate from the production and transfer of small arms and light weapons. The example above highlights the importance of examining ammunition transfer patterns independently in order to assess the impact these transfers can have in the destination countries or in third countries after retransfer. This is especially important for conflict areas or for countries where human rights violations have taken place.

To date, however, small arms ammunition[3] transfers have not been studied in detail. The predominant approach in the literature has been to examine authorized small arms transfers as a whole, with ammunition included under this general rubric. This chapter begins to address this gap by looking specifically at authorized small arms ammunition transfers.[4]

It is important to do this because the share of the trade in small arms ammunition—even when light weapons ammunition is excluded—as part of the trade in small arms and light weapons reported to the United Nations Commodity Trade Statistics (UN Comtrade) database is considerable (see Figure 1 below; Small Arms Survey, 2005, pp. 98–99). Furthermore, once sufficient weapons stocks are in place in conflict areas, transfers of ammunition to these areas may be even more important than additional weapons transfers, since the availability of ammunition directly determines the dynamics of armed conflict. This has been the case in West Africa, for example, where craft production of small arms and light weapons is oriented towards the kinds of ammunition that can be imported (Small Arms Survey, 2006, p. 255). In Angola, Côte d'Ivoire, and Liberia, for example, volumes of ammunition imports increased prior to an expected arms embargo or a military offensive.[5] Finally, what is true for small arms also applies to small arms ammunition—the distinction between authorized and illicit transfers becomes artificial as soon as ammunition initially transferred on an authorized basis enters the illicit sphere. This may happen more easily than in the case of small arms because some ammunition, such as shotgun cartridges,[6] is more difficult to trace than small arms and light weapons themselves.[7]

Furthermore, the trade dynamics for ammunition may be different because it is a consumption good rather than a durable good. Small arms procurement for armed forces routinely occurs on a long-term basis. Major procurement initiatives often involve high levels of weapons procurement over several years (Small Arms Survey, 2006, pp. 6–35). Ammunition procurement patterns reflect a country's military activities, such as involvement in a conflict, much more immediately. Trade patterns over several years are likely to be influenced by this. For example, the shortage of ammunition in the US military in recent years because of US military involvement in Afghanistan and Iraq has led the US government to import increased amounts of small arms ammunition from abroad (including from Israel, South Korea, Sweden, and the United Kingdom) in addition to increasing domestic production.[8]

The main findings of this chapter are the following:

- For the period 1999–2003, the average global value in annual authorized small arms ammunition exports (excluding light weapons ammunition exports)

Box 1 Definitions of exporters and importers used in this chapter

Top exporters:
Countries with a reported* annual value of authorized small arms ammunition exports equal to or greater than USD 30 million (average 1999–2003)

Top importers:
Countries with a reported* annual value of authorized small arms ammunition imports equal to or greater than USD 30 million (average 1999–2003)

Major exporters:
Countries with a reported* annual value of authorized small arms ammunition exports equal to or greater than USD 3 million (average 1999–2003)

Major importers:
Countries with a reported* annual value of authorized small arms ammunition imports equal to or greater than USD 3 million (average 1999–2003)

* 'Reported' refers to countries reporting to UN Comtrade.

did not fluctuate significantly, hovering around USD 700 million, a value that is almost certainly underestimated as a result of underreporting.

- For the period 1999–2003, the *top exporters* (with an annual average export value of at least USD 30 million according to UN Comtrade data) were the United States, Italy, Brazil, Belgium, the United Kingdom, Russia, and Germany.
- The *top importers* for 1999–2003 (with an annual average import value of at least USD 30 million according to UN Comtrade data) were the United States, Saudi Arabia, and Germany.

Section 2 of this chapter addresses data issues and the main impediments to a better understanding of authorized small arms ammunition transfers. Section 3 describes the top and major importers and exporters of small arms ammunition based on UN Comtrade data. The chapter concludes with a discussion of questions to be addressed in future research and some key implications for policy.

Data issues

The calculations in this chapter are based on UN Comtrade data,[9] with 2003 as the latest year for which data on small arms ammunition transfers was available at the time of writing, and were provided in part by the Norwegian Initiative on Small Arms Transfers (NISAT) (Marsh, 2005). The UN Comtrade database records customs data (i.e. data recorded by national customs authorities about the goods that cross their borders). The data used here includes mirror data: export data for a given country is calculated based on the country's own reporting as well as on other countries' reporting on their imports from that country (and vice versa for import data). In this way, some information can be obtained on transfers by countries that either underreport or do not report their small arms ammunition transfers to UN Comtrade.[10]

Box 2 Customs categories of the Harmonized System (HS) for small arms and light weapons ammunition: a disclaimer

Transfers data used in this chapter is based on information provided by the United Nations Commodity Trade Statistics (UN Comtrade) database. This information is derived from statistics provided by customs officers from around the world. One of its advantages is that it uses globally standardized codes to classify categories of products. The classifications sometimes conflate disparate material, however. The global classification is known as the Harmonized System (HS) and is administered by the World Customs Organisation.

Small arms and light weapons ammunition is covered by four HS categories. Only two of these are used in this chapter:

930621: shotgun cartridges and parts

930630: small arms ammunition, that is, ammunition for revolvers, pistols, and military firearms (including cartridges with calibres of 12.7 mm and above, i.e. some light weapons ammunition)

Category 930630 presents relatively negligible problems: of its 22 sub-categories, one is ambiguous,[11] and two are not ammunition for either small arms or light weapons.[12]

Two categories that contain ammunition for small arms and/or light weapons but also other ammunition have not been included in the calculations in this chapter:

930690: light weapons and larger ammunition

930629: airgun pellets, lead shot and other parts of shotgun cartridges

Category 930690 covers a variety of military equipment including large calibre ammunition, some of which could be used in light weapons (such as mortars). It contains 86 sub-categories,[13] only some of which cover ammunition for small arms and/or light weapons. The sub-categories exhibit varying degrees of specificity. For example 'grenades, being munitions of war (e.g., hand and rifle grenades) and parts thereof' is very specific, while 'parts of projectiles, excluding propellant powders, fuses, caps, igniters and detonators' could include a wide variety of components for material not defined as small arms or light weapons. It is thus not possible to quantify the share of small arms and light weapons ammunition as part of the 930690 value for a given country.

Category 930629, which covers airgun pellets, lead shot, and other parts of shotgun cartridges, is also excluded since it covers both small arms ammunition (lead shot and other parts of shotgun cartridges) and non-small arms ammunition (airgun pellets). Based on UN Comtrade data, it is not possible to tell how much of a given transfer in that category included small arms ammunition.

Sources: UN Comtrade (2005); NISAT (2005); email correspondence with Nicholas Marsh, NISAT, 2 February 2006.

Boxes of Russian-made ammunition collected during the disarmament process after Burundi's civil war.
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UN Comtrade data and information from national arms export reports mostly provide values rather than quantities of ammunition transferred. Information on quantities would be more useful in terms of assessing the importance of a transfer, but this kind of data is only rarely available. Comparisons across countries are thus to date only possible based on transfer values. This chapter attempts to complement UN Comtrade data with examples from other sources in order to provide a fuller picture of recent worldwide authorized small arms ammunition transfers.

Some countries do not report at all on any small arms ammunition category, in spite of the fact that they are important traders of small arms ammunition. The values provided in this chapter—an averaged annual total of USD 700 million in global exports of small arms ammunition reported to UN Comtrade in 1999–2003—are thus partly the result of mirror data calculations (Marsh, 2005) and therefore likely to be underestimated. Importers' and exporters' reports can differ for a variety of reasons—including exchange rate fluctuations, different levels of coverage, as well as inclusion or exclusion of transit trade, foreign aid, and transfers to the respective country's armed forces and diplomatic representatives (for further details see Small Arms Survey, 2005, p. 100, Box 4.1).

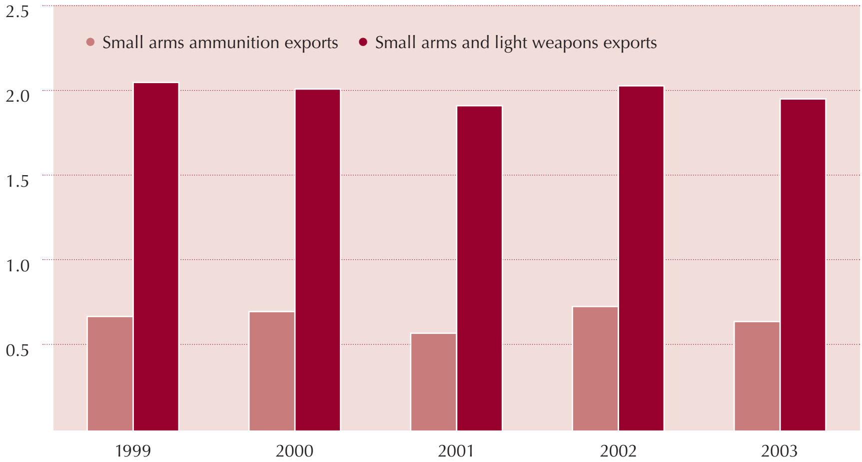
A second source of information on authorized small arms transfers, including transfers of ammunition, is data from national arms export reports. A majority of major exporters published such a report (see Annexe 1), but all of their reports are problematic for at least one of the following reasons: (*a*) they often provide data only on licences granted rather than actual deliveries; and (*b*) many reports do not distinguish between the different categories of ammunition—small arms, light weapons, and larger ammunition. A widely used system of categorization is the Wassenaar Arrangement Munitions List (ML), on which the EU Common Military List is based. This system is problematic for assessing small arms ammunition transfers because category ML3[14] includes ammunition for small arms and light weapons as well as for larger weapons.

Reports by the media, NGOs, and UN expert panels are also possible sources of information about authorized transfers of small arms ammunition. Only rarely, however, do these contain specific details—such as quantities and financial values—of authorized transfers of small arms ammunition.

Small arms ammunition exporters and importers

This section discusses the *top* and *major exporters* and *importers* of small arms ammunition and their main trading partners for the period 1999–2003 (the last five years for which data from UN Comtrade was available at the time of writing). Top and major exporters and importers are determined by averaging each country's trade values for 1999–2003. *Major* exporters and importers are those with a reported annual trade value equal to or greater than USD 3 million. *Top* exporters and importers are defined as those with a reported annual export or import value that is equal to or greater than USD 30 million.[15] The data is adjusted for inflation using 2000 as the base year.[16] About one-third, in terms of value, of the authorized small arms and light weapons exports reported to UN Comtrade in the period 1999–2003 were exports of small arms ammunition (see Figure 1). In common with worldwide small arms and light weapons

Figure 1 **Worldwide small arms ammunition exports as a share of total small arms and light weapons exports, 1999–2003**



Customs categories included: 930630 (small arms ammunition) and 930621 (shotgun cartridges).

Source: UN Comtrade (2005); NISAT (2005).

exports, fluctuations in the total annual value of worldwide small arms ammunition exports over the five-year period were minimal.

Exporters

Annual averages during the period 1999–2003 reveal that the *top exporters* were the United States, Italy, Brazil, Belgium, the United Kingdom, Russia, and Germany (see Figure 2). The five-year total export value of the largest exporter, the United States, was more than three times as high as that of the second-largest exporter, Italy (NISAT, 2005). The differences in total value between the other top exporters for the five-year period are small in comparison. China was not among the top exporters for the 1999–2003 average, according to UN Comtrade. In 1998, however, its reported value of exports of category 930630 items (small arms ammunition) was USD 36,244,000 (UN Comtrade, 2005). It is likely that the country changed its way of reporting to UN Comtrade rather than its actual exports, and it can be assumed that it ranked among the top exporters of small arms ammunition also in the period 1999–2003.

Figure 2 Top exporters of small arms ammunition, annual breakdown, 1999–2003

Customs categories included: 930630 (small arms ammunition) and 930621 (shotgun cartridges).

Sources: UN Comtrade (2005); NISAT (2005).

Figure 2 shows that for countries such as Belgium and Russia, the variations are significant—falling below the USD 30 million threshold and even below USD 20 million in some years but over USD 70–80 million in others. This could be explained by changes in reporting, but these variations could also be linked to real differences in ammunition exports, possibly resulting from procurement decisions on the part of major recipients.

Table 1 lists the major exporters of small arms ammunition (annual average for 1999–2003). Main recipients are countries that appear among the five largest recipients of any given exporter for at least one out of the five years, and whose trade value was higher than 1 per cent of the total trade value for the respective exporter.[17] The top exporters are shown in red. The table is based exclusively on customs data from UN Comtrade. National arms export reports—whenever available—usually do not distinguish between small arms ammu-

Table 1 Authorized small arms ammunition exports for major exporters, annual average, 1999–2003 (annual average export value equal to or greater than USD 3 million)

Country	USD value (UN Comtrade customs data)	Main recipients (number of years for which country has been among main recipients)
Australia	6 million	Belgium (5), France (4), Japan (5), Kuwait (2), New Zealand (5), UK (1), US (3)
Austria	7 million	Belgium (1), Brunei (1), Croatia (1), Finland (2), Germany (5), Latvia (1), Lithuania (1), Malaysia (1), Nepal (1), Norway (1), Sweden (1), Switzerland (2), Tunisia (1), United Kingdom (1), United Arab Emirates (2), US (3)
Belgium	38 million	Australia (1), France (3), Germany (3), Luxembourg (2), Netherlands (3), New Zealand (1), Norway (2), Saudi Arabia (4), UK (2), US (2)
Bosnia and Herzegovina	5 million	Australia (2), Austria (4), Bulgaria (1), France (1), Germany (5), Nepal (1), New Zealand (2), Turkey (2), UK (2), US (2)
Brazil	39 million	Algeria (2), Angola (1), Belgium (1), Colombia (4), Germany (5), Malaysia (1), Norway (1), Peru (2), Saudi Arabia (1), United Arab Emirates (1), US (5), Zimbabwe (1)
Bulgaria	4 million	Austria (3), Czech Republic (1), Estonia (1), Georgia (2), Germany (1), Macedonia (3), Poland (2), Russia (1), Saudi Arabia (1), Slovakia (1), South Korea (1), Sri Lanka (1), Switzerland (1), Turkey (1), US (3)
Canada	18 million	Australia (1), Belgium (5), Denmark (3), France (4), Netherlands (4), Norway (3), US (5)
Czech Republic	23 million	Austria (1), France (3), Georgia (1), Germany (5), Malaysia (1), Poland (5), Slovakia (3), Sri Lanka (1), US (5)
Finland	11 million	Denmark (2), Germany (4), Italy (1), Lithuania (2), Netherlands (1), Norway (3), South Korea (1), Sweden (4), UK (3), US (4)
France	12 million	Brazil (3), Canada (1), Côte d'Ivoire (2), Germany (1), Guinea (3), New Zealand (1), Norway (3), Saudi Arabia (1), Senegal (2), Taiwan (1), Turkey (2), US (5)
Germany	33 million	Austria (5), Denmark (1), France (5), Japan (1), Netherlands (2), Switzerland (5), UK (2), US (4)

Hungary	5 million	Austria (4), Germany (5), Italy (4), Japan (4), Norway (1), Slovakia (2), US (5)
Israel	6 million	Australia (1), Austria (2), Botswana (1), Czech Republic (1), Denmark (1), Germany (5), Mexico (1), Poland (1), Singapore (1), Trinidad and Tobago (3), Turkey (1), UK (2), US (5)
Italy	48 million	Belgium (1), France (4), Germany (4), Japan (3), Mexico (1), Norway (1), Spain (1), Turkey (5), US (5)
Mexico	4 million	Argentina (2), Belgium (1), France (2), Guatemala (3), Honduras (1), Nicaragua (2), Panama (1), Paraguay (3), Peru (1), Uruguay (1), US (5), Venezuela (3)
Netherlands	5 million	Belgium (1), Brazil (1), Czech Republic (1), France (1), Germany (2), Luxembourg (2), Norway (1), Poland (1), Saudi Arabia (1), Switzerland (5), United Arab Emirates (1), UK (1), US (3), Venezuela
Norway	17 million	Belgium (1), Canada (1), France (1), Italy (3), Singapore (2), Spain (2), Sweden (5), Switzerland (5), Turkey (1), UK (2), US (2)
Portugal	4 million	Bangladesh (1), Belgium (3), Chile (1), Germany (3), Greece (3), Guinea (2), Guinea-Bissau (3), Ireland (1), Lebanon (1), Mexico (1), Mozambique (1), Spain (1), US (4)
Russia	35 million	Angola (1), Austria (1), China (2), Ethiopia (1), Germany (1), Greece (1), India (2), Kazakhstan (2), Mongolia (2), New Zealand (1), Poland (1), South Korea (2), Slovakia (1), United Arab Emirates (1), US (5), Yemen (1)
Slovakia	3 million	Austria (2), Cyprus (1), Czech Republic (2), Germany (5), Hungary (4), Indonesia (1), Israel (1), Macedonia (1), Poland (1), Serbia and Montenegro (1), Sri Lanka (1), Turkey (1), Uganda (1), US (1)
South Africa	13 million	Austria (1), Botswana (1), Brazil (2), Germany (5), India (2), Mexico (3), Poland (1), Singapore (1), South Korea (1), Switzerland (2), UK (1), US (5)
South Korea	17 million	Australia (5), Germany (1), Indonesia (2), Israel (4), Pakistan (1), Thailand (1), Turkey (2), US (5), Venezuela (4)

Spain	27 million	Argentina (2), France (1), Germany (1), Ghana (5), Japan (3), Peru (1), Saudi Arabia (1), Turkey (5), UK (1), US (2), Venezuela (3)
Sweden	20 million	Austria (2), Belgium (1), Denmark (4), Finland (1), France (1), Germany (4), Mexico (2), Norway (5), US (5)
Switzerland	26 million	Argentina (1), Austria (2), Bahrain (1), Canada (3), Ethiopia (1), Finland (1), Germany (3), Italy (1), Netherlands (1), Romania (4), Singapore (2), United Arab Emirates (3), UK (1), US (1)
Turkey	5 million	Armenia (1), Azerbaijan (1), Botswana (1), Cameroon (1), Cyprus (2), France (1), Germany (2), Jordan (1), Macedonia (1), Netherlands (1), Romania (1), Rwanda (1), South Africa (1), Switzerland (1), Ukraine (1), US (4)
United Kingdom	37 million	Canada (1), Denmark (5), Germany (4), Ghana (1), Ireland (2), Japan (2), unspecified countries (5), US (5)
United States	152 million	Australia (3), Canada (5), Israel (3), Italy (1), Kuwait (2), Netherlands (2), Saudi Arabia (3), South Korea (3), Taiwan (2), United Arab Emirates (1)

nition, light weapons ammunition, and other types of ammunition. It is thus not possible to compare UN Comtrade data on ammunition exports with data from national arms export reports. Annexe 1 lists major exporters for 2003 only, with remarks regarding the respective national arms export reports, where applicable, and the types of ammunition traded.

There are two main scenarios in which authorized ammunition exports become problematic[18]: (*a*) transfers directly to countries involved in internal or international conflict or to countries where human rights violations have been reported; and (*b*) transfers to neighbouring or other third countries, which may then be transferred through illicit channels to a country involved in internal or international conflict or where human rights violations have been reported.[19] If a regional arms embargo exists for a particular country, it can also be circumvented through retransfer or by the transfer of manufacturing equipment and technology.[20]

In most cases hard evidence is lacking, and the ultimate link between a transfer of small arms ammunition and its problematic final destination can often only be speculated on. As stated above, authorized small arms *ammunition* transfers can be more important than those of small arms and light weapons: if sufficient small arms stocks are available, resupply of ammunition is more crucial to sustaining a conflict, for example, than new supplies of weapons.

An example of self-restraint on the part of countries supplying small arms ammunition to a country involved in conflict points to both the importance of such transfers to sustaining conflict and the possible influence of self-restraint. Australia and New Zealand, traditionally Papua New Guinea's main suppliers of small arms and ammunition, introduced severe restrictions on their exports of small arms ammunition (and small arms) to Papua New Guinea in 2002 because of the conflict there. By 2004 the price of ammunition in the Southern Highlands of Papua New Guinea had doubled. While there may be several reasons for this price rise, it could indicate that previous ammunition exports from Australia and New Zealand had played an important role in satisfying demand for ammunition in Papua New Guinea (Alpers, 2005, pp. 77–79).

Transfers of ammunition production equipment do not appear in data on ammunition transfers. They are, however, important for explaining patterns of worldwide ammunition production and, by extension, in assessing authorized ammunition supplies to conflict regions or countries where human rights violations have been reported—which may happen in spite of the fact that embargoes bind those countries that supply production equipment to third countries. The Eldoret factory in Kenya, supplied with small arms ammunition production technology by the Belgian manufacturer FN Herstal, is an example of how a transfer of small arms ammunition production technology can create concerns about the supply of ammunition to a conflict region. Belgian parliamentarians, NGOs, and journalists raised concerns about possible ammunition transfers from Eldoret to conflict regions, in particular the Great Lakes region. The Independent Commission of Inquiry (ICOI) on Rwanda established by the UN Security Council, however, did not visit the factory and was thus unable to substantiate allegations that ex-FAR (Armed Forces of Rwanda) and Interahamwe members were supplied with ammunition (and small arms) produced at the Eldoret factory (Berman, 2000, p. 5).[21]

Table 2 Small arms instruments and their provisions for small arms ammunition transfers

Instrument	Reference to transfers of small arms and light weapons ammunition
OAS Inter-American Convention (OAS, 1997)	Arts. IX (Export, Import, and Transit Licenses or Authorizations) and X (Strengthening of Controls at Export Points) apply to 'firearms, ammunition, explosives, and other related materials'.
OAS Model Regulations (OAS, 1998)	Chapter II is exclusively devoted to ammunition; specific sections cover export, import, and in-transit shipments.
EU Code of Conduct (EU, 1998; 2003)	Ammunition is covered by the entire text. Category ML3 of the Common Military List includes ammunition for small arms, light weapons, and larger weapons.
ECOWAS Moratorium and Code of Conduct (ECOWAS, 1998; 1999)	Ammunition is covered by the entire text.
OSCE Document on Small Arms and Light Weapons (OSCE, 2000)	Section III on export controls does not make reference to ammunition.
OAU Bamako Declaration (OAU, 2000)	Section 3.B.ii calls for harmonization of legislation on trade, including ammunition, on the regional level.
UN Firearms Protocol (UNGA, 2001a)	Art. 10 on export, import, and transit covers 'firearms, their parts and components and ammunition'.
UN Programme of Action (UNGA, 2001b)	No reference to ammunition transfers.
SADC Firearms Protocol (SADC, 2001)	No specific section on transfers; only broad reference to ammunition transfers in sections on Legislative Measures and State-Owned Firearms.
Wassenaar Arrangement (WA, 2002; 2005)	No specific reference to ammunition transfers; ammunition is only mentioned regarding marking and tracing. Category ML3 of the Munitions List includes ammunition for small arms, light weapons, and larger weapons.
Nairobi Protocol (Nairobi Protocol, 2004)	Art. 10 on Import, Export, Transfer and Transit does not specifically mention ammunition.

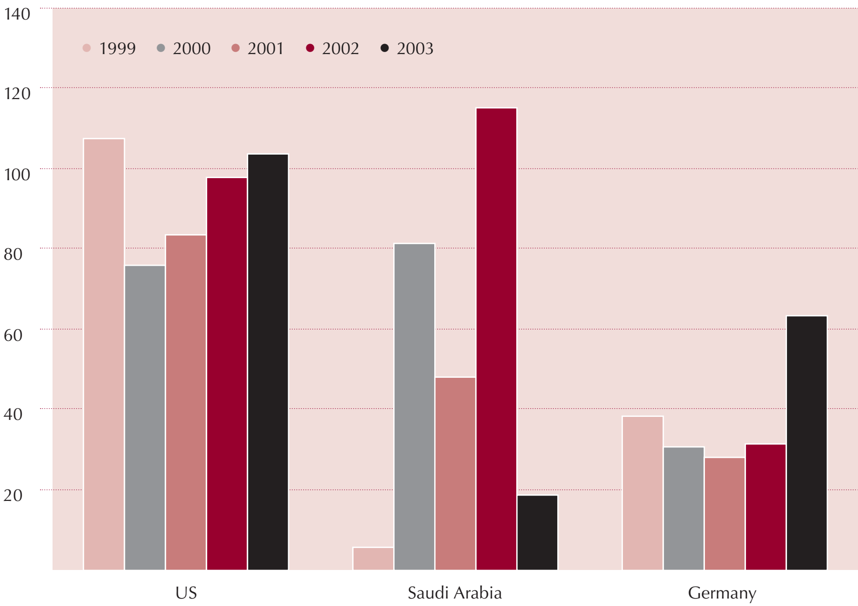
Sources: Small Arms Survey (2005, pp. 23–25); McDonald (2005)

Importers

The *top importers* of small arms ammunition (annual average 1999–2003) were the United States, Saudi Arabia, and Germany (see Figure 3). The five-year total import value of the largest importer, the United States, is 1.7 times as high as that of the second-largest importer, Saudi Arabia, and 2.5 times as high as that of the third-largest importer, Germany (NISAT, 2005). Data for Saudi Arabia shows large variations, from below USD 10 million in 1999 to above USD 110 million in 2002. As in the case of exports, varying procurement decisions as well as changes in reporting could explain these fluctuations.

Table 3 lists the major importers of small arms ammunition (annual average 1999–2003). Main suppliers are countries that appear among the five largest suppliers for any given importer for at least one out of the five years, and whose trade value was higher than 1 per cent of the total trade value for the respective

Figure 3 **Top importers of small arms ammunition, annual breakdown, 1999–2003**



Customs categories covered: 930630 (small arms ammunition), 930621 (shotgun cartridges).

Source: UN Comtrade (2005); NISAT (2005)

Table 3 Authorized small arms ammunition imports for major importers, annual average 1999–2003 (annual average import value equal to or greater than USD 3 million)

Country	USD value (UN Comtrade customs data)	Main suppliers (number of years for which country has been among main suppliers)
Argentina	3 million	Austria (1), Brazil (5), China (1), France (1), Israel (1), Italy (5), Mexico (1), Spain (4), Switzerland (1), US (5)
Australia	22 million	Belgium (1), Bosnia and Herzegovina (1), Brazil (1), Canada (1), Italy (4), Norway (1), Serbia and Montenegro (1), South Korea (4), Spain (1), unspecified countries (5), US (5)
Austria	11 million	Bosnia and Herzegovina (2), Bulgaria (1), Czech Republic (3), Germany (5), Hungary (1), Italy (4), South Africa (1), Sweden (2), Switzerland (4), US (2)
Belgium	13 million	Australia (2), Austria (1), Brazil (3), Canada (5), Italy (5), Portugal (2), Sweden (1), UK (1), US (5)
Brazil	3 million	Canada (1), Finland (2), France (5), Italy (1), Netherlands (1), South Africa (5), Spain (1), Switzerland (2), UK (2), US (5)
Canada	25 million	Czech Republic (1), France (2), Germany (1), Norway (1), Sweden (4), Switzerland (4), UK (2), US (5)
China	4 million	Canada (2), Finland (3), Germany (4), Italy (2), Russia (2), Spain (2), UK (5), US (3)
Colombia	7 million	Brazil (5), Italy (3), Spain (1), UK (1), US (5)
Denmark	10 million	Canada (3), Finland (3), Germany (5), Norway (1), Spain (2), Sweden (5), Switzerland (1), UK (5)
Egypt	4 million	Canada (2), Czech Republic (1), France (1), Germany (2), Italy (4), Spain (1), Switzerland (2), UK (1), US (5)
Finland	6 million	Austria (2), Czech Republic (2), Germany (5), Italy (5), Norway (1), Singapore (1), Sweden (4), Switzerland (1), US (4)
France	19 million	Belgium (3), Canada (2), Czech Republic (1), Germany (5), Italy (5), Netherlands (1), Spain (1), Sweden (2), US (5)

Germany	38 million	Belgium (1), Brazil (5), Czech Republic (4), Italy (5), Sweden (1), Switzerland (2), Turkey (1), UK (1), US (5)
Ghana	3 million	Burkina Faso (1), France (2), Germany (1), Russia (1), South Africa (1), Spain (5), UK (3), US (2)
Greece	4 million	Belgium (1), Czech Republic (1), Germany (3), Iran (3), Italy (5), Portugal (2), Russia (1), South Africa (1), Spain (3), US (5)
India	12 million	Austria (2), Czech Republic (2), France (1), Germany (1), Israel (1), Italy (3), Russia (2), South Africa (2), Switzerland (1), UK (3)
Israel	10 million	Canada (1), Czech Republic (2), South Africa (1), South Korea (5), Slovakia (1), UK (1), US (5)
Italy	13 million	Belgium (2), Czech Republic (1), Finland (1), Germany (5), Hungary (4), Norway (4), Switzerland (2), UK (1), US (5)
Japan	12 million	Australia (4), Germany (2), Italy (5), Spain (5), UK (4), US (5)
Kuwait	8 million	Australia (3), Bosnia and Herzegovina (1), Cyprus (5), France (4), Italy (5), Poland (3), US (4)
Malaysia	10 million	Austria (1), Brazil (3), China (1), Czech Republic (4), Finland (2), Germany (2), Italy (3), Norway (1), South Africa (1), Switzerland (1), UK (2), US (2)
Mexico	7 million	Belgium (2), Cuba (1), Czech Republic (3), Greece (1), Israel (1), Italy (1), South Africa (3), Spain (3), Sweden (2), UK (1), US (5)
Netherlands	14 million	Belgium (4), Canada (3), Finland (1), Germany (5), Spain (2), Switzerland (3), Turkey (1), UK (1), US (5)
New Zealand	5 million	Australia (5), Belgium (2), Bosnia-Herzegovina (1), Brazil (3), Canada (1), Finland (1), France (1), Italy (3), Spain (1), Switzerland (1), UK (1), US (5)
Norway	15 million	Brazil (1), Canada (2), Finland (3), France (3), Germany (1), Italy (3), Sweden (5), Switzerland (1), UK (1), US (5)
Poland	4 million	Bulgaria (1), Czech Republic (5), Finland (1), Germany (5), Hungary (1), Israel (1), Italy (3), Russia (2), South Africa (1), Spain (2), Switzerland (2), Ukraine (1)

Romania	6 million	Austria (1), Czech Republic (1), Germany (3), Greece (1), Italy (4), Spain (1), Switzerland (5), Turkey (1)
Saudi Arabia	54 million	Belgium (4), Brazil (1), Bulgaria (1), Egypt (1), France (2), Germany (1), Netherlands (1), South Africa (1), Spain (2), UK (1), US (5)
Singapore	5 million	Austria (1), Brazil (3), Canada (2), China (1), Germany (2), Israel (1), Norway (4), South Africa (1), Switzerland (4), Thailand (1), US (5)
South Korea	17 million	Finland (4), Germany (4), Italy (3), Russia (4), Spain (3), UK (2), US (5)
Spain	7 million	Belgium (2), Brazil (2), Czech Republic (1), Germany (4), Italy (5), Norway (2), Sweden (3), Switzerland (1), US (5)
Sweden	8 million	Austria (1), Czech Republic (1), Finland (5), Germany (5), Italy (2), Norway (5), Spain (1), US (5)
Switzerland	12 million	Austria (2), Germany (5), Italy (2), Netherlands (3), Norway (5), South Africa (2), Sweden (1), UK (3), US (2)
Taiwan	5 million	France (1), Greece (1), Italy (3), Malaysia (1), South Korea (3), Spain (2), UK (1), US (5)
Turkey	21 million	Bosnia and Herzegovina (1), China (1), Cyprus (1), France (1), Germany (2), Italy (5), Norway (1), Romania (1), South Korea (1), Spain (5), US (5)
United Arab Emirates	10 million	Austria (3), Brazil (4), Canada (1), Czech Republic (1), Finland (2), France (1), Netherlands (1), Russia (1), South Africa (1), Switzerland (4), UK (1), US (5)
UK	27 million	Belgium (2), Brazil (1), Cyprus (1), Finland (2), Germany (3), Italy (2), Norway (1), Spain (2), Switzerland (1), unspecified countries (5), US (5)
US	94 million	Brazil (2), Canada (4), Czech Republic (4), Israel (1), Italy (2), Russia (5), South Africa (1), South Korea (4), Sweden (1), UK (1)
Venezuela	7 million	Brazil (2), Czech Republic (2), Italy (3), Mexico (4), South Korea (4), Spain (5), US (4)

importer.[22] The top importers (the United States, Saudi Arabia, and Germany) are shown in red. The largest importer over the five-year period was either the United States (1999, 2001, 2003) or Saudi Arabia (2000, 2002) (NISAT, 2005). While there were 27 major annual exporters on average for 1999–2003, there were 39 major importers. Also, seven countries exported small arms ammunition of a value of more than USD 30 million, whereas only three countries imported ammunition of a value of more than USD 30 million. This indicates that exports are much more concentrated among a small number of countries, which mostly are also producers of ammunition. By contrast, imports are spread more widely among a larger number of countries.

Conclusions

This chapter provides a starting point for research on authorized transfers of ammunition for small arms and light weapons. It is complemented by Chapter 4 in this volume on illicit transfers of ammunition for small arms and light weapons. The chapter demonstrates that there are still important gaps in reporting and data availability that need to be filled. Increased transparency is a crucial precondition for addressing the possible negative effects of authorized transfers. Customs data from UN Comtrade makes possible an analysis of small arms ammunition only (excluding light weapons ammunition) only because ammunition for light weapons is included in a customs category that also contains larger ammunition. National arms export reporting could be improved in order to allow for an assessment of the scope of ammunition transfers for both small arms and light weapons ammunition, as opposed to transfers of other ammunition.

Since small arms (and light weapons) ammunition is of crucial importance in fuelling conflict or in facilitating human rights violations, authorized transfers of this ammunition must be made more transparent and the subject of greater scrutiny. Small arms ammunition transferred with authorization can be misused by states as well as non-state armed groups and individuals. Improvements in transparency—including developing a universal marking and tracing regime and strengthening international and regional instruments—are crucial to preventing undesirable transfers of small arms ammunition.

Annexe 1 Authorized small arms ammunition exports for major exporters for 2003 (annual export value equal to or greater than USD 3 million) (top exporters shown in red)

Country	USD value (UN Comtrade customs data)	Main recipients (trade value above 1%) in order of importance	Remarks
Australia	8 million	US, Japan, New Zealand, Belgium, France	930630: USD 5 million; 930621: USD 3 million. Has not published a national arms export report for 2003.
Austria	7 million	Germany, Switzerland, Finland, US, Latvia	Value almost exclusively concerns category 930630. Does not publish a national arms export report.
Belgium	11 million	France, US, Luxembourg, Norway, Netherlands	930630: two-thirds; 930621: one-third. National arms export report has been replaced since 2003 by three regional reports: Brussels (1 Sept 2003–31 Dec 2004): only licences granted, not actual deliveries; no separate ammunition figures. Flanders (30 Aug 2003–29 Feb 2004): actual deliveries, but no separate ammunition figures. Wallonia (1 Sept to 31 Dec 2003): only licences granted, not actual deliveries; no separate ammunition figures.
Bosnia and Herzegovina	7 million	Bulgaria, Germany, US, UK, Nepal	Value almost exclusively concerns category 930630. First national arms export report (for 2004) only provides information on the overall category 9306, which includes the problematic categories 930690 and 930629 in addition to 930630 and 930621.

Brazil	52 million	Colombia, Saudi Arabia, US	930630: one-fifth; 930621: four-fifths. Does not publish national arms export report.
Canada	18 million	US, Belgium, France, Norway, Netherlands	Value almost exclusively concerns category 930630. National arms export report for 2002 does not distinguish between ammunition for small arms and ammunition for light weapons.
Croatia	5 million	Macedonia, Serbia and Montenegro, Afghanistan	930630: USD 5 million Does not publish national arms export report.
Czech Republic	15 million	US, Germany, France, Poland, Austria	930630: two-thirds; 930621: one-third. National arms export report does not distinguish between small arms ammunition, light weapons ammunition, and other types of ammunition.
Finland	12 million	Sweden, Norway, Germany, US, UK	Value almost exclusively concerns category 930630. National arms export report does not distinguish between small arms ammunition, light weapons ammunition, and other types of ammunition.
France	12 million	Côte d'Ivoire,[23] US, Germany, Guinea, Canada	Value almost equally divided between categories 930630 and 930621. National arms export report does not distinguish between small arms ammunition, light weapons ammunition, and other types of ammunition.
Germany	44 million	Austria, UK, France, Netherlands, Switzerland	Four-fifths concern category 930630; one-fifth 930621. National arms export report only includes information on licences granted, not on actual deliveries, which may be lower.

Hungary	6 million	US, Italy, Germany, Slovakia, Japan	Value almost equally divided between categories 930630 and 930621. National report on the implementation of the *UN Programme of Action* only contains information on exports and imports of small arms and light weapons, not their ammunition.
Israel	At least 6 million	US, Mexico, Germany, Denmark, Trinidad and Tobago	Value almost exclusively concerns category 930630. Does not report on its small arms ammunition exports to UN Comtrade. Figure is based on importers' reports only and therefore likely to be an underestimate. Does not publish national arms export report.
Italy	61 million	Spain, France, US, Mexico, Turkey	930630: one-quarter; 930621: three-quarters. National arms export report only includes information on licences granted, not on actual deliveries, which may be lower.
Mexico	5 million	US, Honduras, Peru, Guatemala, Panama	930630: two-thirds; 930621: one-third. Does not publish national arms export report.
Norway	18 million	Sweden, Italy, Switzerland, US, UK	Value almost exclusively concerns category 930630. National arms export report does not clearly distinguish small arms, light weapons, and their ammunition from arms exports as a whole.
Russia	16 million	US, Poland, Austria, New Zealand, Mongolia	Value almost exclusively concerns category 930630. Does not publish national arms export report.

South Africa	At least 4 million	US, Brazil, Germany, Austria, UK	Value almost exclusively concerns category 930630. Does not report small arms ammunition exports to UN Comtrade. Figure is based on importers' reports only and therefore likely to be underestimated. No longer publishes national arms export report (Honey, 2005); last report (covering 2000–02) did not distinguish between small arms and their ammunition and grouped light weapons and their ammunition together with larger weapons.
South Korea	19 million	US, Venezuela, Australia, Indonesia, Thailand	Value almost exclusively concerns category 930630. Does not publish national arms export report.
Spain	30 million	US, Ghana, Turkey, UK, France	930630: one-quarter; 930621: three-quarters. National arms export report does not distinguish between small arms ammunition, light weapons ammunition, and other ammunition.
Sweden	25 million	US, Norway, Germany, Denmark, Mexico	930630: nine-tenths; 930621: one-tenth. National arms export report does not distinguish between small arms ammunition, light weapons ammunition, and other ammunition.
Switzerland	40 million	Germany, Austria, United Arab Emirates, Finland, US	Value almost exclusively concerns category 930630. National arms export report does not distinguish between small arms ammunition, light weapons ammunition, and other ammunition.

Turkey	18 million	Germany	Value almost exclusively concerns category 930630. Does not publish national arms export report.
UK	24 million	Unspecified countries, US, Denmark, Germany, Japan	930630: two-thirds; 930621: one-third. National arms export report provides details on ammunition types exported by destination, but no values by types.
US	140 million	South Korea, Canada, United Arab Emirates, Israel, Netherlands	930630: nine-tenths; 930621: one-tenth. National arms export report mostly includes information on licences granted, not on actual deliveries, which may be lower.

Customs categories covered: 930630 (small arms ammunition), 930621 (shotgun cartridges).

Note: This table provides values for exports of small arms ammunition in 2003 based on UN Comtrade. The remarks column details the share of the two ammunition categories covered and indicates what kind of information is provided by a national arms export report, as applicable.

List of abbreviations

BICC	Bonn International Center for Conversion
DRC	Democratic Republic of the Congo
ECOWAS	Economic Community of West African States
GAO	Government Accountability Office (United States)
HRW	Human Rights Watch
HS	Harmonized System (UN Comtrade)
ICOI	International Commission of Enquiry (Rwanda)
ML	Munitions list (Wassenaar Arrangement); Military list (EU)
NISAT	Norwegian Initiative on Small Arms Transfers
NGO	Non-governmental organization
OAS	Organization of American States
OAU	Organization of African Unity (now African Union)
OSCE	Organization for Security and Co-operation in Europe
PRIO	International Peace Research Institute, Oslo

SADC	Southern African Development Community
SEESAC	South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons
UN Comtrade	United Nations Commodity Trade Statistics
WA	Wassenaar Arrangement on Export Controls for Conventional Weapons and Dual-Use Goods

Endnotes

1 Although not a member of the EU, '[o]n 9 May 2002 the Republic of Croatia aligned itself with the Code by announcing its acceptance of the principles contained in the Code' (EC, 2002, p. C 31 9/1). Relevant to the situation discussed here are Criterion Four ('Preservation of regional peace, security and stability') and Criterion Seven ('The existence of a risk that the equipment will be diverted within the buyer country or re-exported under undesirable conditions') (EU, 1998).

2 Uganda has been facing a long-standing domestic threat and has thus been in need of small arms and light weapons imports, including the corresponding ammunition (see e.g. Small Arms Survey, 2006, pp. 272–93), but the possibility of retransfers exists nonetheless.

3 The term 'small arms ammunition' as it is used in this chapter refers to small arms ammunition in the strict sense, excluding light weapons ammunition. For details on UN Comtrade customs categories for different kinds of ammunition and on the issue of mixed categories, see Box 2.

4 Authorized transfers are those transfers authorized by a government. On illicit small arms ammunition transfers, see Chapter 4 in this volume.

5 Email communication with Alex Vines, Arms Expert and Chair, UN Group of Experts on Côte d'Ivoire, 27 February 2006.

6 Although shotgun cartridges are classified as sporting ammunition, they are routinely used in conflicts in Africa (email communication with Alex Vines, Arms Expert and Chair, UN Group of Experts on Côte d'Ivoire, 27 February 2006).

7 Firearms have serial numbers, while ammunition has only a rudimentary marking that does not usually make it possible to identify its source (see Chapter 7 in this volume). 7.62 mm ammunition, however, is quite easy to trace (email communication with Alex Vines, Arms Expert and Chair, UN Group of Experts on Côte d'Ivoire, 27 February 2006).

8 Buncombe (2005); US GAO (2005, p. 12, fns. 6 and 8, and p. 17); Pappalardo (2005); Goure (2005).

9 The download date for all UN Comtrade data used in this chapter is 6 May 2005. For a detailed discussion of UN Comtrade data see Small Arms Survey (2005, Box 4.1, pp. 99–100).

10 NISAT has developed a reliability index for each country in order to assess whether, for a given transfer, a country's reported data or the respective mirror data reported by its trading partners is more reliable. This index is used in all calculations. For further details see Marsh (2005).

11 'Shells, incendiary cartridges, not for riveting or similar tools, captive-bolt humane killers or shotguns' could refer to small arms ammunition, light weapons ammunition, or larger ammunition.

12 ‘Slugs, for air, gas or spring guns, carbines or pistols, but not for shotguns, being parts of cartridges’ and ‘starting cartridges, blank, for compression ignition internal combustion piston engines (e.g., Diesel or semi-Diesel)’.

13 The sub-groups of the four categories mentioned here are not classified further in terms of UN Comtrade customs categories. It is therefore impossible to calculate the share of a particular sub-group in a given transfer value.

14 ‘Ammunition and fuse setting devices, and specially designed components therefor’ (WA, 2005).

15 Since small arms ammunition transfers make up roughly one-third of total small arms and light weapons transfers, these cut-off values correspond to roughly one-third of the corresponding cut-off values for determining top and major traders of small arms and light weapons as a whole, which are USD 100 million and USD 10 million, respectively (these thresholds are used in Small Arms Survey, 2004, 2005, 2006, TRANSFERS).

16 The inflation adjustment was carried out on the basis of the GDP Chained Price Index that is used in the US budget (see US Government, 2005, Section 10).

17 Main recipients were determined based on the actual—not the average—trade value for each year for each exporting country.

18 For an overview of provisions relating to small arms ammunition transfers in regional and international small arms instruments, see Table 2.

19 For an analysis of the links between transfers of small arms as a whole and human rights violations, see Small Arms Survey (2004, pp. 125–33). Chapter 4 in this volume provides an overview of the illicit side of these kinds of diversion processes.

20 An important reason why authorized transfers can easily become illicit is the current system of end-user certificates, which is clearly ineffective (see Anders, 2004).

21 Neither the *Interim report* (UNSC, 1998a) nor the *Final report* of the ICOI (UNSC, 1998b) mentions the Eldoret factory. Some members of the ICOI are reported to have been highly critical of Kenyan officials concerning the possibility that Eldoret could have supplied small arms ammunition to conflict parties in Rwanda (Berkol, 2002, p. 11).

22 Main suppliers were determined based on the actual—not the average—trade value for each year for each importing country.

23 The small arms ammunition declared by Côte d’Ivoire may be related to the transfer of French equipment to France’s ‘Operation Licorne’, which was supporting the Economic Community of West Africa States (ECOWAS) peacekeeping mission in Côte d’Ivoire at the time (phone conversation between the Small Arms Survey and an official from the French Mission in Geneva, 1 December 2005).

Bibliography

Alpers, Philip. 2005. *Gun-running in Papua New Guinea: From Arrows to Assault Weapons in the Southern Highlands.* Special Report No. 5. Geneva: Small Arms Survey. June.

AI (Amnesty International). 2004a. *Undermining Global Security: The European Union’s Arms Exports*. London: AI. <http://web.amnesty.org/library/pdf/ACT300032004ENGLISH/$File/ACT3000304.pdf>

——. 2004b. 'Sudan: Arming the Perpetrators of Grave Abuses in Darfur.' London: AI. <http://www.amnestyusa.org/countries/sudan/document.do?id=6F4D69DB52CBDDDD80256F3F00581BD7>
——. 2005. 'Democratic Republic of the Congo: Arming the East.' London: AI. 5 July. <http://web.amnesty.org/library/index/engafr620062005>
Anders, Holger. 2004. 'Seizing the Opportunity: Scope for EU Advocacy on SALW Control at the United Nations.' Note d'Analyse. Brussels: GRIP. 15 October. <http://www.grip.org/bdg/g4560.html>
Berkol, Ilhan. 2002. 'Small Arms and Light Weapons: Improving Transparency and Control.' Brussels: GRIP. March. <http://www.grip.org/pub/rapports/rg02-hs1_alg.pdf>
Berman, Eric. 2000. 'Sanctions Against the Genocidaires: Experiences of the 1998 UN International Commission of Inquiry.' First Expert Seminar: Smart Sanctions, The Next Step: Arms Embargoes and Travel Sanctions. Bonn: BICC. January. <http://www.bicc.de/events/unsanc/1999/pdf/berman.pdf>
Bosnia and Herzegovina. 2005. 'Report on Arms Export Control.' Bosnia and Herzegovina Ministry of Foreign Trade and Economic Relations, Foreign Trade and Investment Division. Sarajevo.
Brussels (Gouvernement de la Région de Bruxelles-Capitale). 2005. *Rapport du Gouvernement de la Région de Bruxelles-Capitale au Parlement de la Région de Bruxelles-Capitale concernant l'application de la loi du 5 août 1991, telle que modifiée, relative à l'importation, à l'exportation, au transit et à la lutte contre le traffic d'armes, de munitions et de materiel devant servir spécialement à un usage militaire ou de maintien de l'ordre et de la technologie y afférente. Période du 1er septembre 2003 au 31 décembre 2003; période du 1er janvier 2004 au 31 décembre 2004.* 12 July.
Buncombe, Andrew. 2005. 'US Forced to Import Bullets from Israel as Troops Use 250,000 for Every Rebel Killed.' *Independent*, 25 September. <http://news.independent.co.uk/world/americas/article314944.ece>
Canada. 2003. 'Military and Technology: Export of Military Goods from Canada: Annual Report 2002.' Ottawa: Department of Foreign Affairs and International Trade/Export Controls Division of the Export and Import Controls Bureau. December.
Control Arms. 2005. *The G8: Global Arms Exporters. Failing to Prevent Irresponsible Arms Transfers*. Briefing paper. June. <http://www.controlarms.org/downloads/globalarmsexporters.pdf>
Czech Republic. 2004. 'Export Controls in the Czech Republic in 2003: Controls of Transfers of Military Equipment; Production, Export and Import of Small Arms and Light Weapons.' Prague: Ministry of Foreign Affairs of the Czech Republic.
EC (European Communities). 2002. 'Fourth Annual Report According to Operative Provision 8 of the European Union Code of Conduct on Arms Exports.' *Official Journal of the European Communities.* 19 December. <http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_319/c_31920021219en00010045.pdf>
ECOWAS (Economic Community of West African States). 1998. *Declaration of a Moratorium on the Importation, Exportation and Manufacture of Small Arms and Light Weapons in West Africa.* Adopted in Abuja, Nigeria, 31 October. <http://www.smallarmsnet.org/docs/saaf07.pdf>
——. 1999. *Code of Conduct for the Implementation of the Moratorium on the Importation, Exportation and Manufacture of Small Arms and Light Weapons in West Africa.* Adopted in Lomé, Togo, 10 December.

EU (European Union). 1998. *European Union Code of Conduct on Arms Exports.* Document 8675/2/98 Rev 2. Brussels. 5 June. <http://europa.eu.int/comm/external_relations/cfsp/sanctions/codeofconduct.pdf>

——. 2003. *Common Military List of the European Union.* Reproduced in *Official Journal of the European Union.* C314, 23 December. <http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/c_314/c_31420031223en00010026.pdf>

Finland. 2004. 'Annual Report According to the EU Code of Conduct on Arms Exports: National Report of Finland for 2003.'

Flanders. 2004. *Zesmaandelijks verslag van de Vlaamse Regering aan het Vlaams Parlement over de verstrekte en geweigerde vergunningen voor wapens, munitie en special voor militair gebruik of voor ordehandhaving dienstig materiel en daaraan verbonden technologie. Periode 30 augustus 2003 tot 29 februari 2004.*

France. 2005. 'Rapport au parlement sur les exportations d'armement de la France en 2002 et 2003.' Paris: Ministère de la défense. 28 January.

Germany. 2004. 'Bericht der Bundesregierung über ihre Exportpolitik für konventionelle Rüstungsgüter im Jahre 2003 (Rüstungsexportbericht 2003).'

Goure, Daniel. 2005. 'In the End, It's All About Ammunition.' *Army.* September, pp. 68–72. <http://www.ausa.org/pdfdocs/ARMYMag/Ammo.pdf>

Honey, Peter. 2005. 'Arms Sales Kept "Secret".' *Financial Mail*, South Africa. 11 August. <http://www.suntimes.co.za/zones/sundaytimesNEW/business/business1123753234.aspx>

HRW (Human Rights Watch). 2003. 'Ituri: Bloodiest Corner of Congo.' New York: HRW. May. <http://www.hrw.org/campaigns/congo/ituri/armedgroups.htm>

Hungary. 2004. 'National Report on the Implementation of the UN Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects.' New York: Permanent Mission of the Republic of Hungary to the United Nations. 11 June.

Italy. 2004. 'Relazione sulle operazioni autorizzate e svolte per il controllo dell'esportazione, importazione e transito dei materiali di armamento nonché dell'esportazione e del transito dei prodotti ad alta tecnologia (Anno 2003).' Atti parlamentari, XIV legislatura. Rome. 29 March. <http://www.camera.it/_dati/leg14/lavori/documentiparlamentari/indiceetesti/067/003_RS/pdfel.htm>

Marsh, Nicholas. 2005. 'Accounting Guns: The Methodology Used in Developing Data Tables for the Small Arms Survey.' Memorandum. Norwegian Initiative on Small Arms Transfers (NISAT)/International Peace Research Institute, Oslo (PRIO). 14 November. <http://www.prio.no/page/Publication_details//9429/47144.html>

McDonald, Glenn. 2005. *Small Arms Instruments of a General Nature: Applicability to Small Arms, Light Weapons, and Their Ammunition.* Unpublished background paper. Geneva: Small Arms Survey.

Nairobi Protocol. 2004. *Nairobi Protocol for the Prevention, Control and Reduction of Small Arms and Light Weapons in the Great Lakes Region and the Horn of Africa* ('Nairobi Protocol'). Adopted in Nairobi, Kenya, 21 April. <http://www.smallarmsnet.org/docs/saaf12.pdf>

NISAT (Norwegian Initiative on Small Arms Transfers). 2005. Calculations from the NISAT Database on Authorized Small Arms Ammunition Transfers. Unpublished background paper. Geneva: Small Arms Survey.

Norway. 2004. 'Eksport av forsvarsmateriell fra Norge i 2003, eksportkontroll og internasjonalt ikke-spredningssamarbeid.' Oslo: Ministry of Foreign Affairs. 28 May. <http://odin.dep.no/ud/norsk/dok/regpubl/stmeld/032001-040032/dok-bn.html>

OAS (Organization of American States). 1997. *Inter-American Convention against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials* ('Inter-American Convention'). Adopted in Washington, DC, 14 November (entered into force on 1 July 1998). Reproduced in UN document A/53/78, 9 March 1998. <http://www.oas.org/juridico/english/treaties/a-63.html>

——. 1998. *Model Regulations for the Control of the International Movement of Firearms, Their Parts and Components and Ammunition* ('Model Regulations'). AG/RES. 1543 (XXVIII – O/98) of 2 June. <http://www.cicad.oas.org/Desarrollo_Juridico/ENG/Resources/REGLAMENTO%20 ARMAS%20ING.pdf>

OAU (Organization of African Unity). 2000. *Bamako Declaration on an African Common Position on the Illicit Proliferation, Circulation and Trafficking of Small Arms and Light Weapons.* Adopted in Bamako, Mali, 1 December.

OSCE (Organization for Security and Co-operation in Europe). 2000. *OSCE Document on Small Arms and Light Weapons*. FSC.DOC/1/00 of 24 November. <http://www.fas.org/asmp/campaigns/smallarms/osce-sa.pdf>

Pappalardo, Joe. 2005. 'Pentagon Taking Steps to Avert Ammunition Crisis.' *National Defense Magazine.* July. <http://www.nationaldefensemagazine.org/issues/2005/jul/pentagon_taking.htm>

SADC (Southern African Development Community). 2001. *Protocol on the Control of Firearms, Ammunition and Other Related Materials in the Southern African Development Community (SADC) Region* ('SADC Firearms Protocol'). Adopted in Blantyre, Malawi, 14 August. Entered into force on 8 November 2004. <http://www.smallarmsnet.org/docs/saaf09.pdf>

SEESAC (South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons). 2005. 'Croatia Said to Have Violated European Code, Sold Arms Used in Congo Conflict.' SEESAC Daily SALW Media Monitoring Report (BBC Monitoring Service, Nacional Zagreb). 20 July.

Small Arms Survey. 2004. *Small Arms Survey 2004: Rights at Risk*. Oxford: Oxford University Press.

——. 2005. *Small Arms Survey 2005: Weapons at War*. Oxford: Oxford University Press.

——. 2006. *Small Arms Survey 2006: Unfinished Business*. Oxford: Oxford University Press.

Spain. 2004. 'Estadísticas españolas de exportación de material de defensa y de doble uso en 2003.' Boletín económico de ICE n° 2827. Madrid: Ministerio de industria, turismo y comercio/ Información comercial española. 13–19 December.

Sweden. 2004. 'Government Communication 2003/04:114: Strategic Export Controls in 2003—Military Equipment and Dual-Use Goods.' Stockholm: Ministry for Foreign Affairs. 11 March.

Switzerland. 2004. 'Ausfuhren von Kriegsmaterial nach Kategorie pro Endempfängerstaat (01.01.–31.12.2003).' Bern: Staatssekretariat für Wirtschaft (SECO).

UK (United Kingdom). 2004. 'United Kingdom Strategic Export Controls: Annual Report 2003.' London: Foreign and Commonwealth Office. June.

UN Comtrade. 2005. United Nations Commodity Trade Statistics database. Department of Economic and Social Affairs/Statistics Division. Download date: 6 May 2005. <http://unstats.un.org/unsd/comtrade/>

UNGA (United Nations General Assembly). 1997. *Report of the Panel of Governmental Experts on Small Arms.* A/52/298. 27 August.

——. 2001a. *Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, Supplementing the United Nations Convention against Transnational Organized Crime* ('UN Firearms Protocol'). Adopted 31 May. Reproduced in UN document A/RES/55/255 of 8 June. <http://www.unodc.org/pdf/crime/a_res_55/255e.pdf>

——. 2001b. *Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects ('UN Programme of Action').* 20 July. Reproduced in UN document A/CONF.192/15. <http://www.un.org/events/smallarms2006/pdf/N0150720.pdf>

UNSC (UN Security Council). 1998a. *Interim report of the International Commission of Inquiry (Rwanda).* Reproduced in UN Document S/1998/777. 19 August.

——. 1998b. *Final report of the International Commission of Inquiry (Rwanda).* Reproduced in UN Document S/1998/1096. 18 November.

US Department of State. 2004. 'Report by the Department of State Pursuant to Sec. 655 of the Foreign Assistance Act: Direct Commercial Sales Authorizations for Fiscal Year 2003.' Washington, DC: Department of State.

US GAO (United States Government Accountability Office). 2005. 'Defense Ammunition: DOD Meeting Small and Medium Caliber Ammunition Needs, but Additional Actions Are Necessary.' Report to the Honorable David R. Obey, Ranking Minority Member, Committee on Appropriations, House of Representatives. GAO-05-687. July. <http://www.gao.gov/new.items/d05687.pdf>

US Government. 2005. 'Budget of the United States Government: Historical Tables Fiscal Year 2005.' <http://www.gpoaccess.gov/usbudget/fy05/hist.html>

Wallonia. 2004. *Rapport au parlement wallon sur l'application de la loi du 05 août 1991, modifiée par les lois du 25 et du 26 mars 2003 relatives à l'importation, à l'exportation et au transit d'armes, de munitions et de materiel devant servir specialement à un usage militaire, et de la technologie y afférente. Du 1er septembre 2003 au 31 décembre 2003.*

WA (Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies). 2002. *Best Practice Guidelines for Exports of Small Arms and Light Weapons (SALW).* 12 December. <http://www.wassenaar.org/docs/best_practice_salw.htm>

——. 2005. 'Munitions List.' 14 December. <http://www.wassenaar.org/controllists/15%20-%20WA-LIST%20(05)%201%20Corr.%20-%20ML.doc>

A Thai policeman inspects a large number of pistol bullets recovered from a canal near the Grand Palace in Bangkok, May 2003. © Pornchai Kittiwongsakul/AFP/Getty Images

4

Deadly Diversions: Illicit Transfers of Ammunition for Small Arms and Light Weapons

Mike Bourne and Ilhan Berkol

Introduction

In 2005 the Colombian Army discovered a cache containing nearly 500,000 rounds of small arms ammunition and around one tonne of explosives during a large-scale control operation in the forest of Caquetá, Colombia. The cache belonged to the Fuerzas Armadas Revolucionarias de Colombia (FARC). According to the Colombian Army, the headstamps on the cartridge cases allowed forensic experts to determine that they had been manufactured in 1992 by the state-owned Indonesian corporation, P. T. Pindad (*El Tiempo*, 2005a and 2005b). It is likely that this ammunition reached the FARC through some form of illicit transaction but little is known about how this occurred. What is true in this high-profile case is also true for illicit transfers of ammunition for small arms and light weapons generally—little is known about them. It is arguably more important to understand trafficking in small arms ammunition than it is trafficking in small arms and light weapons because maintaining a regular supply of ammunition is crucial to sustaining conflict and armed criminal activity.

Illicit flows of ammunition for small arms and light weapons to criminals and conflicts are often assumed to follow the same paths as illicit flows of small arms and light weapons. This is true in some cases and many of the same channels for illicit transfers of small arms and light weapons operate for their ammunition as well. However, there are some important differences that have implications for policy-makers. In particular these are related to:

- The ways in which these processes work;
- The links with authorized transfers of ammunition for small arms and light weapons; and
- The relative importance of authorized transfers of ammunition for small arms and light weapons to the overall picture of illicit transfers.

While there are close links and similarities between trafficking in ammunition for small arms and light weapons and trafficking in small arms and light weapons, there are also key differences. The most obvious is a simple quantitative difference: ammunition for small arms and light weapons is consumed after a single use and this fact generates continual demand and a need for regular and substantial supplies of ammunition during periods of intense conflict, criminal activity, and other types of use and misuse. Small arms and light weapons, in contrast, may be used countless times over many decades. This gives rise to significant differences in the way ammunition trafficking works, and how measures should be targeted in order to combat it. For instance, it is likely to be the case that supply lines for small arms ammunition have to be better suited to larger shipments or more regular transfers. Theoretically, this would give rise to key differences in the pattern and structure of small arms ammunition trafficking, making different measures necessary for combating illicit transfers.

Other differences between small arms and their ammunition may also affect the character of illicit transfers. For instance, ammunition falls into the category of a 'dangerous good.' As a result it should meet particular standards and its packaging should be approved by authorities in compliance with the model regulations of the United Nations Committee of Experts on the Transport of Dangerous Goods (UNECE, 2005; Small Arms Survey, 2005, p. 26). This requirement, which includes markings on the packaging and accompanying paperwork, could be used to combat illicit transfers (Berkol, 2002, p. 18).

The global legal market for small arms can be regarded as the foundation of small arms trafficking because authorized production, authorized transfers, and the state stocks they supply are the three major sources from which illicit transfers can be sourced. The same is true of ammunition for small arms and light weapons but the global production, transfers, and stocks of small arms ammunition differ from those of small arms and it is open to question whether this creates differences in the links between legal trade and illicit transfers of ammunition. In general, this chapter finds that the links between production, transfers, and stocks of ammunition for small arms and light weapons and their illicit transfer are equally strong as those for small arms and light weapons.

A further question relates to how close the links are between the illicit transfer of small arms and light weapons and the illicit transfer of their ammunition. This chapter finds that, while many cases involve illicit transfers of small arms ammunition alone, small arms and their ammunition are often transferred together.

These are important questions for those wishing to combat illicit transfers of ammunition for small arms and light weapons. Policy-makers should not assume that measures designed to reduce the potential for trafficking in small arms and light weapons will always prove adequate to the task of reducing illicit transfers of such ammunition. The key fact that small arms ammunition is consumed at a higher rate and requires more regular resupply presents a number of specific challenges. Similarities, differences, and links between the trafficking in ammunition for small arms and light weapons and their legal trade, and between ammunition for small arms and light weapons and small arms and light weapons, present key challenges that must be more systematically taken into account in the design of any measures aiming to tackle the illicit availability and flow of small arms and light weapons to conflict areas and criminals as well as other misuse and unauthorized trade and possession.

This chapter explores the similarities and differences between different types of ammunition trafficking processes as well as those between trafficking in small arms and light weapons and trafficking in their ammunition. It highlights the range of mechanisms by which ammunition trafficking occurs and draws out some of the crucial aspects of these mechanisms. The chapter highlights the fact that illicit transfers of ammunition for small arms can only be controlled effectively if the authorized ammunition trade is closely controlled. Current policy discussions target the weapons and miss illicit ammunition by failing to take sufficient account of the need to control the authorized ammunition trade.

This chapter analyses the modalities of four types of illicit transfers: the so-called 'ant trade', covert sponsorship by foreign governments, diversion processes, and large-scale black market transfers. In so doing, the links, similarities, and differences between legal and illicit transfers of ammunition for small arms and light weapons are clarified—along with those between small arms and light weapons and their ammunition.

The chapter focuses primarily on those illicit flows of ammunition for small arms and light weapons that cross borders in some way. In other words, it is about the nature of illicit *transfers* (defined as international illicit flows) rather than all forms and processes of illicit *acquisition* of such ammunition. Recipients of illicit ammunition in situations of conflict and crime obtain it in numerous ways, many of which do not involve international trafficking, including a range of local processes of theft, capture, and purchases from illicit markets *within* states.[1]

The key findings of this chapter are that:

- Illicit transfers of small arms and light weapons and their ammunition often flow together;
- Illicit transfers of ammunition for small arms and light weapons share many similarities with illicit flows of small arms and light weapons;
- Illicit transfers of ammunition for small arms and light weapons are strongly linked to weaknesses in control over authorized transfers and ammunition stocks;
- Most illicit transfers of small arms and light weapons involve some form of diversion from legal transfers or stocks; and
- While many illicit transfers of ammunition for small arms and light weapons occur primarily within regions, the lack of global standards controlling authorized flows makes many global diversion processes possible.

In sum, while public and policy discourse may portray illicit transfers of ammunition for small arms and light weapons as being about 'powerful lawbreakers' or criminal actors breaking laws in order to move illicit small arms ammunition around the globe, the predominant reality is that—while such trafficking may occur—it is overshadowed by a wide range of processes that result from 'weak lawmakers' in which weak or limited legal frameworks and legal loopholes combine with weak enforcement of controls to create opportunities for illicit transfers to occur. There is a clear need for policy initiatives on transfers of small arms and light weapons to more adequately address the challenges presented by ammunition for small arms and light weapons.

The types of trafficking processes for ammunition for small arms and light weapons

Illicit transfers of ammunition for small arms and light weapons—in common with those of small arms and light weapons themselves—take several forms. These range from small-scale smuggling across borders to large-scale illicit flows in breach of international arms embargoes. Trafficking varies according to place, time, and recipient. Thus, there is no single formula for how illicit transfers occur globally. However, it is possible to identify types of processes and to demonstrate how they work. Similarly, illicit transfers of small arms ammunition are likely to present different challenges to those of light weapons ammunition. While only limited and illustrative information is available, this chapter draws out these distinctions where possible by defining types of transfers of ammunition for small arms and light weapons according to policy-relevant distinctions.

A key distinction between aspects of trafficking in small arms and light weapons has been that between the 'black market' and the 'grey market'.[2] This distinction is also important for illicit transfers of ammunition for small arms and light weapons:

- The 'black market' refers to transfers that are clearly illegal. They take place in violation of national and international laws and occur without any official authorization.
- The 'grey market' refers to transfers that fall between the clearly legal and authorized trade and the clearly illegal 'black market' and may be defined as the area of overlap between licit transfers and illicit trafficking. Grey market transfers often involve several stages or processes in which there is a mixture of legal and illegal activity. They often involve the use of legal loopholes or gaps in regulations to divert ammunition for small arms and light weapons into illicit markets (Small Arms Survey, 2001, pp. 141, 166–67).

This distinction is particularly relevant for policy-makers. Black-market flows operate outside legal processes and frameworks and present a strong role for 'lawbreakers' that can be tackled by enhancing capacity and cooperation in law enforcement. Grey-market flows interact in various ways with legal processes and reflect weaknesses in legal frameworks or the systems for their implementation (i.e. weak 'lawmakers') for which the appropriate response is tightening legal frameworks, closing loopholes, and enhancing control systems and cooperation over their implementation.

Similarly, recognizing other distinctions between forms of illicit transfers of ammunition for small arms and light weapons is crucial to achieving a better understanding of the key aspects of and tackling trafficking. The distinction between the black market and the grey market relates to the legal frameworks involved. Differences in the scale of transfers are important because large, concentrated flows may pose different challenges to multiple, small, and diffuse flows. Differences in the actors involved are also important because some types of illicit transfers may occur only to supply particular types of illicit recipients, while others may supply any type of recipient. Similarly, illicit transfers organized by unregulated or criminal private actors may pose different challenges to those conducted by states.

As stated above, this chapter examines the nature of four main types of ammunition trafficking. These different types relate to the various key distinctions and thus reveal critical aspects of the similarities and differences in the illicit transfer of ammunition for small arms and light weapons, and in the trafficking in the weapons themselves. The four main types of trafficking examined in this chapter are:

- The 'ant trade': The cross-border smuggling of relatively small quantities of ammunition for small arms and light weapons, usually purchased on markets in neighbouring states;
- Covert sponsorship by foreign governments: The politically motivated supply by states or their agents to a specific illicit recipient. This is primarily for non-state groups involved in conflicts;
- Diversion processes from authorized transfers and sources: The grey-market processes that begin in legal and authorized markets and move into illicit markets as ammunition is diverted from legal stocks or authorized transfers;
- Large-scale black-market transfers: Large and clearly black-market transfers involving no legal processes where each stage of the process is illicit.

By examining these four interrelated types of trafficking in ammunition for small arms and light weapons, this chapter clarifies the nature and challenges of illicit small arms ammunition transfers. Each type reflects a particular com-

Table 1
Key distinctions between trafficking types

Type	Grey market or black market	Large or small scale	Specific or all recipients	Suppliers
Ant trade	Both	Small	All	All
Covert Sponsorship	Grey	Both	Specific	States
Diversion	Grey	Both	All	All
Large-scale black market	Black	Large	All	All

bination of defining features that is of importance for policy responses to such trafficking (see Table 1).

For each type, the sections below examine the nature of these transfers, including the sources from which the ammunition is supplied, the methods used for transferring it, how common the type is, and whether it tends to be a regional or a global phenomenon. These questions are important when designing and implementing policy responses to curtail the illicit transfer of ammunition for small arms and light weapons.

Ant-trade smuggling of ammunition for small arms and light weapons

A definition of the ant trade

The 'ant trade' is defined as small scale cross-border smuggling. It is commonly understood to stem mainly from legal retail markets in one state in which small arms ammunition is purchased legally and then smuggled across borders to illicit markets or recipients (Small Arms Survey, 2001, p. 168). While the ant trade inextricably links legal markets in one state to illicit markets in another, the term specifically refers to the scale of the smuggling. It thus relates not only to legally sourced ammunition for small arms and light weapons (grey market) but also to ammunition sourced illegally (from black markets) in one state—at a low price—and smuggled into another state in which higher prices can be expected (see Box 1).

There is no clear, universal threshold at which a particular illicit flow ceases to be ant trade and becomes a more substantial phenomenon. As an indication, the trafficking of, for instance, 4,000 rounds of 9 mm ammunition may be commonplace because this amount could easily be concealed in an ordinary car. The trafficking of the same number of 82 mm mortar bombs, however, is a physically more challenging prospect.

Key aspects of both small arms and their ammunition contribute to their potential to be trafficked through the ant trade. A key to the ant trade in small arms is that they are easy to smuggle—in part because they are small, light, and easy to conceal. The same is true, to some extent, for their ammunition. Individual rounds of small arms ammunition are notably smaller, lighter, and more easily concealed than the small arms that fire them. Ammunition for small arms and light weapons, however, is subject to significant variations in price that may affect the profitability, and thus importance, of ant-trade trafficking (see Box 1). Small quantities of small arms ammunition sometimes have little economic value and demand is usually for large quantities, which are often bulky and heavy. At first sight, therefore, it seems highly unlikely that a steady trickle of dozens or hundreds of rounds would be sufficient for a conflict protagonist (rebel group, large militia, or government forces) as a major means of procurement and would only be able to meet the demand from small criminal groups. While each case of ant-trade smuggling is small scale, however, the ant trade can cumulatively traffic significant quantities of ammunition for small arms and light weapons into a country.

The continuous demand for such ammunition means that it is often profitable for dealers in the recipient country to reaggregate small stocks of trafficked ammunition. Thus traffickers do not need to find and sell small arms ammunition directly to the final users. Instead, local dealers will buy small quantities from traffickers, put them together, and then sell them to final users—such as conflict actors—that can buy substantial quantities. Thus, the capacity of local illicit markets to reaggregate ant-traded small arms ammunition may contribute to the profitability and importance of the ant trade. Overall, however, the relative importance of the ant trade also depends on its modus operandi and the types of small arms ammunition that can be trafficked in this way.

Sources of the ant trade

The sourcing mechanisms for small arms ammunition within the ant trade are varied. In some cases, ammunition for small arms and light weapons that is already in unregulated circulation may be moved across borders. Such localized black-market circulation is likely to be a feature in regions with substantial black markets for small arms and light weapons, such as parts of South and Central Asia, Latin America, and the Balkans. Ammunition for small arms and light weapons, however, is often used up during intense periods of conflict and in these areas it may not accumulate in black markets in the same way that small arms and light weapons do. Furthermore, the more limited durability and more hazardous nature of such ammunition may militate against the continual cycles of recirculation seen for firearms, although this factor should not be overstated. Unfortunately, there is currently insufficient information available to examine this area systematically.

In many regions ant-trade trafficking in small arms ammunition relies on small-scale diversion processes. Stolen stocks and legal retail markets are both major sources. Theft from government stocks, and smuggling involving collusion and corruption by a range of government officials, may feed into ant-trade trafficking. For instance, in 2005 it was reported that small quantities of small arms and ammunition were purchased illegally from members of the Philippine military and then smuggled into Taiwan with the collusion of officials and organized criminal groups (Chang, 2005).

Furthermore, some types of ammunition for light weapons are only found in military stocks and must be sourced either from there or from the factories that produce them. In regions where stockpile security has been weak, leakage from such stocks has circulated on regional black markets. In this way even man-portable air defence systems (MANPADS) can become part of the ant trade. In December 2004 cooperation between the police in Albania and Montenegro led to the seizure of three Strela 2-M missiles in Albania. These were hidden in two trucks under cargoes of meat. The missiles had reportedly been purchased for a total of Euro 100,000 in Bosnia and were part of the national stockpile of the former Yugoslav army (VIP, 2004). The missiles were seized after entering the country from Montenegro, and may have been destined for ethnic-Albanian groups in Macedonia (BBC, 2004 and 2005).

Box 1 A note on illicit ammunition prices and trafficking

The ant trade is dynamic and driven by differences in the prices of ammunition for small arms and light weapons between countries or regions. Prices of illicit small arms ammunition vary widely from a few cents to several US dollars (USD) per round. This may have significant implications for the nature, scale, and importance of the ant trade (and indeed for other forms of trafficking) at any given time. For example, in the western Balkans illicit small arms ammunition prices rise to approximately USD 1 per round. Thus, a few hundred rounds carry the same price incentives and similar physical challenges for smuggling as a small armament.

Prices of small arms ammunition vary over short periods of time and follow complex patterns. In Somalia, for instance, prices of small arms ammunition in Mogadishu markets may fluctuate by as much as 50 per cent from one month to the next. Between May and June 2005, the price of G3 ammunition went from USD 0.42 to USD 0.64. Types of small arms ammunition vary significantly in price and follow different trends. For example, in March 2005 a round of M-16 ammunition was USD 1.30 while a round of G3 ammunition was approximately one-third of this price at USD 0.46. However, within one year that difference had been reduced to only 20 per cent (USD 1.02 to USD 0.82). Additionally, it is important to note that the trends in prices of ammunition and the trends in prices of the weapons they are for are not necessarily the same. It is interesting to note that the most expensive small arms ammunition is that which is fired by the cheapest type of small armament (SAACID, 2006a and 2006b). Thus, the prices of small arms ammunition on the illicit market may vary rapidly and in complex ways, meaning that ant-trade smuggling may be highly profitable one month and less profitable the next.

While prices fluctuate significantly from week to week or month to month, longer term trends also shape the potential for ant-trade trafficking. For instance, a recent survey of ammunition prices in the Democratic Republic of Congo and in Burundi has shown that between 2000 and 2005 illicit small arms ammunition prices fell in Burundi but remained variable in neighbouring eastern Democratic Republic of the Congo (DRC). This can be explained by the fact that the recent peace process in Burundi reduced the demand for weaponry there, while the security situation remains problematic on the Congolese side. Average prices vary by type of small arms ammunition: prices for pistol and revolver ammunition were USD 0.09 in Burundi and USD 0.13 in DRC; prices were higher (on average) for assault rifle ammunition at USD 0.29 in Burundi to USD 0.21 in DRC (Ntibarikure, 2006, p. 26).

The survey also found that, according to those interviewed in DRC, small arms ammunition seized by the Congolese authorities was resold clandestinely. Thus, even when seized by the state, smuggled ammunition can continue to fuel illicit markets through the corrupt sale of confiscated ammunition.

Small arms ammunition is sold legally to civilians in many countries where controls over such sales are often more relaxed than those on the sale of firearms. Like the trade in small arms, these sales can be a major source of cross-border smuggling in the ant trade as well as of larger flows. For instance, in 2005 two people were arrested in Brownsville, Texas, by US authorities for attempting to smuggle 17,650 rounds of small arms ammunition into Mexico where laws on the civilian possession of small arms and their ammunition, and associated trade, are much tighter.[3] The couple had purchased the small arms ammunition legally in a Wal-Mart supermarket (Montgomery, 2006). In this case it seems that they were caught because the unusually large quantity of small arms ammunition raised suspicion. Many thousands of rounds, however, are likely to follow the same kind of route around the world on a regular basis—much of the small arms ammunition involved in the ant trade is bought on a small scale from retailers. These small quantities are ostensibly purchased for personal use and so efforts to reduce this type of sourcing require attention to regulatory systems controlling authorized retail traders. This sourcing is unique to the ant trade and is not a feature of other forms of trafficking.

A young boy examines bullets at an open gun market in Chamchamal, Iraq. © Ramin Talaie/Corbis]

The ant-trade process

Like the ant trade in small arms and light weapons, the modus operandi for small-scale cross-border smuggling of ammunition for small arms and light weapons involves concealment and mislabelling. For instance, on numerous occasions quantities of such ammunition have been hidden in larger shipments of scrap metal, machinery, or other metal goods in order to avoid detection by metal detecting equipment. In August 2005 Russian customs officials seized a truck attempting to smuggle small quantities of ammunition into China via Siberia. The truck was loaded with scrap metal, within which 79 armour-piercing 7.62 mm rounds in an old machine-gun belt and approximately 50 5.45 mm tracer cartridges were concealed (Ryabinskaya, 2005).

In some cases ammunition is just one commodity among many in routine cross-border informal economies. In areas where border security is much tighter, however, more sophisticated smuggling infrastructures have been developed. One important example is the Rafah smuggling tunnels under the border between Egypt and the Gaza Strip—under the tightly controlled Philadelphi strip. Over 40 such tunnels were discovered in 2003. According to the Israeli Ministry of Foreign Affairs, tens of thousands of rounds of small arms ammunition were smuggled into Gaza between January 2003 and May 2004 using these tunnels (Israel Ministry of Foreign Affairs, 2004). The tunnels reportedly cost at least USD 10,000 to build but AK-47 ammunition sold for USD 3.00 per round in Gaza and cost only USD 0.09 to smuggle in from Egypt and there were high profits to be made (figures from Israel Ministry of Foreign Affairs, 2004).

In the ant trade it is common for ammunition to be trafficked together with small arms and light weapons. This may indicate that there is often little separate ant trade in ammunition for small arms and light weapons. It may also to be a reflection, however, of the limited available information, which is drawn largely from media reports that are more likely to emphasize weapon seizures. In these combined flows, the quantities of small arms ammunition involved are usually relatively small—some 50 or so weapons accompanied by 1,000–2,000 rounds, or less, of small arms ammunition. Such small quantities of small arms ammunition would be unlikely to satisfy demand from those purchasing weapons originating in the ant trade—particularly in situations of armed conflict or other high levels of armed violence. Thus, while the ant trade may supply many of the weapons available in local black markets, it is often unclear whether such trafficking has the capacity to provide a similarly high proportion of the ammunition available.

It is important to note that the ant trade is predominantly a regional phenomenon. While global small-scale trafficking in ammunition for small arms and light weapons does occur, such transfers across long distances are relatively rare. They have occurred, for instance, in supplies of small quantities of small arms and their ammunition purchased from retail outlets in the USA and posted illegally to members of the Irish Republican Army (IRA) in Northern Ireland (*Daily Telegraph*, 2002). However, such cases appear to be relatively rare because long-distance trafficking carries risks of interception and would be expensive and thus not sufficiently profitable for small quantities of ammunition.

Overall, the ant trade in ammunition for small arms and light weapons is likely to be the most common form of illicit small arms ammunition transfers—in terms of the number of transactions that occur each year. The ant trade in small arms ammunition primarily supplies local black markets in neighbouring countries, from where criminals, combatants, and civilians may purchase it. Key points about the ant trade are that:

- Both small arms ammunition and light weapons munitions can be trafficked through the ant trade but small arms ammunition smuggling is apparently much more common.[4]
- The main sources for the ant trade appear to be legal markets and state stockpiles, and weaknesses in the control of both are the primary foundations of ant-trade trafficking.
- It is likely that in the ant trade small arms, light weapons, and ammunition often flow together.
- The ant trade in ammunition has a modus operandi similar to small-scale cross-border smuggling of arms and other contraband; that is, it relies on porous borders and concealment.

Covert sponsorship

Covert sponsorship is the politically motivated provision of ammunition for small arms and light weapons through an illicit transfer conducted by a foreign government. Such sponsorship is commonly provided to an armed non-state actor—usually a rebel group. By definition such transfers are not authorized by the government of the recipient state, and as such are illicit. Covert sponsorship is a common and significant feature of the arming of non-state actors in conflict. Similar transfers may be provided to government forces that are under an arms embargo—although this appears to be less common and such flows more usually occur through diversion (see below). Covert sponsorship is primarily a feature of small arms and ammunition flows to conflicts and is not a significant feature of the arming of criminals (apart from subsequent leakage, or the evolution of conflict parties into criminal groups). It is worth noting that similar assistance is often provided domestically within conflict areas because many non-state actors, such as ethnic militia, civil defence forces, pro-government paramilitaries, and so on, are provided with arms by their own government.

This category of illicit transfers brings to mind the familiar cases of the large pipelines of CIA covert assistance in the 1980s to the mujahideen in Afghanistan or the Contras in Nicaragua. Although covert sponsorship of non-state actors is often thought of as a relic of cold war bipolarity, this type of small arms, light weapons, and ammunition flow remains common. While most research on such flows has focused on small arms and light weapons rather than its ammunition, some indications of the 'who? what? and how?' of covert sponsorship of ammunition transfers can be provided.

Who?

Recent research shows that, in the case of small arms and light weapons, covert sponsorship is now provided largely by states in the same region (Bourne, forthcoming). It seems likely that there is little distinction between small arms and light weapons and their ammunition in this regard. Given the importance of access to regular and substantial supplies of fresh ammunition, it would be expected that covert sponsorship by regional patrons would prove even more crucial to arming conflicts. For instance, in the CIA-run arms pipeline that supplied Contra forces in Nicaragua in the 1980s, Honduras acted as a major transhipment point and also a rear base and delivery point for the US-sponsored groups. When supplies from the CIA pipeline ran low, the Honduran Government unilaterally provided small arms ammunition covert sponsorship (Klare and Andersen, 1996, p. 78). Thus, even within extra-regionally organized covert sponsorship pipelines, critical unilateral ammunition for small arms and light weapons supplies take place regionally.

In addition to following the general trend towards the regionalization of covert sponsorship, it seems likely that procurement through such channels is both more important and more localized for small arms ammunition than for small arms. This seems likely in large part because ammunition for small arms and light weapons is needed regularly in larger quantities, and is bulky—and thus transport costs are likely to be high. In addition, lax controls on authorized transfers, and limited requirements for marking and record keeping, mean that large quantities of untraceable ammunition are available to any would-be patron.

What?

While regional actors may be particularly important *suppliers* of ammunition for small arms and light weapons to rebel groups, the *sources* from which covert sponsorship is provided may be more varied. Ammunition for small arms and light weapons tends to be less well marked than the weapons themselves, and also to be poorly registered. Therefore, it is often harder to trace the origins of such ammunition and its history up to the point of diversion. This increases the deniability of supplies from states' ammunition stocks, which are likely to be a significant source for this purpose—provided that they are of an appropriate type, unmarked, and untraceable. Furthermore, some ammunition for small arms and light weapons provided as covert sponsorship is initially imported apparently legally by the patron government, which then retransfers it illicitly (i.e. to an illicit recipient and/or in breach of the end-use agreement in the legal deal). For instance, in one of the few known cases in which the specific origin of illicit light weapons ammunition is known, the Guinean Ministry of Defence is believed to have legally imported mortar rounds from Iran, which were then given to the anti-Taylor Liberians United for Reconciliation and Democracy (LURD) forces in Liberia (HRW, 2003; UNSC, 2003a, p. 30; UNSC, 2003b, pp. 25–27; see Chapter 5).

Given that ammunition for small arms and light weapons is produced or assembled in numerous countries, many states have a ready supply of such ammunition from which to provide covert sponsorship. For instance, Zimbabwean supplies to the Alliance of Democratic Forces for the Liberation of Congo-Zaire (ADFL) in Zaire in 1997 were primarily composed of surplus small arms, originally imported from North Korea, plus some domestically manufactured ammunition for small arms and light weapons (Bourne, 1999, p. 151). Significantly, therefore, while small arms and light weapons and their ammunition often flow together through the supply lines of covert sponsorship, they may not originate from the same sources.

How?

Covert sponsorship is provided by states. This means that a wider range of methods for moving shipments is available to the suppliers than is the case for other smugglers and brokers. In some cases ant-trade style smuggling has been used. During the Rwandan civil war, for instance, the Ugandan Army was supplying the Rwandan Patriotic Front (RPF, with ammunition, which was smuggled into Rwanda through remote, heavily forested small paths in order to avoid being detected (Prunier, 1998, pp. 131–32). Larger amounts of ammunition for small arms and light weapons require more concentrated transportation. Iranian transfers of weaponry to the Northern Alliance in Afghanistan were organized in cooperation with Russia and transported through Uzbekistan and Kyrgyzstan (Buckhard, 1999; Pirseyedi, 2000, pp. 22–23). In one such transfer in 1998, 700 tons of ammunition for both small arms and light weapons and heavier weapons categories (including machine-gun ammunition, rounds for 122 mm guns, missiles for Grad installations, anti-tank mines, and grenades) was reportedly disguised as humanitarian aid and transported by train through those countries, filling 20 railway wagons. This cargo was intercepted and later returned to Iran (Interfax, 1998; Niyazov, 1998). It is worth noting that the scale of this shipment is highly unusual. In other cases it is the armed forces of the sponsor states that transport small arms and light weapons and their ammunition for the clients. The Ethiopian Air Force reportedly shipped 100 tons of ammunition for small arms and light weapons to Somali forces in flights between January and November 1997 (Xinhua, 1997).

Key points about covert sponsorship as an important type of illicit transfer of ammunition for small arms and light weapons are that:

- Given the need for regular and substantial supplies of ammunition for small arms and light weapons, in particular in times of intense conflict, regional suppliers seem to be better placed to deliver such illicit assistance.
- Covert sponsorship draws on authorized international transfers.
- Covert sponsorship also draws on widespread production and surpluses of ammunition for small arms and light weapons in patron states.
- A wide range of methods for delivering such aid are available to states with the motivation to provide it.

Overall, therefore, as a result of the widespread legal production of and trade in ammunition for small arms and light weapons, and the benefits of statehood, the opportunities to provide covert sponsorship are open to all states with a political motive for doing so. It is often neighbouring states that choose to engage in this type of activity.

Diversion

Diversion processes are those processes through which licit small arms ammunition becomes illicit. In common with illicit transfers of small arms, much trafficking in ammunition uses licit markets and stocks as a source. Most ammunition for small arms and light weapons is manufactured legally, and most large-scale international flows of such ammunition take place within authorized trade. Ammunition for small arms and light weapons can enter illicit circulation through theft or capture from legal stocks, or through a variety of processes involving diversion from authorized transfers. Much of the diversion, particularly through theft and leakage from civilian markets, occurs domestically (see Chapters 5 and 6). For the purposes of this chapter, however, processes of diversion that involve trafficking occur in different contexts:

- Legal, authorized exports diverted en route by brokers, transporters, or other facilitators (often through transit countries or 'springboard' recipient countries);
- Import and illicit re-export by a government or corrupt government officials (as is the case in some instances of covert sponsorship);
- Leakage of imported ammunition from civilian markets into the ant trade.

Much of the expert and policy community concerned with small arms and light weapons are familiar with numerous cases of their diversion, often in relation to the breaching of UN arms embargoes. Such cases tend to involve arms brokers who navigate loopholes in regulations and mislead regulatory bodies by producing forged documentation in order to facilitate transfers that are then diverted. The question is therefore whether these and similar diversion processes operate in the same way for the ammunition for small arms and light weapons. In short, how does the trafficking in such ammunition relate to the licit trade?

The case of the diversion of Belgian P90 sub-machine guns and their ammunition (see Box 2), among others, clearly shows that, in common with trafficking in small arms and light weapons, brokers are key to ammunition diversion processes. In another example, in 2001, an arms broker based in Guatemala obtained 3,000 surplus AK-47 assault rifles and 2.5 million rounds of small arms ammunition from the Nicaraguan Government. The Nicaraguans thought the guns were destined for the Panamanian National Police—because they had been provided with a purchase order to that effect. Instead, they were packed underneath crates marked 'plastic balls' and shipped to Turbo, Colombia, where they were delivered to the Autodefensas Unidas de Colombia (AUC), a

The Panamanian ship *Otterloo,* centre, declared its destination as Panama but allegedly transported 3,000 AK-47s and 2.5 million rounds of ammunition to Colombia in 2001. © Tomas Munita/AP Photo

Box 2 A case study of diversion: the diversion of Belgian P90 sub-machine guns and their ammunition

In the summer of 1998, the Belgian manufacturer FN Herstal delivered 100 P90 sub-machine guns to the Government of Jordan purportedly to equip Jordanian Special Forces. This order was originated by the Swiss arms merchant, Mr Thomet (Brügger and Thomet AG), following a meeting during an arms fair in Amman with a close associate of the Jordanian royal family.

The guns were rapidly retransferred to Switzerland, from where they were sent to the Dutch armourer, J.F.Y., in Maarsen, the Netherlands, to transform them into semi-automatic guns allowing them to be sold to civilians in Switzerland. The Swiss firm possessed all the legal documents required for import, export, and private sale. Some of the P90s were sold to Belgian and Finnish gun dealers and to private owners in Switzerland. Some were delivered to competitors of FN Herstal such as Heckler & Koch. About 20 remained in the Netherlands as payment for the conversion work. Some of those guns were recovered from criminals having reportedly been used in armed robberies.

This case demonstrates that states (in this case Jordan) do not always respect end-use restrictions forbidding the re-export of purchased items. Furthermore, while granting the import licence, the state (in this case Switzerland) should contact the country of origin (in this case Belgium) and not just the current exporting state. If there is a no re-export restriction in the end-use conditions of the country of origin, it should deny the import licence. This clearly did not occur in this case. It is also surprising that the Dutch authorities did not contact their Belgian counterparts in the course of the transaction between the Netherlands and Switzerland, since European Union and Belgian regulations prevent the sale of this type of weapon to civilians, even when transformed into semi-automatic guns. Furthermore, no inspection was made by the authorities of the conversion that the guns had undergone in the Netherlands. Thus, a failure to engage in a basic exchange of information between neighbouring countries, end-users, and supplier states was integral to facilitating this diversion. Additionally, if officials involved in approving these transfers possessed more specialized expertise in armaments, they would probably have had sufficient technical competence to understand that the transaction was irregular because they would have known that the type of weapon involved would never have been authorized for a transfer between the Netherlands and Switzerland.

Ammunition for P90s

P90s require a specific type of 5.7 calibre ammunition that is unique and can only be provided by FN Herstal. It subsequently emerged that Jordan did not order any ammunition required for the P90 guns.[5] In spite of the fact that there was no simultaneous export of ammunition from Jordan to Switzerland with the P90s, it appears that the Swiss armourer and its clients had no concerns about procuring such ammunition. According to FN Herstal officials, these 5.7x28 mm cartridges are restricted to law enforcement agencies and cannot be found on the civilian market unless they pass through illicit channels.

On 26 August 2005, judicial authorities of Hasselt, Belgium, seized 54 weapons of war, including two P90 sub-machine guns, and 21,000 rounds of 5.7x28mm ammunition exclusively manufactured in Zutendal, Belgium, for FN Herstal. A ten-month investigation revealed that security agents from FN Herstal were involved in this trafficking and 13 people were arrested. According to newspaper reports, FN Herstal also launched its own internal investigation and it transpired that leakages had been occurring for a considerable time.[6]

This case shows how international arms diversion is linked to domestic trafficking in ammunition. It is also worth noting that, while no ammunition was ordered in the diverted transaction, Jordan had already bought some other P90s and corresponding ammunition from FN Herstal. Therefore, it is also possible that Jordan re-transferred 5.7 calibre rounds to the Swiss importer of P90s in a separate shipment.

Recently, the potential for diversion of P90 ammunition into illicit markets has increased. In order to reduce its production costs, FN Herstal in 2005 contracted Fiocchi Ammunition to manufacture SS196 and SS197 ammunition, which are new versions of the 5.7x28 mm cartridge (also called SS190), in the United States and Italy. Although officially restricted to law enforcement personnel in the United States, SS197 rounds can be bought on the Internet—potentially adding a new possibility of diversion to illicit markets. An Ammo ID/Age Statement is required in order to purchase restricted P90 rounds online, and a local dealer has to be nominated by the buyer for the delivery. According to such Internet sites, however, a fax or a copy of such statements is considered sufficient. In some cases, such as if payment is made by credit card, the statement may not even be necessary. It is also possible for civilians using certain Web sites to buy P90 ammunition with only a background check. According to the Boston police, a new kind of handgun that is able to pierce bullet-proof vests is in circulation in Boston.

Sources: Dupont, 2001; Preyat, 2004; *La Libre Belgique,* 2005a, 2005b, and 2005c; gunbroker.com, 2006a and 2006b; impactguns.com, 2006a, 2006b, and 2006c[7]; Smalley, 2006.

Colombian group on several lists of terrorist organizations (OAS, 2003; Schroeder and Stohl, 2004). In this case, according to the Organization of American States (OAS) investigations, the Guatemalan company involved failed to take appropriate steps to detect the diversion but does not appear to have colluded in it. Instead, the Panama-based Israeli arms broker to whom the company sold the arms and ammunition provided the false documentation in order to facilitate the deal and arranged for a ship to pick up the small arms and small arms ammunition. This ship, the *Otterloo*, declared its destination as Panama but instead went to Colombia. The OAS investigation lays the blame for this diversion not solely on the illicit broker who misled authorities, but also on corrupt officials in Colombia and—of critical importance—on the failure of the Nicaraguan Government to implement its commitments in the 1997 OAS Convention to check end-user guarantees and commitments (OAS, 2003). Thus, while diversions are often facilitated by brokers, they also rely on the limited capacity or willingness of governments to implement basic procedures to prevent diversion.

While arms brokers are often the key to the diversion of legal transfers of ammunition for small arms and light weapons, diversion can also occur without them. For instance, in June 2005 the Colombian police arrested two US soldiers for alleged involvement in a plan to transfer ammunition to right-wing paramilitary groups in the country. The ammunition, stored in the house in which the soldiers were arrested, included 32,000 rounds of small arms ammunition initially provided to Colombia by the US government under its Plan Colombia programme (AP, 2005).

Importantly, diversion appears to be as possible for more sophisticated light weapons ammunition as it is for small arms ammunition. For instance, in a US undercover investigation 'Operation Smoking Dragon' in November 2005, which also involved investigations into counterfeiting and other smuggling activities, two men were the first to be indicted under a new anti-terrorism statute for 'conspiracy to import missile systems designed to destroy aircraft'. The two men allegedly offered to arrange for the import of several Qianwei-2 (Advance Guard 2) MANPADs (US Department of Justice, 2005). The Chinese-made Qianwei-2 is a highly sophisticated MANPAD developed as recently as 1998 (*Chinese Defence Today,* 2005). The US Department of Justice claims that the two men told an undercover agent that a third country would claim to be purchasing the missiles from the manufacturer, but they would be shipped instead to the USA in sea-land containers that would be listed on manifests as containing some form of civilian equipment (US Department of Justice, 2005).

Probably the most common form of diversion is related to the theft of government stocks of ammunition for small arms and light weapons for black-market trafficking . In many cases this seems to be a largely regional process. For instance, Ecuador's National Army declared the loss of 100,000 rounds of such ammunition from its own arsenal between 2000 and 2002 (*La Hora*, 2004a). According to official figures, 1.2 million rounds of small arms ammunition of all calibres were seized in the first year of the 'Plan Patriota' military offensive against FARC rebels in the same period (*El Tiempo,* 2005a). Information on this seized ammunition indicates that much of it belonged to the armed forces of neighbouring countries including Ecuador, Panama, Peru, and Venezuela[8]. It is therefore likely that many of the 100,000 rounds lost by the Ecuador Army found their way to Colombia.

Overall, therefore, the nature of diversion processes indicates that there are strong links between authorized transfers of ammunition for small arms and light weapons and their illicit transfer. Key points include that:

- The processes of diversion of ammunition for small arms and light weapons often use the same methods as diversions of small arms and light weapons.
- The processes of diversion of ammunition for small arms and light weapons rely on and take advantage of the same regulatory weaknesses as diversions of small arms and light weapons.
- Brokers and corrupt officials play critical roles in many diversions.
- The lack of regulation over brokering, of common procedures for preventing diversions (marking, record-keeping and tracing, and end-user guarantees and their verification), and of inspections during transfers contribute significantly to this form of trafficking.
- The situation is exacerbated in some cases by a lack of enforcement of the frameworks and standards that already exist.
- The common element of all diversions is therefore not so much the role of 'powerful lawbreakers' as the obvious weakness of lawmakers.

Large-scale black-market illicit transfers

The sections above examine illicit transfers of ammunition for small arms and light weapons that, in some way, link legal stocks with illicit recipients—particularly through processes that are part of the grey market. This section deals with cases that are clearly illegal from start to finish. Some black-market transfers of ammunition for small arms and light weapons are small scale and fit within the ant trade. However, in theory, some black-market transfers may be large-scale shipments. Such transfers are important for supplying conflicts and criminal groups. This section examines how such transfers work and how common they are.

There are hypothetically two types of large-scale black-market illicit transfers—those that are larger versions of the flows that take place in the ant trade, and those that are purely illegal versions of the global flows that take place in the legal and grey markets. Broadly speaking, research carried out for this chapter finds large-scale, clearly illegal black-market flows of ammunition for small arms and light weapons to be more common at the regional level than as a global phenomenon. However, this might only be the case because there is so little information available. Thus, the analysis below can only be indicative.

Much large-scale black-market trafficking in ammunition for small arms and light weapons is simply an expanded version of the ant trade. Some borders are sufficiently porous for large-scale black-market flows of this kind and for ant trade smuggling to occur simultaneously and through essentially identical channels. For instance, in West Africa the border between Benin and Nigeria is apparently a major trafficking route. In 2001, Nigerian police seized 106 boxes containing 26,500 rounds of small arms ammunition entering from Benin. Similarly, in February 2002, the Gendarmerie in Benin discovered 1,000 rounds hidden in a car attempting to cross the border from Burkina Faso. Nigeria was thought to be the car's ultimate destination (Oyo, 2001; IRIN, 2002). While this ant trade is ubiquitous, larger shipments exist alongside such trade. In 2004 three truck drivers were arrested at Saki, a border town between Benin and Nigeria. Their three trucks were reportedly carrying 105,000 cartridges packed in 80 sacks, mixed with bags of maize and sawdust to avoid detection (Olori, 2004). While West African borders are notoriously porous, similar examples of large-scale black-market smuggling have occurred in other regions. For instance, in September 2005 the Saudi Arabian Government intercepted a truck illegally carrying 190,000 rounds of small arms ammunition into the country from neighbouring Kuwait (Reuters, 2005). Similarly, in June 2003 Greek border guards seized more than half a million rounds of Kalashnikov and G3 ammunition in a heavy truck being moved across the border from Albania (AFP, 2003). It is notable that all cases of this type of trafficking examined for this chapter occurred within their own region. It is likely that this is because regional sources were sufficient, and that they presented fewer risks or lower overall costs than longer supply lines.

Hypothetically, large black-market flows are not just a bigger version of the ant trade, but may instead more closely resemble illicit versions of the long-distance authorised trade. In practice, however, these cases seem rare, and only one clear case of a large-scale black-market transfer that closely resembles an illicit version of the long-distance authorized trade was identified in the course of the research for this chapter. All the others involved some legal processes and diversion, making them 'grey-market'. In May 2004 a Czech arms dealer, Dalibor Kopp, was arrested for attempting to illegally export small arms ammunition (mostly for sub-machine guns) from the Czech Republic to Iraq. Czech intelligence sources reportedly believe that the supply, which was being arranged without appropriate licences, was to have been diverted to insurgent forces operating inside Iraq. In this case, although probably reflecting a rare coalescence of roles, Kopp was also employed by the manufacturer of the small arms ammunition. Kopp was the director of small infantry ammunition for a Czech company, Valenter, which had applied unsuccessfully for an export licence. Kopp reportedly continued with the deal through his own companies such as Kopp Arms. According to the Czech Industry and Trade Ministry, the attempted export was to take place through an undisclosed US company (Mlada fronta Dnes, 2004).

Like the diversion processes discussed above, this case appears to result from limitations in the enforcement of legal frameworks rather than the activities of particularly powerful criminal actors. Kopp had previously been suspected of numerous illicit small arms and small arms ammunition deals.[9] Limited legal frameworks and weaknesses in enforcement, however, had prevented appropriate legal proceedings from being taken. After Kopp's arrest in the Czech Republic he fled to Liberia, where he is widely reported to have been a major supplier of arms to the Taylor regime while Liberia was under a UN arms embargo. Kopp was again arrested, this time in Liberia by the United Nations Mission in Liberia (UNMIL), in December 2004 on the basis of an international arrest warrant issued by the Czech authorities and an Interpol Red Notice. He escaped but was recaptured and then freed in March 2005 following unsuccessful extradition proceedings (*Business Ghana*, 2005; *Analyst*, 2005). He was arrested once again in Belgium in January 2006 and extradited to the Czech Republic in April 2006 (*Ceské Noviny,* 2006). The opportunities for trafficking to occur as a result of Kopp slipping through gaps in regulations and enforcement would have been reduced by stronger controls over brokers, combined with enhanced global cooperation and enforcement.

Some trafficking in ammunition for small arms and light weapons may be carried out by the illicit recipients themselves rather than by smugglers, brokers, or other illicit traders. While such cases are probably rare, and do not involve large quantities of light weapons ammunition, it is alleged that an Al Qaida-aligned group illicitly acquired and trafficked SA-18 MANPADS purchased from Chechens in 2002 and subsequently smuggled them through Georgia and Turkey into France (Samuel, 2005). It is believed that this acquisition significantly enhanced the arsenal of the group concerned. Previously, such cells are believed to have been limited to less sophisticated—and hence less accurate and reliable—SA-7 Strela missiles that are more easily defeated by countermeasures (World Tribune, 2005).

In sum, while large-scale black-market trafficking could hypothetically take several forms, in practice it overwhelmingly takes the form of large regional cross-border smuggling rather than resembling illegal versions of international authorized trade. Key points, therefore, are that:

- Most large black-market (clearly illegal) illicit trafficking in ammunition operates like the ant trade writ large;
- The same conditions of porous borders, corruption, and the availability of large stocks (presumably from stockpiles rather than reaggregated from the legal retail trade or local black markets) fuel this trade; and
- Such trade is largely regional.

While long-distance black-market trafficking is not unknown, few cases were identified for this research (other large long-distance cases involved diversion or covert sponsorship and hence were grey-market). This may be due in part to the limitations of the data, but does appear to reflect a limit on the need for international trafficking in small arms ammunition to rely on potentially risky and costly black-market channels when diverting authorized flows and stocks is relatively easy and offers more and safer opportunities to acquire substantial quantities of ammunition for small arms and light weapons.

Conclusion

Illicit transfers of ammunition for small arms and light weapons are widespread. No region of the world is unaffected by them. Small arms and light weapons and their ammunition are often trafficked together. The types of processes used to traffic ammunition for small arms and light weapons are similar to those used in the trafficking in the weapons themselves as well as other contraband with similar characteristics. There are several types of trafficking, most of which rely on weaknesses in regulations and their enforcement rather than powerful criminal groups. Global and regional action is required to tackle this problem, and such action should take account of the specific challenges posed by ammunition for small arms and light weapons.

The ant trade in small arms ammunition is ubiquitous. It relies on porous borders and concealment, and on easily available sources of ammunition in neighbouring states. The main sources for the ant trade appear to be licit markets and state stockpiles and weaknesses in the controls on both are the primary foundations of ant-trade trafficking. Because a high proportion of small arms ammunition is bought from dealers on a small scale apparently for personal use, increased controls on those sales to individuals, including more rigorous information about the purchaser and stricter record-keeping by dealers, could help to reduce this part of the problem. Enhanced stockpile management and security is the key to ensuring that small and large leakages from state stocks do not feed illicit trafficking.

Covert sponsorship is a common form of illicit transfer for both small arms and light weapons and their ammunition. Covert sponsorship, particularly of rebel groups, is a form of illicit transfer unique to supplying areas of conflict. It can draw on different sources from those for trafficking in small arms and light weapons and use a wider range of channels for delivery than other trafficking. As such it is probably sufficiently adaptable and deniable to enable it to maintain a steady flow of ammunition when needed. Any government can be a provider of covert sponsorship—including that of the country itself. Since the end of the cold war, those foreign governments that choose to do so tend to be neighbours of the country in conflict.

Some illicit transfers of ammunition for small arms and light weapons constitute black-market flows. From the cases that could be identified, it seems that most large black-market flows of ammunition are regional and few are global in reach. Most large black-market flows are simply larger versions of the ant trade. They rely on the same foundations of concealment, poorly controlled legal retail trade, and gaps in stockpile management and security.

Global processes tend to be diversion processes rather than black-market transfers. The nature of diversion processes indicates that there are strong links between the legal global trade in ammunition for small arms and light weapons and their trafficking. Diversion processes may be varied but reflect the same methods and regulatory weaknesses as diversions of small arms and light weapons. It is clear that the critical types of vulnerabilities in states' controls over arms transfers that create the potential for diversion are equally—if not more—significant for ammunition for small arms and light weapons. For instance, because the marking and registration of ammunition is not yet well regulated—that is, lot numbers and information on the producer or end-user are not always marked on cartridges (see Chapter 7),[10] and movements of authorized transfers are not recorded in registers—it is difficult to trace ammunition after illicit use and discover the routes of diversion.

Another important aspect of diversion is the role of arms brokers. The scope for brokers to engage in illicit transfers is great. Only 32 countries control some aspects of brokering, and many of these controls are weak and poorly implemented (Biting the Bullet, 2005, p. 302). Overall, however, while diversions are often facilitated by brokers, they also rely on the limited capacities or willingness of governments to implement basic procedures for preventing diversion.

Trafficking in ammunition for small arms and light weapons has strong regional dimensions. Three of the four types of trafficking that move such ammunition illicitly across borders appear to operate solely or primarily at the regional level. Much ammunition is trafficked as part of illicit shipments of small arms and light weapons that occur regionally. Ammunition for small arms and light weapons also moves in separate shipments through the same networks of corruption, collusion, and covert assistance as small arms and light weapons. Thus, trafficking in this ammunition has the same regional attributes as trafficking in small arms and light weapons. Furthermore, it also seems to have a particularly strong reliance on regional sources of such ammunition for feeding into black-market and some grey-market flows.

States often play a strong role in trafficking ammunition for small arms and light weapons: they often engage in illicit transfers; they feed other entities' illicit transfers by using legal means and transfers to feed illicit users such as states under embargo or non-state actors, and their omissions and failures are crucial to all forms of trafficking. The overarching conclusion of this chapter is that almost all illicit transfers of ammunition for small arms and light weapons, in one way or another, rely on the absence of effective global instruments and the failure of certain states to implement and enforce their commitments made in existing instruments. This appears to result in part from a lack of prioritization of ammunition for small arms and light weapons and the specific challenges it raises. This prioritization could take place relatively easily, for instance by enhancing controls over authorized transfers, and improving marking and tracing systems for ammunition—even though it is not officially covered by the international instrument on marking and tracing (see Chapter 7).

This study of the four types of illicit transfers yields the following conclusions:

- All types of ammunition for small arms and light weapons can be illicitly transferred, from common civilian types to sophisticated light weapons;
- Legal or authorized transfers and stocks are the foundation of much trafficking;
- Weak legal provisions and enforcement, rather than powerful criminal groups, are the dominant feature of most illicit transfers. For instance, while arms brokers play a key role, that role relies on them being poorly regulated, and on the existence of numerous loopholes in existing regulations.

Illicit transfers of ammunition for small arms and light weapons pose the same range of challenges for control as those posed by the corresponding weapons. Many of these challenges are more marked for ammunition for small arms and light weapons than for small arms and light weapons themselves. Those measures designed to reduce the potential for trafficking in small arms and light weapons will not always prove adequate to the task of reducing trafficking in ammunition. The two illicit trades are closely related, and should be tackled together, but are also sufficiently different to pose distinct challenges that must be better integrated into the design of measures to reduce illicit transfers. While this chapter finds that much trafficking in ammunition for small arms and light weapons occurs at the regional level, much of it is also fed, and added to, by global diversion processes. The illicit availability of ammunition for small arms and light weapons, which is fed in part by illicit transfers, can only be tackled effectively at the national, regional, and global levels together.

List of abbreviations

ADFL	Alliance of Democratic Forces for the Liberation of Congo-Zaire
CIA	Central Intelligence Agency (United States)
DRC	Democratic Republic of Congo
FARC	Revolutionary Armed Forces of Colombia
FN	Fabrique Nationale (Belgium)
IRA	Irish Republican Army
LURD	Liberians United for Reconciliation and Democracy
MANPADS	Man portable air defence systems
OAS	Organization of American States
RPF	Rwandan Patriotic Front
UNMIL	United Nations Mission in Liberia

Endnotes

1 These issues are tackled in Chapters 5 and 6 on Conflict and Crime, respectively.

2 It is important to note that the distinction between black market and grey market is difficult to draw in practice because each state has different definitions of what it considers to be illegal. It is often helpful, therefore, to think of these distinctions as part of a spectrum with legal transfers at one end, the black market at the other, and a grey area in between. For example, see Small Arms Survey, 2001, p. 141.

3 Mexican rules on small arms possession and trade are reputedly among the most restrictive in the world. Mexican law bars possession of weapons above .22 calibre and requires strict registration of other weapons (http://www.ryerson.ca/SAFER-Net/regions/Americas/Mex_MY03.html).

4 This is a reflection of a range of factors including narrower production, less widespread demand, and a lack of (or reduced) legal retail trade in light weapons ammunition. This aspect of the ant trade contrasts with other forms of trafficking. While current data is not sufficiently detailed to prove this conclusively, it seems likely that the predominance of small arms ammunition is not so marked for the covert sponsorship of rebel groups because this form of trafficking would not be as restricted by these factors.

5 These cartridges are varnished with a specific polymer resin that is indispensable if they are to function in the P90 sub-machine guns.

6 Since the investigation is secret, no further information is available.

7 Impactguns.com is a Web-based 'online superstore' selling firearms and ammunition, including to law enforcement agency personnel. Gunbroker.com is an online auction site specializing in firearms, ammunition, and related products.

8 Sources: *Hoy*, 2003; *El Universo*, 2004; *La Hora*, 2004a and 2004b; *El Tiempo*, 2005a; *El Universal*, 2005a and 2005b.

9 It is alleged that Kopp had previously been involved in other illegal transfers of ammunition production equipment. He was reportedly investigated by the Czech police in 1998 for attempting to import a small arms ammunition production line through another arms trading company with links in Kyrgyzstan, which police believed was exported to the Persian Gulf region (Czech News Agency, 2004).

10 Only Brazilian legislation prescribing the marking of this information on cartridges since January 2005. Law No. 10,826/03 (December 2003), Article 23. The recent UN tracing instrument (A/60/88) excludes ammunition from its scope, and in the UN Firearms Protocol (A/RES/55/255) ammunition is beyond the scope of traceability.

Bibliography

AFP (Agence France Presse). 2003. 'Half a million bullets seized on Greek–Albanian border'. 29 June. <http://www.balkanpeace.org/hed/archive/jun03/hed5869.shtml>

Analyst (Monrovia). 2005. 'Czech "fugitive" finally released'. 3 March. <http://www.analystnewspaper.com/czech_fugitive_finally_released.htm>

AP (Associated Press). 2005. 'Colombia arrests 2 US soldiers in ammunition trafficking plot'. 22 June.

BBC (British Broadcasting Corporation). 2004. 'Missiles seized in Albania'. BBC Monitoring Service. 16 December. Information provided to authors by SEESAC, March 2006.

—. 2005. 'Four charged with illegally transporting missiles in Albania'. BBC Monitoring Service, Shekuli. 10 May. Information provided to authors by SEESAC, March 2006.

Berkol, Ilhan. 2002. *Marking and Tracing Small Arms and Light Weapons: Improving Transparency and Control.* GRIP Reports: Special Issue. March. <http://www.grip.org/pub/rapports/rg02-hs1_alg.pdf>

Biting the Bullet. 2005. *International Action on Small Arms 2005: Examining Implementation of the UN Programme of Action.* London: Biting the Bullet and IANSA. <http://www.iansa.org/documents/2005/red-book/red-book-2005.pdf>

Bourne, Mike. Forthcoming. *Arming Conflict: The Proliferation of Small Arms*. Basingstoke: Palgrave.

—. 1999. 'Light weapons and conflict in Central Africa'. Abdel Fatau Musah and Niobe Thompson, eds. *Over a Barrel: Light Weapons & Human Rights in the Commonwealth*. London: Commonwealth Human Rights Initiative, pp. 141–59.

Buckhard, Conrad. 1999. *Small Arms Transfers and Disarmament: A Security Leitmotif for Tajikistan in the late 1990s?* Camberley: Conflict Studies Research Centre.

Business Ghana. 2005. 'Suspected Czech arms trafficker re-arrested in Monrovia' 23 January. <http://www.businessghana.com/portal/news/index.php?op=getNews&news_cat_id=&id=5360>

Chang, Rich. 2005. 'Officials, gangsters collude to smuggle arms'. *Taipei Times*. 26 September 2005.

Chinese Defence Today. 2005. 'QW-2 shoulder-fired missile'. <http://www.sinodefence.com/missile/airdefence/qw2.asp>

Czech News Agency. 2004. 'Entrepreneur Kopp illegally traded in arms for many years'. 4 June.

Ceské Noviny. 2006. 'Arms Dealer Kopp Delivered to Prague by Interpol.' *Ceske Noviny*. 3 April. <http://www.ceskenoviny.cz/news/index_view.php?id=181222>

Daily Telegraph (London). 2002. 'Terror international'. 28 April. <http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2002/04/28/wira28.xml&sSheet=/news/2002/04/28/ixworld.html>

Dupont, Gilbert. 2001. 'Cent P90 dans la nature. . .' *Dernière Heure*. 7 November.

El Tiempo. 2005a. 'Los 500.000 cartuchos decomisados a las Farc en Caquetá provendrían de Indonesia.' Bogotá. 30 May. <http://eltiempo.terra.com.co/coar/ACC_JUDI/accionesjudiciales/ARTICULO-WEB-_NOTA_INTERIOR-2086982.html>

—. 2005b. 'El Ejército decomisó medio millón de balas de las Farc en selvas de Caquetá.' Bogotá. 30 May. <http://eltiempo.terra.com.co/coar/ACC_MILITARES/accionesarmadas/ARTICULO-WEB-_NOTA_INTERIOR-2085349.html>

El Universal. 2005a. 'Guardia Nacional se incautó de 3.750 cartuchos en el Táchira.' Caracas. 19 February. <http://www.eluniversal.com/2005/02/19/pol_art_19108I.shtml>

—. 2005b. 'Colombia se incauta 8 mil municiones venezolanas.' Caracas. 7 May. <http://www.eluniversal.com/2005/05/07/pol_art_07108C.shtml>

El Universo. 2004. 'Decomisan un cargamento de 4.120 municiones.' Guayaquil. 27 July.

gunbroker.com. 2006a. <http://www.gunbroker.com/Auction/ViewItem.asp?Item= 44054420>

—. 2006b. <http://www.gunbroker.com/User/BuyerTutorial.asp>

Hoy. 2003. 'Peru: Descubren re que traficaba armamaneto en Ecuador'. Quito. 28 August.

HRW (Human Rights Watch). 2003. *Weapons Sanctions, Military Supplies, and Human Suffering: Illegal Arms Flows to Liberia and the June-July 2003 Shelling of Monrovia.* HRW Briefing Paper. 3 November. <http://hrw.org/backgrounder/arms/liberia/liberia_arms.pdf>

impactguns.com. 2006a. <http://www.impactguns.com/store/fn_ammunition.html>

—. 2006b. <http://www.impactguns.com/store/fn_p90.html>

—. 2006c. <http://www.impactguns.com/store/ammo_ship.html>

Interfax. 1998. 'Kyrgyz seize weapons from Iran destined for anti-Taliban'. Moscow. 12 October.

IRIN (Integrated Regional Information Network). 2002. 'BENIN: Gendarmes seize Nigeria-bound ammunition.' IRIN News. 5 February.

Israel Ministry of Foreign Affairs. 2004. 'Weapon smuggling tunnels in Rafa–Operation Rainbow'. 17 May. <http://www.mfa.gov.il/MFA/Terrorism-+Obstacle+to+Peace/Terror+Groups/Weapon+Smuggling+Tunnels+in+Rafah+May+2004.htm>

Klare, Michael T. and David Andersen. 1996. *A Scourge of Guns: The Diffusion of Small Arms and Light Weapons in Latin America*. Washington, DC: Federation of American Scientists.

La Hora. 2004a. 'Desaparecen 100 mil cartuchos de municiones en Ecuador.' 28 January.

—. 2004b. 'Un marino implicado en presunto trafico de armas.' 3 July.

La Libre Belgique. 2005a. 'Des agents de la FN mêlés au trafic'. 27 August.

—. 2005b. 'Trafic d'armes: des agents de la FN impliqués'. 27 August.

—. 2005c. 'Enquête interne à la FN-Herstal'. 30 August.

Mlada fronta Dnes. 2004. 'Czech arms dealer charged over illegal export of ammunition to Iraq'. Prague. 25 May.

Montgomery, Dave. 2006. 'Mexican criminals turn to US for weapons, authorities say'. *Contra Costa Times*, 16 January.

Niyazov, Alisher. 1998. 'Kyrgyzstan to Return Afghan Arms to Iran'. *ITAR-TASS.* 29 October.

Ntibarikure, Jacques. 2006. *Trafics D'Armes: Enquête Dans La Plaine De La Ruzizi (RDC-Burundi)*. Les rapports du GRIP 06/1. Brussels: GRIP.

OAS (Organization of American States). 2003. *Report of the General Secretariat of the Organization of American States on the Diversion of Nicaraguan Arms to the United Defense Forces of Colombia.* 6 January.

Olori, Toye. 2004. 'Politicians and criminals don't register weapons'. *Mail and Guardian online.* 23 April. <http://www.mg.co.za/Content/l3.asp?ao=58655>

Oyo, Remi. 2001. 'Small Arms Fuelling Violent Crime.' *Black World Today*. 19 July.

Pirseyedi, Bobi. 2000*. The Small Arms Problem in Central Asia: Features and Implications.* Geneva: United Nations Institute for Disarmament Research.

Preyat, Marc. 2004. 'Tant qu'il y aura des armes.' Broadcast (Actuel) by Radio et television belges francophones (RTBF) (Belgian Radio and Television). 20 October.

Prunier, Gérard. 1998. 'The Rwandan Patriotic Front'. In Christopher Clapham, ed. *African Guerrillas*. Oxford: James Currey, pp. 119–33.

Reuters. 2005. 'S Arabia seizes smuggled ammo'. *Daily Star*. 10 September. <http://www.thedailystar.net/2005/09/10/d50910011410.htm >

Ryabinskaya, Yana. 2005. 'Russian customs thwarts ammunition smuggling into China'. RIA-NOVOSTI. 10 August. <http://en.rian.ru/business/20050810/41127669.html>

SAACID, 2006a. 'Year-on-year survey of small arms ammunition prices in Mogadishu'. February. <http://www.saacid.org>

—. 2006b. 'Year-on-year survey of small arms weapon prices in Mogadishu'. February. <http://www.saacid.org>

Samuel, Henry. 2005. 'Terror cell "smuggled missiles into Europe"'. *Daily Telegraph*. 29 October. <http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2005/10/29/wterr29.xml&Sheet=/portal/2005/10/29/ixportal.html>

Schroeder, Matt and Rachel Stohl. 2004. 'Controlling the most dangerous guns'. *San Diego Union–Tribune*. 11 November. <http://www.signonsandiego.com/uniontrib/20041111/news_lz1e11schroed.html>

Small Arms Survey. 2001. *Small Arms Survey 2001: Profiling the Problem*. Oxford: Oxford University Press.

—. 2005. *Small Arms Survey 2005: Weapons at War.* Oxford: Oxford University Press.

Smalley, Suzanne. 2006. 'Boston Police Warn of Vest-Piercing Gun: High-Powered Weapon on Streets.' *Boston Globe*. 18 February. <http://www.boston.com/news/local/massachusetts/articles/2006/02/18/boston_police_warn_of_vest_piercing_gun/?page=full>

UNECE (United Nations Economic Commission for Europe). 2005. *Recommendations on the Transport of Dangerous Goods ('Model Regulations').* 14th rev. edn. Geneva: UNECE. <http://www.unece.org/trans/danger/publi/unrec/rev14/14files_e.html>

UNSC (United Nations Security Council). 2003a. *Report of the Panel of Experts appointed pursuant to paragraph 4 of Security Council Resolution 1458 (2003), concerning Liberia.* Reproduced in UN document S/2003/498 of 24 April.

—. 2003b. *Report of the Panel of Experts appointed pursuant to paragraph 25 of Security Council resolution 1478 (2003) concerning Liberia.* Reproduced in UN document S/2003/937 of 28 October.

US Department of Justice. 2005. '"Smoking Dragon" Undercover Investigation Results in New Indictment Alleging Scheme to Smuggle Surface-To-Air Missiles into United States'. Press Release. 9 November. <http://losangeles.fbi.gov/dojpressrel/pressrel05/la110905usa.htm>

VIP. 2004. 'Strela MANPADS smuggled in Albania'. VIP Defence and Security, Associated Press (AP). 23 December. <http://adam.gateway.bg/LANGen/public/portal/read_news.php?id=198>

World Tribune. 2005. 'Al Qaida acquires Russian surface-to-air missiles' 11 November. <http://www.worldtribune.com/worldtribune/05/front2453686.1305555557.html>

Xinhua. 1997. 'Reports confirm Ethiopian ammunition consignment'. 4 November.

Part 2

AMMUNITION IN CONTEXT

A woman walks by a supermarket window after shots were fired in Rio de Janeiro, February 2003.
Brazil's capital experienced unrest as drug gangs torched buses and attacked stores. © Sergio Moraes/Reuters

6

Crime and Ammunition Procurement: The Case of Brazil

Pablo Dreyfus

Introduction: weak states, organized crime, and patterns of ammunition procurement

Unlike common criminality such as burglary, armed robbery and kidnapping for ransom, organized crime is associated with the production and distribution of illegal goods and services such as drugs, illegal gambling, and prostitution as well as extortion linked to the control of services such as gas, electricity, and water[1]. In order to achieve their aims, criminal groups use violent means and resort to the corruption of officials. Criminal organizations not only penetrate the institutional structures of the state, but also challenge the state by exerting territorial control by the use of armed force. The extent of this territorial control, as well as the degree of penetration and corruption of state institutions by criminal organizations, however, depends on the strength of the state in terms of its level of socio-political cohesion, territorial centrality,[2] socio-economic development, and policy capacity.[3] A country where there is widespread corruption, a lack of institutional legitimacy, a high degree of inequality, a fragmented society, and inefficient or ineffective security forces is less capable of containing, repressing, and controlling criminal organizations (Dreyfus, 2002).

On a 'weak state–strong state continuum',[4] countries that are closer to the 'weak' pole are more susceptible to criminal organizations with the capacity to challenge the state's monopoly on the legitimate use of force, and which acquire firearms in order to maintain territorial and market control. Lucrative markets, however, generate competition and in the illegal side of the economy such competition is often characterized by violence (Dreyfus, 2002). In the absence of strong institutions capable of enforcing the rule of law there is no ‘peacekeeper’ or even ‘peace enforcer’ and this vacuum can lead to an escalation of armed violence between rival organizations. In such a setting the procurement of ammunition becomes vital to sustain this escalation.[5] This is the case, for example, in certain areas of Brazil, Colombia, Nigeria, and the Philippines where organized armed groups involved in illicit activities control territory and engage in armed confrontation not only with the state security forces but also with rival organizations (Dowdney, 2005).

In weak states criminal organizations take advantage of legal loopholes and institutional flaws in order to procure ammunition through the internal and external flows or procurement routes listed in Table 1.[6]

While similar methods are used by organized crime in stronger states such as Italy and the United States, for instance, in weak states widespread corruption, lack of control by the central state, and weak law enforcement structures increase the magnitude of the problem. In this situation, criminal organizations purchase arms and ammunition with the logic of irregular armies, that is, purchasing large job lots through illicit channels in order to be able to defend their (rural or urban) territorial base and their markets (Naylor, 2002).

Brazil is treated in this chapter as a paradigmatic case of a weak state facing the problem of heavily armed criminal organizations that control urban territories and have the capacity to match and challenge the state’s security agencies.

Table 1
Internal and external ammunition procurement flows

Internal flows	External flows
• Diversion (via theft or corruption) from military and police inventories[7] • Diversion from private security companies and gun shops • Purchase in gun shops by taking advantage of weak or non-existent controls (particularly for small calibre ammunition) • Illicit sales from ammunition factories and shops • Ammunition stolen from individuals in burglaries (particularly for small calibre ammunition)	• International trafficking networks • Smuggling of ammunition purchased in neighbouring countries due to legal loopholes as well as weak law enforcement and border controls

After the United States, Brazil is the second largest producer of small arms and light weapons and related ammunition in the western hemisphere. It also has one of the highest small arms-related death rates in the world (Dreyfus, Lessing, and Purcena, 2005; Phebo, 2005). This chapter shows how Brazilian-made ammunition feeds the cycle of criminal violence in some of the country's major cities and is used by criminal and armed non-state groups in the region. It also analyses the effectiveness and possible outcomes of recently enacted Brazilian firearms legislation that *inter alia* established ammunition marking measures, which have been in force since July 2005.

Most of the examples used in this chapter are from Rio de Janeiro. Crime in Rio de Janeiro is significant because its particular feature is a strong territorialization. Drug trafficking factions compete for armed control over enormous favelas (poor informal settlements) and this provokes violent competition for control of strategic points for the sale of, in particular, cocaine and marijuana.

Assessing the problem

According to national data for 2002,[8] 38,088 people were killed using firearms in Brazil in that year and 90 per cent of these deaths were homicides. Of the country's homicides, 63.9 per cent were committed using firearms. In the same year firearm death rates were 21.8 per 100,000 inhabitants, and the average firearm-related homicide rate in Brazil's state capitals was 29.6 per 100,000 inhabitants (Phebo, 2005, pp. 15–21).

This small arms-related violence is linked to weapons misuse and to crime stimulated by drug trafficking, and rooted in social inequality in densely populated urban areas (Fernandes, 1998; Cano and Santos, 2001). The central-west region of the country, where the agricultural frontier is still being extended through land purchases and deforestation, is close to the borders of drug-producing countries and firearm mortality has increased by 57 per cent in the past 20 years. In the south-east part of the country, which contains large urban centres heavily affected by drug trafficking—predominantly state capitals and their metropolitan areas[9]—this rate increased by 54.1 per cent over the same period (Phebo, 2005, p. 19). Small arms-related violence in Brazil is mainly an urban problem. The highest average death rates from firearms are concentrated in cities with more than 100,000 inhabitants, all of which went through rapid and disorganized urbanization processes (ISER, 2005).

Although unaffected by internal or international armed conflict, Brazil is one of the most violent places in the world. It is plagued by organized crime, urban interpersonal violence, and police brutality, corruption, and abuse of lethal force. The number of civilians killed by the police in Rio de Janeiro and São Paulo in 2003, for example, was 1195 and 868 persons, respectively (Carvalho, 2004, p. 41).

Brazil is a regional cocaine and marijuana consumption centre. It shares long and porous borders with Colombia, a cocaine producing country involved in a serious and protracted internal armed conflict; Peru and Bolivia, two cocaine producing countries with serious organized crime problems; and Paraguay, a marijuana producing country and a trans-shipment platform for all kinds of goods—including firearms—that is plagued by institutional corruption and the lack of a state presence in its border areas (Dreyfus, 2002; Dreyfus et al., 2003).

To this worrying scenario is added the fact (outlined above) that Brazil is the second largest producer and exporter of small arms and ammunition in the western hemisphere. Brazil is the home of the two largest producers of small arms and ammunition in Latin America—Forjas Taurus (Taurus) and the Companhia Brasileira de Cartuchos (CBC). The state-owned Indústria de Material Bélico do Brasil (IMBEL) produces assault rifles for the Brazilian armed forces and some police agencies and exports most of its production of pistols. Taurus has an almost complete monopoly position in the domestic civilian and police small arms market. CBC, in turn, monopolizes the national small arms ammunition market (apart from the market for hand grenades) with products ranging from the .22 long rifle ammunition to .50-ammunition for heavy machine guns (12.7 mm). The production of and trade in small arms and ammunition in Brazil is monitored by the army. Since 1934 it has enacted regulatory decrees that heavily protect Brazilian industry by restricting the importation of these goods. However, in the past two decades, the lack of efficient regulation of this lucrative and expanding industry has allowed the growth of an impressive grey and illegal regional market for small arms and ammunition.[10]

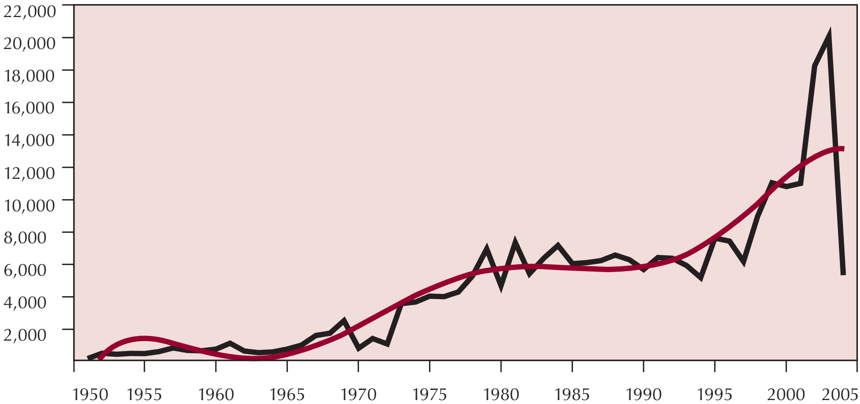
As the studies below show, Brazilian ammunition and guns are legally shipped to neighbouring countries (notably Paraguay in the 1990s) and then smuggled

Seized ammunition stockpiled at the vault of the Division of Control of Arms and Explosives (DFAE) of Rio de Janeiro's Civilian Police. © Kita Pedroza/Viva Rio

into other countries or back to violent urban centres in Brazil. The result was an explosive cocktail: a prosperous and inadequately regulated ammunition industry in a violent country (Dreyfus, Lessing, and Purcena, 2005). For example, in 2002 alone, 37,418 small arms were seized in the state of São Paulo,[11] and 18,056 small arms were seized in the state of Rio de Janeiro.[12] In both cases, more than 70 per cent of the weapons were made in Brazil. Small arms seized in police operations in Brazil are predominantly Brazilian-made handguns—mainly revolvers (Dreyfus and de Sousa Nascimento, 2005; Rivero, 2005). Some Brazilian states with a strong presence of criminal organizations have witnessed an increasing trend of seizures of foreign-made assault weapons and high-calibre semi-automatic pistols in the past decade (Dreyfus and de Sousa Nascimento, 2005; Rivero, 2005).

The metropolitan area of Rio de Janeiro witnessed a drastic rise in the seizure of weapons in the 1990s (see Graph 1), which coincides with the rise in cocaine

Graph 1
Small arms seized by police in the state of Rio de Janeiro (1951–July 2004)



Source: Rio de Janeiro civilian police, Control of Arms and Explosives Division (Divisão de Fiscalização de Armas e Explosivos, DFAE)

trafficking in that city. Although assault weapons were just 3 per cent of the total number of arms seized in the past decade, these kinds of high power small arms have been increasingly procured and used by rival drug trafficking factions in the densely populated favelas located in the northern and western parts of the city (Rivero, 2005). Assault weapons in the hands of criminal groups in Rio de Janeiro have a qualitative rather than a quantitative importance linked to their firepower and potential to cause damage, and their symbolic significance vis-à-vis rivals and the police (Dowdney, 2003; Rivero, 2005).

According to Delegate Carlos Antônio Luiz de Oliveira, Chief of the Firearms enforcement unit (Delegacia de Repressão de Armas e Explosivos, DRAE) of the civilian police in Rio de Janeiro[13], small arms trafficking has been decreasing in Brazil since the late 1990s.[14] This is linked to several factors such as stricter laws concerning the illicit carrying, possession, and trade of small arms as well as improvements in law enforcement and intelligence capabilities.[15] Most of the organizations that specialized in trafficking arms from border areas to the major Brazilian cities were disbanded during that period. In addition, the United States suspended small arms exports to Paraguay in 1998, a move followed by Brazil in 2000; Paraguay itself adopted stricter trade controls on foreign-made and domestically produced small arms in 1999. These factors may also have contributed to reducing the flow of legally exported weapons that were then illicitly diverted to criminal organizations in the region—most often back to Brazil (Dreyfus et al., 2003; Dreyfus, Lessing, and Purcena, 2005.[16]

Weapons, however, are useless without ammunition and while small arms, with adequate maintenance, are durable goods, ammunition is normally a single use commodity that could also be described as a perishable good. According to Delegate Oliveira , the main problem in Brazil today, and specifically in Rio de Janeiro, is ammunition trafficking rather than trafficking in small arms. In spite of the stricter controls on imports outlined above, an average of more than 14,000 small arms were seized annually in Rio de Janeiro between 1999 and 2003.[17] This statistic demonstrates that the enormous inflow of weapons in the 1990s created an stockpile that criminals are still able to draw on without any immediate need for replacements. Recent research estimates put criminal holdings in Brazil at around 4 million weapons (Dreyfus and de Sousa Nascimento, 2005). According to Delegate Oliveira, police officers in their operations against drug trafficking factions encounter fewer brand new weapons but large quantities of new ammunition of all calibres, makes, and countries of origin. Seized ammunition is, however, still predominately manufactured by CBC.[18]

The ability to obtain ammunition is a crucial factor in enabling drug trafficking organizations to remain in business, expand, and maintain territorial control in the favelas, which is all done using armed force (Lessing, 2005; Rivero, 2005).[19] According to Delegate Oliveira, DRAE agents seize more than 5,000 rounds of ammunition in each operation. Rounds are generally loose, of mixed makes and, when found in their original packages, it is common to find that bar codes or lot numbers have been erased or destroyed in order to make tracing difficult.[20] According to the same source, between 2002 and 2004 the DRAE seized a total of 442,000 rounds of ammunition of various calibres.[21]Although in the 1990s the drug factions in Rio de Janeiro and São Paulo were heavily dependent on professional small arms traffickers for their supplies of ammunition, today drug traffickers negotiate directly with arms and ammunition suppliers (the deals are closed in places such as São Paulo and Ciudad del Este, Paraguay) and then send their own transport to smuggle weapons and ammunition from Paraguay to Rio de Janeiro or São Paulo.[22] This change is partly because most major arms traffickers were arrested in late 2002 and 2003 well-coordinated operations by the federal police and state-level police corps. So far there is no evidence of cooperation between organized crime groups in Rio de Janeiro and São Paulo over joint purchases or transportation of ammunition.[23]

In Brazil, various classes of ammunition have been designated 'restricted use ammunition' that can only be used, purchased, or in the possession of the armed forces, the police, small arms collectors (who can only store disabled ammunition), and registered sport shooters and hunters.[24] This kind of ammunition cannot be sold in gun shops and can only be purchased directly from the factory with an authorization from the Brazilian Army Directorate of Controlled Products (Diretoria de Fiscalização de Productos Controlados, DFPC) (Presidência da República do Brasil, 2000, articles 16, 17, Chapter VIII and Chapter IX of Title V; Presidência da República do Brasil, 2004, article 19).[25]

Ammunition for civilian use is defined by the same legislation as 'permitted use ammunition' and can only be purchased on presentation by the purchaser of their registration certificate for a small arm of the same calibre and their identity card.[26] The police, however, seize hundreds of thousands of both kinds of ammunition every year. The Viva Rio and Institute for Religious Studies (Instituto de Estudos da Religião, ISER) small arms project has identified a number of patterns to the internal and external routes used to divert ammunition to criminal markets. In all cases, ammunition follows the same routes and methods as those used for small arms trafficking. These routes and methods are summarized in Table 2.

According to law enforcement sources, shipments of ammunition to criminal organizations in Rio de Janeiro are made to order (i.e. to an identified purchaser) because of the risks and costs involved in such operations (it is a drive of at least 2,000 km from the border with Paraguay to the south-west coast of Brazil). This kind of traffic is rarely of the 'ant trade' variety (i.e. little by little in small quantities). Carriers usually transport not fewer than 5,000 rounds hidden in secret compartments in cars or trucks.[27] The modus operandi is different when it comes to diversion from the armed forces or the police. In these cases it is a network of corrupt officials that diverts boxes of ammunition little by little (three to five boxes containing 20 to 50 rounds each time). Other officials, usually retired, collect and stockpile the diverted ammunition and then distribute

Table 2

The most common types of illicit ammunition transfers from Brazil

Type of illicit transfer	Origin	Type of ammunition	Remark
Cross-border smuggling	Previous Brazilian exports to neighbouring countries sharing land borders with Brazil, particularly Paraguay	All types of ammunition	This ammunition goes back to Brazil or to insurgent groups in Colombia (mainly Fuerzas Armadas Revolucionarias de Colombia, FARC)
Transnational illicit channels mainly run by criminal organizations based in Ciudad del Este (Paraguay) and by corrupt military and police organizations in neighbouring countries	Neighbouring countries and other regions of the world	All types of ammunition, restricted use ammunition, as well as hand grenades	This ammunition is smuggled into Paraguay and then diverted to neighbouring countries
Corruption and theft	Police and military holdings	Police and military ammunition of all types, as well as hand grenades	In April 2004 the Brazilian Army officially acknowledged that, between 1995 and 2004, 178 small arms and 7,788 rounds of ammunition had been diverted from army bases and that 117 weapons and 5,555 rounds had been recaptured from criminals
Diversion and theft	Private security companies	Particularly for civilian use ammunition and 12 gauge shells	
Illicit sales	Ammunition factories and gun shops in Brazil	All types of ammunition	
Robbery/theft	Individuals in Brazil	Particularly permitted use ammunition	

Sources: Delegacia Legal (2005); Dreyfus (2005); Dreyfus et al. (2003); GEDES (2004); McDermott (2004) it to purchasers in criminal organizations.[28] These methods of ammunition procurement and illicit trade are illustrated in the section below by a number of case studies.

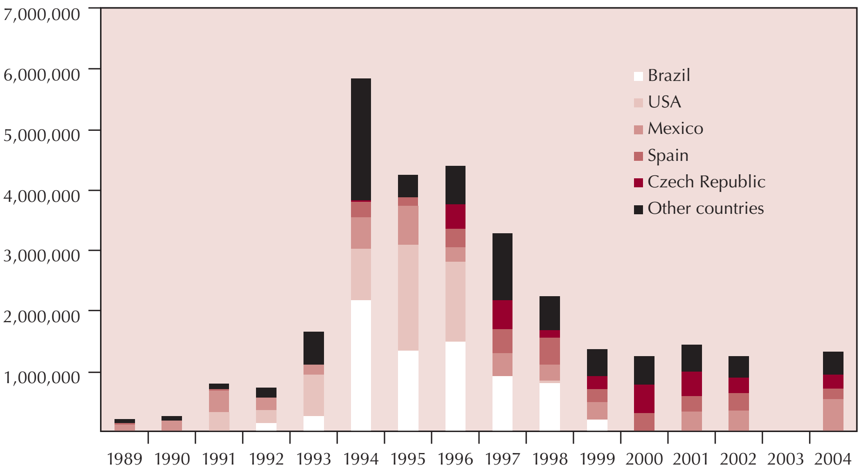
Patterns of ammunition procurement by criminals: some case studies

Case 1: a round trip to Paraguay[29]

On 2 August 2002, after a two-month long police investigation, agents of the Political and Social Order Division (DELOPES) of the Brazilian Federal Police seized 50,000 rounds of ammunition in different parts of the city of Rio de Janeiro. The ammunition had, according to police sources, been delivered to several criminal groups based in city's favelas. Among the people arrested in the operation were two retired Brazilian army non-commissioned officers who had served in a military unit near Foz de Iguaçu, a city located in the tri-border area joining Argentina, Brazil, and Paraguay. The police seized 7.62 mm, 9 mm, 5.56 mm, .40, and .30 rounds manufactured in the Czech Republic and by CBC in Brazil. Most of the 7.62 mm rounds were manufactured by CBC. Before 2003 ammunition manufacturers were not obliged by law to include lot numbers on the ammunition headstamps (i.e. the information engraved on the cartridge case). They would, however, write the lot numbers on the packages containing the rounds. Since the CBC bullets were still in their original packages with the lot numbers, the police could identify that these rounds belonged to lot number LT 547.4-Trim/POL K N-135 L 479/81, which had been exported to Paraguay by CBC. Identifying the lot number on the boxes was key to tracing the trafficking route back to Paraguay and thus concentrating police efforts on blocking that route (Costa, 2002; Borges, 2002).

Paraguay has one of the lowest per capita incomes in the region and a small population of 5 million. The country is not at war and does not register high rates of firearm-related deaths. In the mid 1990s, the amount of small arms and ammunition imported by Paraguay far exceeded the country's needs, offering further evidence of the leakage of small arms from the lawful to the illicit market. Until 2002 Paraguayan legislation allowed the purchase of handguns by foreign tourists; most gun shops are located in cities along the border with Brazil. In

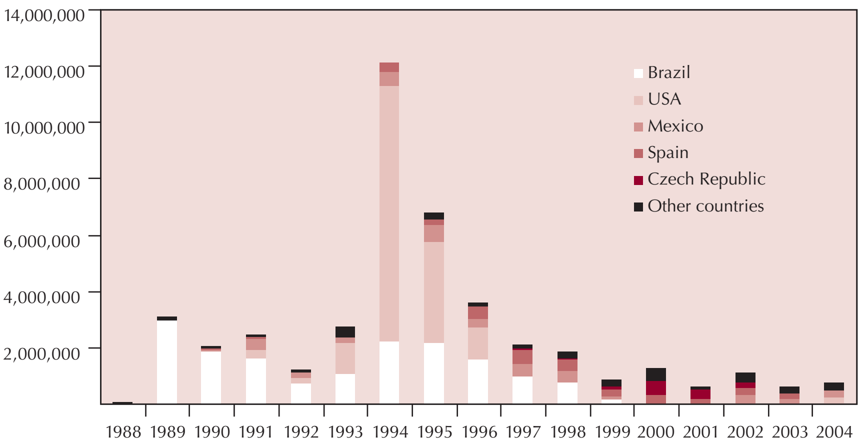
Graph 2
Paraguay: volume of ammunition imports, 1989–2004 (USD)



Note: All figures in current USD. Includes customs codes 930621 (shotgun cartridges) and 930630 (small arms ammunition)

Source: UN COMTRADE, Analysis: Viva Rio/ISER

Graph 3
Exports of ammunition to Paraguay, 1989–2004 (USD)

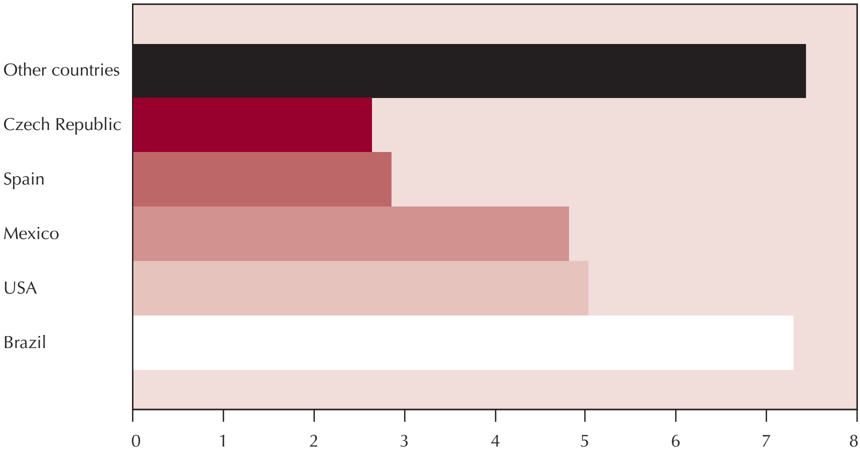


Note: All figures in current USD. Includes customs codes 930621 (shotgun cartridges) and 930630 (small arms ammunition)

Source: UN COMTRADE, Analysis: Viva Rio/ISER

Graph 4[30]

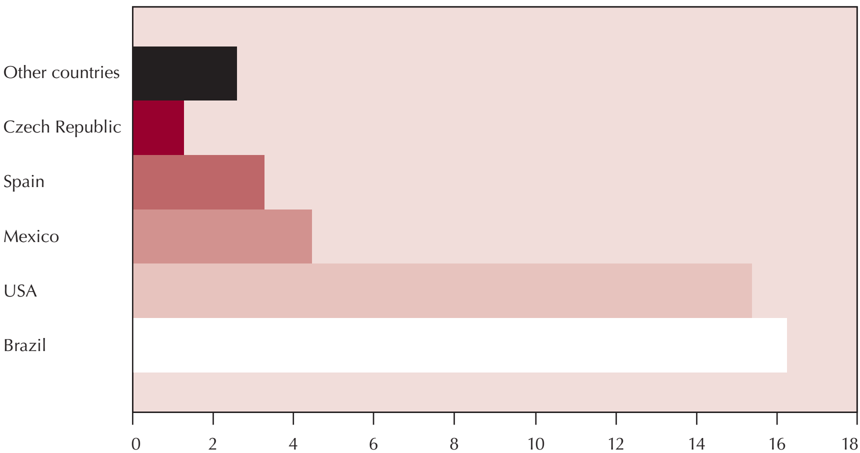
Paraguay: imports of ammunition by exporter, 1989–2004 (USD million)



Note: all figures are in constant (2004) USD
Source: UN COMTRADE, Analysis: Viva Rio/ISER

Graph 5

Exports of ammunition to Paraguay, 1989–2004 (USD million)



Note: all figures are in constant (2004) USD
Source: UN COMTRADE, Analysis: Viva Rio/ISER

2002, after heavy pressure from the Brazilian government and civil society, Paraguay repealed the decree allowing foreign tourists to buy small arms and ammunition, a route that had been used extensively by Brazilian criminals (Dreyfus et al., 2003; Dreyfus, Lessing, and Purcena, 2005). In 2004 the Paraguayan government enacted a decree that specifically forbids tourists and foreign nationals from buying small arms and ammunition in Paraguay (Presidencia de la República del Paraguay, 2004, article 31).

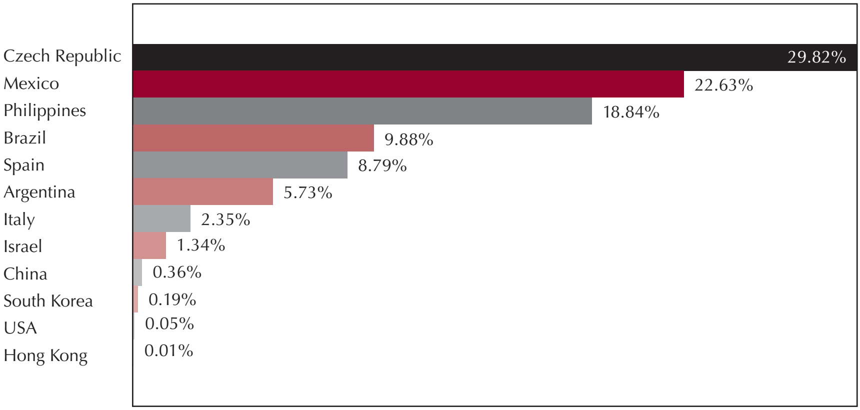
Diplomatic pressure also led Paraguay in late 2000 to declare a three-year moratorium on the import of Brazilian-made small arms and ammunition. Paraguayan authorities also decided that their country should not import more than it required for its domestic market (Dreyfus et al., 2003; Iootty Dias, 2004). Graphs 2–5 show that Paraguay has made clear efforts to address the issue of grey ammunition markets on its territory. Imports considerably decreased in the current decade—especially those from Brazil.

Although Graphs 1–5 reveal a difference in values for imports reported by Paraguay to the United Nations Commodity Trade Statistics Database (UN Comtrade) and the exports reported by its trading partners, the top five exporters (Brazil, the United States, Mexico, the Czech Republic, and Spain) are the same in both cases and the drop in exports and imports is reflected in both sets of data. It is notable that the United States suspended exports to Paraguay in 1996 on the grounds that export licence applications exceeded reasonable estimates of domestic need in that country (US State Department, 2000). The US government argued in 1996 that weapons exported to Paraguay were being diverted to criminals in Brazil (de Barros Lisboa, Fernandes, and Stubert Aymore, 2001, p. 10). Brazil also suspended exports for the same reason after the moratorium mentioned above.[31] Paraguay imported 153.5 million rounds of ammunition between 1997 and 2003, however, and it is not surprising that surplus stocks were still being smuggled into Brazil in 2004.[32] Graph 6 gives a breakdown of these imports by exporting country.

While grey markets may have declined in importance, entirely underground small arms trafficking networks remain a major problem in Ciudad del Este in the tri-border area (see Map 1) (Dreyfus et al., 2003; McDermott, 2004). In 2002, federal and Rio de Janeiro police investigations detected a diversion route for 7.62 x 39 mm Wolf ammunition produced in Russia, legally imported

Graph 6

Volume of ammunition imports into Paraguay (percentage of units or cartridges) by exporter, 1997–2003



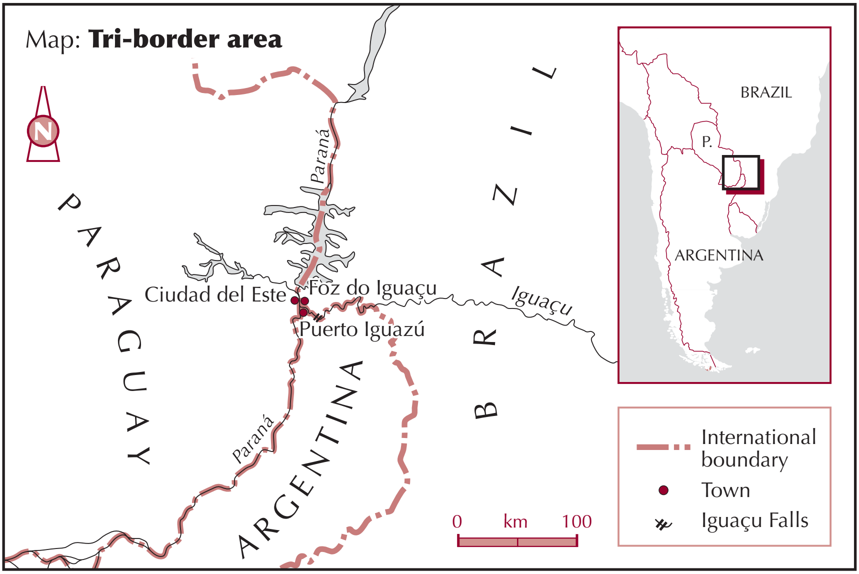
Source: OCIT Trade, Asunción, Paraguay. Analysis: Viva Rio/ISER

by a firm in Argentina and then trafficked to Rio de Janeiro through the tri-border area (Werneck, 2002, p. 15).

There is also evidence to suggest that the region was used as a trafficking route for Argentine-made GME-FMK-2-MO hand grenades used by drug traffickers in Rio de Janeiro and allegedly diverted from Argentine military stockpiles[34]. Another disquieting issue is the fact that, even if the importance of Paraguay as an ammunition trans-shipment point diminishes, the problem can shift to other countries in the region that have lax small arms laws and poorly controlled borders. One likely candidate is Bolivia, a country even poorer than Paraguay with no small arms control laws (apart from vague ministerial resolutions), problems with corruption in law enforcement agencies, and a virtually unpatrolled border with Brazil.

Case 2: crime arsenals

On 20 April 2004 a team from the civilian police in Rio de Janeiro raided an illegal arms cache located in the favela of Coréia in the western part of the city. They were astonished to find 18,350 rounds of ammunition of various calibres,[35]



161 hand grenades (M-20 riot control and M-3 fragmentation grenades), and eight M-409 anti-personnel mines. According to the police, the cache belonged to Robinho Pinga, a trafficker and member of the criminal faction Terceiro Comando.[36] Both the grenades and the mines were engraved with lot numbers,[37] which allowed the DRAE agents to begin an investigation in order to identify the point of diversion of these military weapons. The grenades were traced back to their manufacturer—the Brazilian company RJC Defesa Aeroespacial based in Lorena in the state of São Paulo. RJC´s owner declared that lots CEV-4-11-96 and RJC 669-98, to which the grenades belonged, had been sold as complete lots in 1996 and 1998 to the Directorate of War Material at the Brazilian Air Force (based in Rio de Janeiro) and to the Brazilian Aeronautic Commission (based in São Paulo), respectively. The mines belonged to lot 1-35 manufactured by Poudres Réunies de Belgique (PRB) in Belgium, a company which is no longer trading. According to the Brazilian Ministry of Defence, the army still retains 5,497 M-409 mines from this particular lot for training purposes. It is not clear, however, if the entire lot was sold by PRB to the Brazilian Army.[38]

The remaining 18,350 rounds of small arms ammunition found in the cache were, according to the Director of the DRAE, manufactured by CBC. Since most of this ammunition had been unpacked and since lot numbers were not marked on the headstamps, it was not possible to find out if the ammunition was diverted from a military or a police unit.[39] The fact that the ammunition was found with the mines and the grenades would, however, point in the direction of either the army or the air force as a possible procurement source. Both the Brazilian Air Force and the Brazilian Army deny that the hand grenades and mines were diverted from their stockpiles but the lot numbers and the testimony of one of the manufacturers seem to contradict this denial.[40]

Ammunition diversion from the Brazilian Armed Forces and law enforcement agencies is linked to a number of factors. A total of 71,944 troops from the three armed services are stationed in the state of Rio de Janeiro.[41] Most of these military units (as well as their arsenals) are based inside the city limits of Rio de Janeiro—sometimes near the most violent favelas. Every year, 18-year old men living in these slums are conscripted to serve in the neighbouring military units. For example, most of the air force logistical and materiel bases are in Rio, as are most of the small arms belonging to the air force infantry that guards these bases. The elite force of the marines also has its major bases and facilities in Rio de Janeiro, and four brigades of the army (one in the neighbourhood of Niteroi) are largely formed from conscripts recruited in these municipalities. The military police battalions and their ammunition depots are also often located close to areas where organized crime has a strong presence. This creates highly suitable conditions for the theft and diversion of small arms and ammunition.

In July 2005, Internal Affairs detectives uncovered a network of ten serving and retired police officials who were diverting restricted use ammunition to drug factions. By the time they were discovered and arrested they had been able to divert at least 10,000 rounds of ammunition from the Rio de Janeiro civilian police ammunition depot. One of the leaders of this network of corrupt officials was the man who had for 16 years been the head of the ammunition depot (Secretaria de Segurança Pública, 2005; O Globo.com, 2005). Ammunition was diverted in small amounts at a time and stockpiled by a retired senior police officer who would then arrange for its sale to criminals (Secretaria de Segurança Pública, 2005; O Globo.com, 2005).

Theft and diversion from official ammunition stockpiles are not particular to Rio de Janeiro. For example, on 15 July 2004 the civilian police in the north-eastern state of Amazonas, which has borders with Colombia and Venezuela, raided an illegal arms cache in the city of Manaus and seized 8,795 rounds of 12.7 mm, 7.62 mm, and 9 mm calibre that had been manufactured by CBC. The police believe that the ammunition was to be shipped to Fuerzas Armadas Revolucionarias de Colombia (FARC) combatants (although FARC denied this) or to armed groups in Venezuela. The detective in charge of the investigation also suspects that the ammunition was stolen from a military base in the neighbouring state of Roraima (Brasil, 2004a; Brasil, 2004b). Intelligence officials in Colombia confirm that military ammunition (mainly 12.7 mm rounds) is diverted from Brazil along the Vaupés River in order to supply the southern FARC fronts in Colombia (Dreyfus, 2005).

These cases demonstrate that applying efficient marking and tracing mechanisms and controls is crucial to preventing the diversion of police and military ammunition to criminal markets.

Case 3: from the gun shop to the criminals

On 21 February 2005 agents of the federal police small arms trafficking prevention division (Delegacia de Repressão ao Tráfico Ilícito de Armas, DELEARM) seized up to 2 million rounds of different calibres in the city of Estação, in the southern state of Rio Grande do Sul. They also arrested Leandro Brustolin, owner of the ammunition depot and of the wholesaler Brustolin & Brustolin; Antônio Ferreira de Farias, owner of three gun shops located in Recife in the north-eastern state of Pernambuco; and Paulo Roberto Schilling da Silva, former manager of the firearms producing company Rossi. The seizure and arrests were the result of Operação Gatilho ('Operation Trigger'), a combined operation by the federal police and the DFPC.

After a six-month intelligence operation, they dismantled a network of gun shops that had been used as front companies for the distribution of ammunition to criminal groups in the north-east of Brazil and (allegedly) in São Paulo and Rio de Janeiro (Irion, 2005). The ammunition (and a quantity of small arms) was stockpiled at Brustolin & Brustolin and then shipped by truck to the gun shops in Pernambuco, from where it was distributed to criminal groups involved in bank robberies, raids on armoured trucks, and drug trafficking.

According to the federal police, Paulo Roberto Schilling da Silva, using his knowledge of the arms business, acted as a broker between Leandro Brustolin in Rio Grande do Sul and Antônio Ferreira de Farias in Pernambuco. Most of the ammunition seized was produced in Brazil. This represents a clear case of internal ammunition procurement by criminal groups involving a group of legitimate entrepreneurs shifting to criminal activities (Irion, 2005).

According to Delegate Carlos Antônio Luiz de Oliveira, although diversion from wholesale and retailing companies is a problem, robbery of ammunition from gun shops and private wholesale deposits is not common practice in the state of Rio de Janeiro. These shops and deposits are guarded well *inter alia* by good security systems. Furthermore, such private deposits are prohibited by law from storing restricted-use calibres of ammunition—the kind of ammunition procured in large quantities by criminal organizations in order to sustain their armed competition with rivals and defend themselves against the police.[42]

A hospital worker displays a handful of stray bullets that have hit Rio's Bonsucesso Hospital, which stands close to two notorious slums. The staff has earned a reputation as experts on gunshot wounds. January 2005.
© Douglas Harrison Engle/WPN

Case 4: from the law abiding citizen to the criminal—a highly plausible scenario

In September 2005 the governor of the state of Rio de Janeiro released a study of sources of supply of firearms to criminals produced by the Delegacia Legal Programme of the civilian police in Rio de Janeiro in cooperation with the ISER (Delegacia Legal, 2005). The study presents the results of a systematic analysis of data on 86,849 firearms used in different types of crime and seized by the police between April 1999 and June 2005. A database lists the type of crime in which the weapon was used, its owner (civilian, police, or private security), as well as the make, manufacturer, serial number, model, and calibre of the weapon. It was also possible to identify weapons that had previously been legally registered and, in some cases, if there was a report of the theft or loss of that weapon. The research indicates that 14 per cent of the weapons seized in drug trafficking-related crimes had previously been legally registered, and that 37 per cent matched the definition of what are known as 'informal guns', that is, unregistered permitted-use handguns that are likely to have been purchased by law-abiding citizens before registration became mandatory in 1980. This means that, in part, drug traffickers supply members of their organizations with weapons stolen from law-abiding citizens which then circulate in illicit markets. If theft is one source of supply for firearms used in criminal activity, it is plausible that ammunition is also stolen with the guns. Law-abiding individuals who own guns are thus indirectly and involuntarily supplying criminals with ammunition. This fact is disquieting because, until 2003, owners of small arms could, by presenting valid identification and the registration certificate for their gun(s), purchase up to 50 cartridges per month for handguns and rifles; up to 300 .22 long rifle cartridges; and up to 200 shotgun cartridges (Ministério do Exército, 1980, article 11; and Ministério da Defesa, 1999, article 19). Even more worrying is the fact that in Brazil an estimated 5.6 million registered firearms are owned privately by individuals and another 4.6 million firearms are held informally by individuals and unregulated private security companies (Dreyfus and de Sousa Nascimento, 2005, p. 160). All these guns use ammunition that could be either diverted or stolen. According to the Brazilian Army Statistical Yearbook, 320.9 million rounds were sold to gun shops and ammunition distribution depots by CBC between 1995 and 2002 (Ministério da Defesa, 1995–2002).

Complicating matters further is the fact that Brazil is home to 161 private security companies that handle large stockpiles of ammunition that could be either stolen or diverted to illicit channels.[43] According to the Brazilian Federation of Private Security and Valuables Transportation Firms (Federação Nacional das Empresas de Segurança e Transporte de Valores, FENAVIST), the federal police in 2002 alone authorized the purchase of 2.3 million rounds by private security firms (FENAVIST, 2002).

Control measures in the Brazilian Statute of Disarmament

Federal Law No. 10,826, known as the Statute of Disarmament, was finally passed on 22 December 2003 (specific technicalities were regulated on 1 July 2004 by Presidential Decree No 5123). This law was the result of a decade of campaigning for a federal law that would tighten controls on the circulation and use of small arms. The statute bans the carrying of small arms by civilians. It also includes provisions for stricter regulation of the small arms and ammunition industry.

Such measures include, for example, a mandatory online link between the army database, which lists production, imports, and exports, and the federal police database, which—under the new law—centralizes registration and information about seized weapons and ammunition. Previously, a lack of communication and information exchange between these institutions had prevented the efficient identification of diversion and trafficking patterns. The statute also establishes a centralized ballistic information system managed by the federal police, which will be supplied by manufactures with samples of bullets fired by new types of domestically manufactured or imported small armament. The use of Integrated Ballistics Identification System (IBIS)-type equipment will assist the identification and tracing of small arms used in crimes. The statute also gives the federal police powers to undertake periodic inspections of the stockpiles held by private security companies, gun shops, and depots—and prescribes severe penalties for underreporting of losses or thefts from the inventories of such organizations.

To tackle the specific problem of ammunition diversion, the new law establishes that the headstamps of cartridges produced in Brazil for federal and local public security agencies and armed forces must include a lot number. The regulation entered into force on 1 January 2005 for .40 and .45 calibre ammunition and in July 2005 for 5.56 x 45 mm; 7.65 x 51 mm and 9 mm Parabellum; .380, .38, .50, and 12 gauge cartridges (Ministério da Defesa, 2004, articles 4, 11, and 12). The lot number identifies the public security institution or armed service that purchases lots of 10,000 rounds. These rounds are assigned to a single public legal entity with a unique lot number, and their lots are manufactured at their specific request. If, for instance, a lot of 10,000 rounds of 5.56 x 45 mm cartridges is manufactured by CBC for the Brazilian Army, that lot will be sold only to the army and the lot number will be marked on the base of each cartridge using laser technology at the end of the production process (Anders, 2005).[44]

It is expected that lot numbers will help the police to identify patterns of ammunition leakages from the police or the military to organized crime. It may be possible to identify reloaded ammunition as such because CBC original primers are marked with a letter 'V'.

It should be noted that illicit ammunition reloading is currently only a minor problem according to the police forensic analysts in the state of Rio de Janeiro. This is not surprising considering the easy availability of ammunition on the illegal market. However, the issue of ammunition reloading as an option for criminal organizations should be considered in the near future if supply flows are curtailed by the enforcement of new legal and control measures.[45]

Imported ammunition of the calibres named above will have to comply with the same packaging and marking requirements as Brazilian-made ammunition. Brazil, however, is a country that imports practically no ammunition since its legislation explicitly (and protectively) states that defence articles similar to those produced in the country are not to be imported unless there are explicit and specific national security reasons for doing so (Presidência da República do Brasil, 2000, articles 183, 189, 190, 195, and 196; Presidência da República do Brasil, 2004, articles 51, 52, 53, and 54). With regard to sales to individuals in gun shops, a recent regulation from the army reduces the quantity that each gun owner can purchase (per weapon) to 50 cartridges per year (Ministério da Defesa, 2005, articles 1 and 2).

Conclusion

It is too early to assess the impact of the new measures.[46] The expectation is that ammunition marking will provide the federal police and the justice system with a powerful tool to enable them quickly to identify and punish those state agents responsible for diverting ammunition to criminal outfits or for not taking the necessary security measures to prevent the theft and diversion of ammunition. It is also expected that ammunition marking will provoke a 'virtuous circle' by strengthening the control and security of military and police stockpiles. The sanctions established in the Statute of Disarmament should have a deterrent effect: trafficking, diverting, stealing, and illegally stockpiling ammunition falls under article 17 (illegal trade in firearms) and article 18 (international arms trafficking), which establish penalties of 8–16 years imprisonment.

Ammunition marking should not, however, be regarded as a panacea for preventing the diversion of ammunition to criminal outfits. None of the measures listed above would work by itself. It is the effective combination of these measures that will reduce the magnitude of the problem. Information exchange between the army, the manufacturers, the importers, and the federal police—as well as the control of private security companies and gun shops—will allow a strict control of the production, distribution, and recording of imports and exports of ammunition. The exchange of information between federal and local authorities on seizures and illicit use will also help to identify and eventually curtail diversion and trafficking routes and schemes. Combating and reducing institutional corruption, improving stockpile security and the disposal of surpluses, and reforming and adapting border control capabilities are complementary actions that must be undertaken at the same time. Technical measures can help in weak states such as Brazil. The key, however, is to strengthen the state to enable its institutions to implement such measures. Reducing and combating corruption is probably the biggest challenge that Brazil faces with regard to organized crime.

The Brazilian authorities are currently implementing one of the most comprehensive small arms control laws in the world. It is likely that these domestic restrictions will lead criminals to source ammunition from abroad from the police and military holdings of neighbouring countries. As stated above, there is evidence, for example, of past diversion of hand grenades from Argentine military stockpiles to criminal organizations in Brazil. Neighbouring countries must now adopt similar restrictions on the domestic sale of ammunition and similar marking procedures. Another necessary step is regional initiatives to improve stockpile security and management, as well on measures to dispose of surplus ammunition. The regional harmonization of laws and practices, as well as the adequate, efficient, and timely exchange of intelligence and police information, will be key to achieving a reduction in transfers of ammunition to criminals in the years to come.

List of abbreviations

ACP	Automatic Colt Pistol
AE	Action Express
CBC	Companhia Brasileira de Cartuchos
DELEARM	Delegacia de Repressão ao Tráfico Ilícito de Armas (Small Arms Trafficking Prevention Division, Brazilian federal police)
DELOPES	Delegacia de Ordem Política e Social (Political and Social Order Division, Brazilian Federal police)
DFAE	Divisão de Fiscalização de Armas e Explosivos (Control of Arms and Explosives Division, Rio de Janeiro civilian police)
DFPC	Diretoria de Fiscalização de Productos Controlados (Directorate of Controlled Products, Brazilian Army)
DRAE	Delegacia de Repressão de Armas e Explosivos (Firearms Enforcement Unit, Rio de Janeiro civilian police)
FARC	Fuerzas Armadas Revolucionarias de Colombia
FENAVIST	Federação Nacional das Empresas de Segurança e Transporte de Valores (Brazilian Federation of Private Security and Valuables Transportation Firms)
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Statistics and Geography)
IBIS	Integrated Ballistics Identification System
IMBEL	Indústria de Material Bélico do Brasil
ISER	Instituto de Estudos da Religião (Institute for Religious Studies)

JUCERJA	Junta Comercial do Estado do Rio de Janeiro (Trade Board of the State of Rio de Janeiro)
PRB	Poudres Réunies de Belgique
Secex	Secretaria de Comércio Exterior (Brazilian Secretariat of Foreign Trade)
SINARM	Sistema Nacional de Armas
SPL	Special
S&W	Smith and Wesson
Comtrade	Commodity trade (UN statistics database)

Endnotes

1 Such offences could be called 'market-based' offences.

2 The term 'territorial centrality' refers in this context to the degree to which the monopoly on the use of legitimate armed force is exercised by the government of a state over its territory as well as the physical and functioning presence of accepted and legitimate national institutions that are not challenged by non-state groups.

3 The term 'state' is used in this chapter as a synonym of 'country' or 'nation state', that is, a recognized sovereign socio-political entity formed by a permanent territory, a defined population, and functioning government institutions.

4 Weak and strong state types are not static polar opposites. States can move along a continuum depending on variations in the levels of their socio-political cohesion, socio-economic development, territorial centrality, and political capacity. It is certainly possible to argue that in the late 1920s and early 1930s the United States was a weaker state than it is today, with widespread political and police corruption, economic depression, and strong social inequalities. Strong criminal organizations with territorial control over cities such as Chicago were a symptom of this weakness. The same could be argued about Italy and organized crime in the south of the country, particularly in Sicily. The process of containment of the Italian mafia was part of a parallel process of the consolidation and reform of Italian political and judicial institutions. For a discussion of the concept of 'weak states' in the context of an analysis of transnational organized criminal activity see Dreyfus, 2002; Lyman and Potter, 1997; and Stefanini, 2005.

5 In this chapter the term ammunition refers to cartridge-based ammunition up to 12.7 mm (.50) calibre as well as hand grenades. These are the types of ammunition commonly used by criminals and especially criminal organizations in Brazil.

6 The author is grateful to Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, for the concept of 'internal and external flows'.

7 This is particularly, although not exclusively, the case for military and law enforcement calibres such as 7.62 x 39 mm, 7.62 x 51 mm, 5.56 x 45 mm, 9 mm, .45 and .40, .30, and .50 AE.

8 A Brazilian Ministry of Health study reports that there were 39,325 firearm-related deaths in 2003 and 36,091 in 2004 (Ministério da Saúde, 2005, p. 3).

9 Brazil is a Federal Republic made up of 26 states.

10 In this chapter the concepts 'illicit grey market' or 'illicit grey transaction' refer to cases in which legal loopholes or flaws are exploited in order to intentionally circumvent national or international laws or policies. The definition of 'grey market' is adapted from the concept defined in the *Small Arms Survey*, 2001, pp. 166–67.

11 Raw data obtained from the Secretariat of Public Security in the state of São Paulo and analysed by Viva Rio/ISER.

12 Raw data obtained from the state of Rio de Janeiro civilian police Control of Arms and Explosives Division (Divisão de Fiscalização de Armas e Explosivos, DFAE) and analysed by Viva Rio/ISER.

13 Each Brazilian state has a uniformed militarized police force and a plain-clothed investigative or civilian police force.

14 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August 2005.

15 A new federal small arms control law known as the Sistema Nacional de Armas (SINARM) was passed in 1997. It criminalized illicit possession and carrying of small arms and illicit trade in small arms. Before the new law, illicit carrying, for example, had been a simple violation punishable by a fine. In 2003 the new and stricter federal law known as the Statute of Disarmament increased penalties for illicit carrying of arms and ammunition still further and criminalized illicit arms and ammunition trafficking. In 2001 the Rio de Janeiro state created a firearms enforcement unit (the Delegacia de Repressão de Armas e Explosivos, DRAE) to enforce small arms control laws. It is notable that the late 1990s and the early 2000s was a period of increasing cooperation and information sharing between state police forces and the federal police.

16 According to sources interviewed in Paraguay, the United States resumed issuing export licences to Paraguay in 2005. These exports, however, are limited to hunting and sport shotguns.

17 Raw data obtained from the state of Rio de Janeiro civilian police DFAE and analysed by Viva Rio/ISER.

18 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005; interview with Forensic experts from the Rio de Janeiro state police, Rio de Janeiro, November 2005.

19 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

20 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

21 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

22 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

23 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

24 The following types of ammunition are designated restricted-use ammunition: 7.62 x 51 mm; 5.56 x 45 mm; 9 mm; .357 Magnum; .38 Super Auto; .40 S&W; .44 SPL; .44 Magnum; .45 Colt

and .45 Auto; .22-250; .243 Winchester; .270 Winchester; 7 Mauser; .30-06; .308 Winchester; 7,62 x 39 mm; .357 Magnum; .375 Winchester; .44 Magnum; and .50 AE cartridges (Ministério da Defesa, 2001, articles 6 and 8; Ministério da Defesa, 2000; and Ministério da Defesa, 2001b, articles 6, 8, and 15; Ministério do Exército, 1998).

25 The definition of 'restricted use' also includes any weapon and ammunition similar or equal to those used by the armed forces and the police. This would include, for example, assault rifles, machine guns, grenade launchers, sub-machine guns, as well as light weapons and their ammunition.

26 The following types of ammunition are designated permitted-use ammunition: .22LR; 32 S&W; .38 SPL; .380 Auto; 7.65 mm Browning or 32 ACP; .25 Auto; 32-20; 38-40; .44-40 and up to 12 gauge. (Presidência da República do Brasil, 2000, articles 16, 17, Chapters VIII and IX; Presidência da República do Brasil, 2004, articles 19 and 21, paragraph 1; Presidência da República do Brasil, 2003, article 4, III-3º). 12 gauge ammunition is only considered to be for 'permitted use' when purchased for shotguns with a barrel longer than 24 inches.

27 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

28 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, August, 2005.

29 A shorter version of this case study was presented in Small Arms Survey, 2005, p. 26.

30 In Graphs 2–5 the group 'other countries' includes, in order of importance, the Philippines, South Korea, Argentina, Italy, Israel, and Germany.

31 This data has been checked against official US and Brazilian customs information. The author would like to thank Julio Cesar Purcena, Researcher at the Small Arms Control Project of Viva Rio/ISER, for his technical support in the analysis of these foreign trade statistics.

32 Based on cross-checked information from the Brazilian Secretariat of Foreign Trade (SECEX) and the Statistical Yearbook of the Brazilian Army on the quantity of ammunition exported and the proportion of that ammunition exported to Paraguay, it is estimated that between 1982 and 1999 Brazil exported 71,803,082 rounds of ammunition to Paraguay.

33 In contrast to Graphs 2–5, Graph 6 presents quantities rather than values and covers a shorter time period (the data available from OCIT covered 1997–2003). This explains, for example, the large share shown for exports from the Philippines, which started exporting ammunition to Paraguay in 1997 after the United States and Brazil had ceased their exports.

34 Dreyfus et al., 2003, p. 18; Gosman, 2003; Viva Rio/ISER, 2003; Werneck, 2003, p. 18; Alves, Soler, and Werneck, 2004, p. 17.

35 The calibres found were 7.62 mm; 5.56 mm; .40; .45; 9 mm; .380, and 12.7 mm.

36 Bottari and Goulart, 2004; Jornal de Brasília, 2004; O Globo, 2004; Pinheiro and Martins, 2004.

37 The lot numbers for the grenades were engraved in the security lever and the fuse.

38 Bottari and Goulart, 2004; Jornal de Brasília, 2004; O Globo, 2004; Pinheiro and Martins, 2004.

39 Interview with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, Rio de Janeiro, November 2004.

40 Bottari and Goulart, 2004; Folha de São Paulo, 2004; Jornal de Brasília, 2004; O Globo, 2004; Pinheiro and Martins, 2004.

41 This figure comes from the Brazilian Institute of Statistics and Geography (Instituto Brasileiro de Geografia e Estatística, IBGE), which compiled the data from the 2000 national census.

42 Correspondence with Delegate Carlos Antônio Luiz de Oliveira, Chief of the Rio de Janeiro civilian police DRAE, December 2005. It is also true that there are few gun shops in the state of Rio de Janeiro. According to the state Board of Trade in Rio de Janeiro (Junta Comercial do Estado do Rio de Janeiro, JUCERJA) there were nine gun shops in that state in 2003. According to an assessment made by Viva Rio in 2005, there were only four shops trading in the state of Rio de Janeiro.

43 These stockpiles contain .38 SPL; .32 S&W; 32ACP; .380 Auto; and 12 gauge ammunition.

44 Information from a presentation by an officer of the Brazilian Army Directorate of Controlled Products at the Putting People First, Rio Meeting 'Regulating civilian ownership of weapons' organized by Humanitarian Dialogue, Viva Rio, and Sou da Paz, Rio de Janeiro, 16–18 March, 2005.

45 Interviews with forensic analysts at the Rio de Janeiro state or scientific and technical police, Rio de Janeiro, November 2005. According to the analysts, reloaded ammunition is only a minor and unrepresentative part of the ammunition they examine in the course of their work. Reloading is limited to revolver and pistol ammunition and is identified either by the primer capsule or, in the case of pistol ammunition, because the head does not have a full metal jacket as is the case for most of the pistol ammunition manufactured by CBC. According to Brazilian legislation, apart from law enforcement agencies and the armed forces, only the following entities are authorized to reload ammunition and own reloading machines: shooting clubs, authorized shooters, hunters, arms companies, and private security academies.

46 Local and federal law enforcement officials and forensic experts interviewed for this chapter had not yet seen cases of new lots with numbered cartridges (interviews, Rio de Janeiro, November 2005).

Bibliography

Alves, María Elisa, Antonio Werneck, and Alessandro Soler. 2004. 'A Guerra do Rio: Granadas: Fuzis e Balas Eram Vendidas a Quadrilhas do Complexo da Maré e do Morro do Turano'. *O Globo*. 15 October.

Anders, Holger. 2005. *Scope for International Minimum Standards on Tracing Illicit SALW Ammunition: Recommendations to the UN Open-Ended Working Group on Tracing Illicit SALW, 6–17 June.* 2005. Brussels: Groupe de recherche et d'information sur la paix et la sécurité (GRIP). <http://www.grip.org/bdg/g4575.html>

Borges, Waleska. 2002. 'PF Apreende Arsenal no Rio', *Jornal do Brasil*, 3 August. <http://www.guria.com.br>

Bottari, Elenilce and Gustavo Goulart. 2004. 'As Granadas da Discórdia'. *O Globo* Web edition. 24 April. <http://www.fab.mil.br/publicacao/enotimp/enotimp115.htm>

Brasil, Kátia. 2004a. 'Gerrilheiros Colombianos Negam Uso de Munição do Exército Brasileiro', *Folha* Web edition. 19 July. <http://www1.folha.uol.com.br/folha/brasil/ult96u62547.shtml>

Brasil, Kátia. 2004b. 'Polícia Apreende Munições no Amazonas', *Folha* Web edition. 17 July 2004. Available at Força Aérea Brasileira, Centro de Comunicação Social da Aeronáutica, Divisão de Jornalismo, Noticiário da Imprensa da Aeronáutica (NOTIMP), Notimp Eletrônico, No. 1999. <http://www.fab.mil.br/Publicacao/enotimp/enotimp199.htm>

Cano, Ignácio and Nilton Santos. 2001. *Violência Letal: Renda e Desigualdade Social no Brasil*. Rio de Janeiro: 7 Letras.

Carvalho, Sandra. 2004. *Human Rights in Brazil 2003: Global Justice Annual Report*, Rio de Janeiro: Centro de Justiça Global. May. Accessed 26 February 2006. <http://www.global.org.br/english/arquivos/JGAR2003English.pdf>

Costa, Ana Claudia. 2002. 'Menos Munição Para o Tráfico', *O Globo*, 3 August. <http://www.guria.com.br>

De Barros Lisboa, Marcos, Rubem César Fernandes, and Ramon Stubert Aymore. 2001. *As Exportações Brasileiras de Armas Leves 1989–2000*, Rio de Janeiro: ISER. <http://www.sindominio.net/afe/dos_armas/bradsilexp.pdf>

Delegacia Legal. 2005. *Fontes de Abastecimento do Mercado Criminal de Armas*. Rio de Janeiro: Governo do Estado do Rio de Janeiro, Secretaria de Segurança Pública, Policia Civil do Estado do Rio de Janeiro.

Dowdney, Luke. 2003.*Children of the Drug Trade: A Case Study of Children in Organized Armed Violence in Rio de Janeiro*. Rio de Janeiro: 7 Letras. <http://www.coav.org.br/publique/media/livroluke_eng.pdf>

—. 2005. *Neither War Nor Peace: International Comparisons of Children and Youth in Organized Armed Violence, Rio de Janeiro*. COAV/Viva Rio/ISER/IANSA. <http://www.coav.org.br/publique/cgi/cgilua.exe/sys/start.htm?sid=104&UserAct%20iveTemplate=_en>

Dreyfus, Pablo. 2002. *Border Spillover: Drug Trafficking and National Security in South America*. PhD. thesis, Geneva: Graduate Institute of International Studies.

—. 2005. 'Political Economy of Illegal Arms Acquisitions in Colombia.' Background paper: Geneva/ Bogotá: Small Arms Survey (SAS)/Conflict Analysis Resource Center (CERAC).

Dreyfus, Pablo, Carolina Iootty de Paiva Dias, Benjamin Lessing, and William Godnick. 2003. *Control de Armas Pequeñas en el MERCOSUR*. Rio de Janeiro/London: Viva Rio/International Alert. June. <http://www.iansa.org/regions/samerica/mercosur_spanish_241003.pdf>

Dreyfus, Pablo, Benjamin Lessing, and Julio César Purcena. 2005. *A Indústria Brasileira de Armas Leves e de Pequeno Porte: Produção Legal e Comércio*. In Rubem César Fernandes (coordinator) *Brasil: As Armas e as Vítimas*. Rio de Janeiro: 7 Letras, ISER, pp. 64–125. <http://www.desarme.org/publique/media/vitimas_armas_producao_comercio.pdf>

Dreyfus, Pablo and Marcelo de Sousa Nascimento. 2005. 'Posse de Armas de Fogo no Brasil: Mapeamento das Armas e seus Proprietários', in Rubem César Fernandes, pp. 126–96. <http://www.desarme.org/publique/cgi/cgilua.exe/sys/start.htm?sid=4&infoid=4647>

FENAVIST (Federação Nacional das Empresas de Segurança e Transporte de Valores). 2002. *Relatório Anual da Segurança Privada no Brasil*. Brasília: FENAVIST.

Fernandes, Rubem César. 1998. 'Small Arms and Light Weapons Proliferation: Latin America, Rio de Janeiro, Brazil'. In Salpy Eskidjian ed. *Small Arms, Big Impact: A Challenge for the Churches. A Report of the Consultation on Microdisarmament organized by the World Council of Churches Programme to Overcome Violence*. Geneva: World Council of Churches, pp. 25–45.

Folha de São Paulo. 2004. 'Terreno Minado', *Folha de São Paulo* Web edition. 24 April. Available at Força Aérea Brasileira, Centro de Comunicação Social da Aeronáutica, Divisão Jornalismo, Noticiário da Imprensa da Aeronáutica (NOTIMP), Notimp Eletrônico, No. 115. <http://www.fab.mil.br/publicacao/enotimp/enotimp115.htm>

Gosman, Eleonora. 2003. 'Cómo llegan a los narcos de Río las armas argentinas, *Clarín*. 6 July. <http://www.clarin.com/diario/2003/07/06/i-02815.htm>

Grupo de Estudos de Defesa e Segurança Internacional (GEDES). 2004. *Observatório Cone Sul de Defesa e Forças Armadas: Informe Brasil No. 120*. São Paulo: Universidade Estadual Paulista, Campus Franca.

Iootty Dias, Carolina. 2004. *Mercosur: Armonizando las Leyes para Prevenir la Transferencia Ilícita de Armas de Fuego*, Rio de Janeiro: Viva Rio.

Irion, Adriana. 2005. 'Munição do RS Abastecia Crime no Nordeste: Polícia Federal Apreendeu Cerca de 2 Milhões de Cartuchos em Empresa na Cidade Gaúcha de Estação'. *Zero Hora*. Available at Polícia Federal, Divisão de Comunicação Social <http://www.dpf.gov.br/DCS/clipping/2005/Fevereiro/24-02-2005REG.htm#Munição%20do%20RS%20abastecia%20crime%20no%20Nordeste>

ISER (Instituto de Estudos da Religião). 2005. 'Research Project: Brazil and the Small Arms Factor'. Unpublished research findings.

Jornal de Brasília. 2004. 'Aeronáutica Apura Desvio de Armamentos'. *Jornal de Brasília*. 24 April. Available at Força Aérea Brasileira, Centro de Comunicação Social da Aeronáutica, Divisão Jornalismo, Noticiário da Imprensa da Aeronáutica (NOTIMP), Notimp Eletrônico, No. 115. <http://www.fab.mil.br/publicacao/enotimp/enotimp115.htm>

Lessing, Benjamin. 2005. 'Demanda por Armas de Fogo no Rio de Janeiro.' In Rubem César Fernandes (coordinator). *Brasil: As Armas e as Vítimas*, Rio de Janeiro: 7 Letras, ISER, pp. 268–92. <http://www.desarme.org/publique/media/vitimas_armas_demanda_RJ.pdf>

Lyman, Michael D. and Gary W. Potter. 1997. *Organized Crim*e. Upper Saddle River: Perentice Hall

McDermott, Jeremy. 2004. 'Colombia Struggles to Counter Arms Smuggling'. *Jane´s Intelligence Review*. 1 December.

Ministério da Defesa. 1995–2002. Anuário Estatístico do Exército Brasileiro (ANEEX), Brasília: Exército Brasileiro. Issues from 1995 to 2002.

—. 1999. Portaria No. 036-DMB de 09 de dezembro de 1999. Aprova as normas que regulam o comércio de armas e munições, Brasília, Exército Brasileiro, Departamento de Material Bélico, Dir G de MB/1952.

—. 2000. Portaria No. 024-DMB de 25 de Outubro de 2000, Aprova as Normas que Regulam as Atividades dos Colecionadores de Armas, Munição ,Armamento Pesado e Viaturas Militares, Brasília, Exército Brasileiro, Departamento de Material Bélico, Dir G de MB/1952.

—. 2001a. Portaria No. 004-D Log de 08 de Março de 2001, Aprova as Normas que Regulam as Atividades dos Atiradores, Brasília, Exército Brasileiro, Departamento Logístico.

—.2001b. Portaria No. 005-D Log de 08 de Março de 2001, Aprova as Normas que Regulam as Atividades dos Caçadores, Brasília, Exército Brasileiro, Departamento Logístico.

—. 2004. Portaria N°16-D Log, de 28 de Dezembro de 2004, Aprova Norma Reguladora da Marcação de Embalagens e Cartuchos de Munição, Brasília, Comando do Exército, Departamento Logístico.

—. 2005. Portaria Normativa No. 40-MD, de 17 de Janeiro de 2005, Define a quantidade de munição e os acessórios que cada proprietário de arma de fogo poderá adquirir, Brasília, Gabinete do Ministro

Ministério da Saúde (Ministry of Health, Brazil). 2005. *Impacto da Campanha do Desarmamento no Índice Nacional de Mortalidade por Arma de Fogo.* Brasilia: Secretaria de Vigilância em Saúde.

Ministério do Exército. 1980. Portaria Ministerial N.1261, de 17 de outubro de 1980 Normas que regulam a compra e venda de armas e munições por pessoas físicas e jurídicas, Brasília, Ministro do Estado do Exército.

—. 1998. Portaria No. 025 DMB, de 22 de Dezembro de 1998, Aprova as Normas para a Aquisição e Utilização das Armas e Munições de Calibres Restritos ou Proibidos, Brasília, Departamento de Material Bélico (Dir G de MB/1952)

Naylor, R. T. 2002. *Wages of Crime: Black Markets, Illegal Finance and the Underworld Economy*. Montreal: McGill-Queen´s University Press.

O Globo. 2004. 'Crime Organizado: Mistério das Dranadas está No Ar'. 24 April. Available at Força Aérea Brasileira, Centro de Comunicação Social da Aeronáutica, Divisão Jornalismo, Noticiário da Imprensa da Aeronáutica (NOTIMP), Notimp Eletrônico, No. 115. <http://www.fab.mil.br/publicacao/enotimp/enotimp115.htm>

O Globo.com .2005. 'Policia Bandida'. Fantástico, sua revista eletrônica. 31 July. <http://fantastico.globo.com/Jornalismo/Fantastico/0,,AA1005448-4005-0-0-31072005,00.html>

Phebo, Luciana. 2005. 'Impacto da Arma de Fogo na Saúde da População do Brasil'. In Rubem César Fernandes (coordinator). *Brasil: As Armas e as Vítimas*. Rio de Janeiro: 7 Letras and ISER, pp. 9–36. <http://www.desarme.org/publique/media/vitimas_armas_impacto_saude.pdf>

Pinheiro, João and Marco Antônio Martins. 2004. 'Pente-fino nos Quartéis'. *Jornal do Brasil.* Web edition. 24 April. Available at Força Aérea Brasileira, Centro de Comunicação Social da Aeronáutica, Divisão Jornalismo, Noticiário da Imprensa da Aeronáutica (NOTIMP), Notimp Eletrônico, No. 115. <http://www.fab.mil.br/publicacao/enotimp/enotimp115.htm>

Presidência da República do Brasil. 2000. Decreto No. 3665 de 20 de Novembro de 2000. Dá nova redação ao Regulamento para a Fiscalização de Produtos Controlados (R-105), Brasília, Casa Civil, Subchefia para Assuntos Jurídicos. <https://www.presidencia.gov.br/ccivil_03/decreto/D3665.htm>

—. 2003. Lei No. 10826 de 22 de Dezembro de 2003. Dispõe sobre registro, posse e comercialização de armas de fogo e munição, sobre o Sistema Nacional de Armas-Sinarm, define crimes e dá outras providências, Brasília, Casa Civil, Subchefia para Assuntos Jurídicos. <https://www.presidencia.gov.br/ccivil_03/Leis/2003/L10.826.htm>

—. 2004. Decreto 5123, de 1 de Julho de 2004. Regulamenta a Lei no. 10826, de 22 de dezembro de 2003, que dispõe sobre registro, posse e comercialização de armas de fogo e munição, sobre o Sistema Nacional de Armas-Sinarm e define crimes, Brasília, Casa Civil, Subchefia de Assuntos Jurídicos. <https://www.presidencia.gov.br/ccivil_03/_Ato2004-2006/2004/Decreto/D5123.htm>

Presidencia de la República del Paraguay. 2004. Decreto No. 3625 del 28 Oct/04-Reglamento de la Ley 1910/02. Por el cual se reglamenta la Ley N° 1910/02 de fecha 19 de junio de 2002 'De Armas de Fuego Municiones y Explosivos'. Asunción, Ministerio de Defensa.

Rivero, Patricia. 2005. 'O Mercado Ilegal de Armas de Fogo na Cidade de Rio do Janeiro: Preços e simbologia das armas de fogo no crime'. In Rubem César Fernandes (coordinator). *Brasil: As Armas e as Vítimas*. Rio de Janeiro: 7 Letras and ISER, pp. 197–267. <http://www.desarme.org/publique/cgi/cgilua.exe/sys/start.htm?sid=4&infoid=4647>

Secretaria de Segurança Pública. 2005. 'Operação Navalha na Carne: Navalha na Carne Prende Policiais que Vendiam Munição para Traficantes'. Secretaria de Segurança Publica. 20 July. <http://www.ssp.rj.gov.br>

Small Arms Survey. 2001. *Small Arms Survey 2001: Profiling the Problem.* Oxford: Oxford University Press.

—. 2005. *Small Arms Survey 2005: Weapons at War*. Oxford: Oxford University Press.

Stefanini, Roberto. 2005. *Mafie o Criminalitá Disorganizzata? I Fenomei Criminali di Rio de Janeiro e le Politiche Pubbliche di Contrasto. Uma Comparazione con il Caso Italiano di Lotta Alla Máfia* Tesi di master in Relazioni Internazionali Europa: America Latina, Università di Bologna: Sede di Buenos Aires. October.

United States Department of State. 2000. *US Comprehensive Initiative on trafficking in Small Arms and Light Weapons*. Washington, DC: International Information Programs. <http://usinfo.state.gov/is/Archive_Index/U.S._Comprehensive_Initiative.html>

Viva Rio/ISER (Instituto de Estudos da Religião). 2003. *Estadísticas Sobre Armas Argentinas de Uso Exclusivo de la Fuerza Pública Incautadas en Río de Janeiro hasta Diciembre de 2001 y Octubre de 2002 en el Caso Específico de las Granadas de Mano*. Rio de Janeiro: Viva Rio, Projecto Control de Armas de Fuego. <http://www.desarme.org/publique/media/datos.pdf>

Werneck, Antonio. 2002. 'Balas Ligam Todos os Atentados: Cápsulas Apreendidas na Prefeitura São do Mesmo Tipo Usado em Ataques à Policia'. *O Globo*. 26 June.

—. 2003. 'Argentina Sabia de Desvio de Armas', *O Globo*. 28 May.

Iraqi Shiite militia loyal to the radical cleric Moqtada al-Sadr fill ammunition belts in between skirmishes in August 2004 in Najaf, Iraq. © Ghaith Abdul-Ahad/Getty Images

5

Sustaining the Conflict: Ammunition for Attack

Stéphanie Pézard

Introduction

A regular supply of large quantities of ammunition is crucial in theatres of conflict. Ammunition is a good that cannot be used twice and it therefore needs to be resupplied constantly, unlike weapons which can be used reliably for many years before needing to be replaced.[1] An illustration of this disparity in life expectancies is that two of the *mortars* used in Liberia in 2003 by Liberians United for Reconciliation and Democracy (LURD) dated from 1973 while, in the shelling of Monrovia, Liberia, in the same year, the *mortar rounds* used by LURD were new and had been recently supplied (Human Rights Watch, 2003b, p. 18).

This chapter examines how ammunition reaches theatres of conflict, how it influences combat, and what happens to it when the fighting is over. It focuses mainly on civil conflicts and non-state armed groups, for which patterns of ammunition procurement and use are often not well documented. This study also examines the overall demand for ammunition in times of conflict, in terms of the quantity and the types of rounds that are most sought after by combatants. Patterns of ammunition use during conflict provide a better understanding of issues related to control and command and other structures inside armed groups through, for example, restrictions—or their absence—on the use of ammunition or 'shooting discipline'.

The aftermath of conflict also poses huge challenges to communities whose safety remains endangered by leftover stocks of ammunition and unexploded ordnance.

The main findings of this chapter are:

- Ammunition stockpiles are quickly exhausted during the early violent exchanges in a conflict, making constant resupply necessary. A shortage of the desired type of ammunition can, in some cases, make existing stocks of weapons unusable.
- The lack of security at existing ammunition stockpiles can fuel conflicts. Leakages are a source of procurement for armed groups and, when they occur far from a conflict zone, they are exploited by arms dealers who ship ammunition to conflict zones.
- Shortages of ammunition during a conflict are likely to impose a 'shooting discipline' on armed groups while plentiful supplies make restraint less likely and can result in abuses and violations of human rights.
- Ammunition flows in violation of embargoes or other restrictions could be tracked through their supply chain to identify nodes of diversion into the illicit sphere. There are no international standards or required norms, however, on measures such as ammunition marking, record keeping, or cooperation between states in tracing illicit ammunition.
- Failure to properly collect and destroy ammunition along with weapons increases the risk that a conflict will reignite and also contributes to potential health hazards associated with abandoned explosives.

Bringing ammunition to conflict zones

Demand

The amount of ammunition that is required on a battlefield is dependent on a number of factors. In small insurgencies that can rely on few vehicles or porters for logistic support (or that have no encampment or storage area nearby) the weight of the ammunition is an issue.

As an illustration, combatants in Mali in the early 1990s usually carried 300 rounds each if they had a machine gun, 150 rounds each if they had an assault rifle (corresponding to five or six magazines), and a maximum of two antitank rounds.[2] Similar figures were given by Burundian combatants from the Conseil National pour la Défense de la Démocratie—Forces pour la Défense de la Démocratie (CNDD–FDD), who carried three or four magazines of 30 rounds (usually for AK-47s).[3]

Other factors that can determine the amount of ammunition carried by combatants include:

- The amount of weapons owned by the group: if only small stocks are available, ammunition will be distributed to combatants more carefully in order to stretch supplies and ensure that those killed in combat do not provide large quantities of material to the enemy.
- The nature of the terrain: if it is difficult (e.g. hilly or wooded) combatants defending a position will usually need less ammunition than the attackers.
- The strategic position: in the case of ambushes, defenders generally need much more ammunition than attackers because it takes them some time to identify the exact location of the enemy and they will often 'spray' bullets for protection and lack of better option.[4]
- The shooters' skills and level of training: the UN Group of Experts on the Problem of Ammunition and Explosives noted in 1999 that '[a] general lack of training leading to poor accuracy and lack of fire discipline is characteristic of inexperienced combatants involved in many of the conflicts being fought around the world' (UNGA, 1999, sec. 48, p. 9). The less skilled a shooter is, the more likely he is to 'spray' at the target and waste large amounts of ammunition, depleting the group's stockpiles. Moreover, a group with limited ammunition may, in turn, be more reluctant to use it for training to improve combatants' shooting skills.

The use of ammunition for training depends on the wealth of the group or state involved and on the number of cartridges at its disposal. Until recently, the Chad Army, for instance, could only provide its soldiers with eight bullets each for basic training. For comparison, in an average US marine infantry battalion the carrier of an M249 Squad Automatic Weapon (SAW) light machine gun routinely uses up to 950 rounds per year for training purposes (Cargile, 2001, p. 27). The training ammunition capacity in Chad, however, rose to more than 700 bullets per soldier for those who benefited from a six-week joint training exercise in counter-terrorist tactics with the US Marines, a programme funded by US military aid (McLaughlin, 2004). Many non-state armed groups as well as troops from poorer countries, on the other hand, undergo virtually no training, in part because of the need to save the limited supplies of ammunition for combat.

The type of military operation undertaken can also be an important factor in the amount of ammunition needed by an armed group. Small-scale operations such as ambushes require fewer rounds of ammunition than assaults on enemy positions. In the latter case, weapons with rapid rates of fire such as machine guns are needed to cover the position of assailants. When it comes to large-scale operations, even wealthy states can encounter difficulties regarding ammunition supply. Faced with two simultaneous conflict theatres—Afghanistan and Iraq—as well as an increased training requirement, the United States found its production capacity stretched to the limit. Between 2000 and 2005, US Army requirements for small calibre ammunition increased from about 730 million rounds per year to nearly 1.8 billion rounds (US GAO, 2005, p. 9),[5] while medium calibre ammunition requirements increased from 11.7 million rounds to more than 21 million (US GAO, 2005, p. 10).[6] In spite of additional investment in the ammunition manufacturing industry by the US Department of Defense (close to USD 100 million was devoted to modernization efforts between 2000 and 2005), the military production capacity still lags behind need (US GAO, 2005, p. 3). The only government-owned production facility for small-calibre ammunition, the Lake City Army Ammunition Plant in Missouri, has already increased production from 350 million rounds per year in 2000 to 1.2 billion rounds in 2005. Yet the US Army is still short by 300 million rounds per year of the quantity required to replenish stocks and set aside strategic reserves (Pappalardo, 2005). In fiscal year (FY) 2004, the US Army purchased ammunition from Israeli, South Korean, Swedish, and US commercial ammunition producers as well as 120 million rounds from the British war reserve stocks (US GAO, 2005, p. 12; Pappalardo, 2005).

Looking at conflicts worldwide, the type of small arms ammunition in greatest demand seems to be the 7.62 x 39 mm ('Soviet') round used in AK-47-type assault rifles, the many makes of which from various producing countries represent the weapon of choice in most current conflicts in Asia and Africa. In Uganda, for instance, all combatants—from the Lord's Resistance Army (LRA), Uganda People's Defence Forces (UPDF), and the police to local defence units or even civilians—commonly use AK-47s.[7] Ammunition for RPK [Ruchnoy Pulemyot Kalashnikova] light-machine guns is also in great demand. In general, larger calibre ammunition is the most sought after by non-state armed groups

A Nigerien soldier loads ammunition into clips during a training exercise in September 2004 in Samara, Niger. Through the Trans-Sahara Counter Terrorist Initiative, US Marines are training local forces in the region to fight Al Qaeda and other terrorist groups. © Jacob Silberberg/Getty Images

and the most difficult to get because it is relatively more expensive than small arms ammunition.[8] In Mali in the early 1990s Tuareg combatants sought to acquire mortar and anti-tank rounds but with little success—partly because even the Malian government was experiencing a shortage and the chances of recovering some on the battlefield or stealing some from government stockpiles were therefore quite low.[9]

The availability of ammunition can also have an impact on a group's choice of weapons: in Papua New Guinea, NATO-standard (5.56 x 45 mm and 7.62 x 51 mm) calibre ammunition can easily be found locally, while other types of ammunition must be obtained from abroad and are difficult to import. Combatants therefore use mainly NATO-type ammunition and the corresponding weapons, in stark contrast to neighbouring Asian countries where Kalashnikov derivatives using 7.62 x 39 mm ammunition are most often used (Alpers, 2005, p. 75). There is strong anecdotal evidence to show that ammunition availability governs the types of weapons most often used—and in some cases leads to weapons being discarded even if they are in perfect working order. In Mindanao

(Philippines), 7.62 x 39 mm rounds were in short supply, leading Moro National Liberation Front (MNLF) combatants to gradually discard their AK-47s (Davis, 2003). In Burundi, armed groups fighting the government army were able to seize a number of Belgian FAL rifles, but these weapons proved useless because the corresponding ammunition was almost impossible to find. These were the rifles handed in first to authorities during the ensuing disarmament, demobilization, and reintegration (DDR) process.[10] In Kenya, researchers found that although G-3 rifles were more expensive than AK-47s, they were nonetheless preferred—partly because the ammunition was easier to find, possibly because it is the weapon commonly carried by the Kenyan security forces (Human Rights Watch, 2002, p. 11).

Supply

In 2003, the UN Panel of Experts on Somalia noted that '[s]ince large quantities of . . . weapons are already available throughout the country, most armed groups require steady access to ammunition rather than arms' (UNSC, 2003c, p. 17, para. 72). Ammunition is spent quickly during conflict and resupply is therefore a constant concern for combatants. For non-state armed groups that cannot rely on normal military procurement, sources of ammunition are very much the same as those for weapons: they include capture of material from enemy combatants, seizures and leakages from enemy or government stockpiles, transfers from supportive states, small-scale transfers (the so-called 'ant trade', e.g. from diasporas), and in-conflict trade (see Chapter 4). This means that ammunition can be obtained from global, regional, and local sources. In cases where the conflict situation does not seem serious enough to warrant restrictions on ammunition transfers, transfers may legally enter conflict zones. In other cases, ammunition comes from illicit sources and may reach its final destination by convoluted means.

Global transfers

In numerous cases the ammunition used in conflict theatres has come from distant places of production. The arms and ammunition industry is globalized and products are often resold and retransferred. The UN Group of Experts on Côte d'Ivoire, for instance, investigated in 2005 the case of Israeli 9 mm ammunition that had been manufactured in 2002 for the Netherlands military and ended up in Côte d'Ivoire in spite of the embargo (UNSC 2005, p. 24, para. 82). Another illustration of the convoluted routes that ammunition can take is the identification in 2002 by the Liberian government of 81 mm mortar rounds seized in a LURD stronghold, which turned out to have been produced in the United Arab Emirates (UAE). The UAE identified these rounds as part of a military assistance package they had sent to Guinea (Human Rights Watch, 2003b, p. 18). This identification was made possible by markings on some of the mortars that gave the country of origin (in this case the UAE). Other information is often needed to trace the route ammunition takes to its ultimate destination. Human Rights Watch, drawing on ammunition markings, cargo records, and eyewitness testimonies, determined that mortars used by LURD in attacks on Monrovia in 2003 had been sourced from Guinea, which imported them from Iran (Human Rights Watch, 2003b, p. 15). A similar attempt to trace the ammunition found in the Gatumba camp in Burundi after the massacre of more than 150 Congolese refugees in August 2004 was less successful. The cartridges retrieved from the site were of Bulgarian, Chinese, and Yugoslavian origin and their respective years of production were stamped on the casing but, in the absence of a lot number, it was not possible to determine where these cartridges had been exported from before ending up in Gatumba (Amnesty International et al., 2004, pp. 6–7; see Chapter 7).

Arms embargoes, which attempt to prevent the transfer of military material including ammunition to states where this would fuel conflict, are often circumvented. Recommendations to strengthen capacities to enforce embargoes include 'profiling brokers and transportation companies, improving the inspection of cargo at airports, and enhancing law enforcement and customs cooperation' (Centre for Humanitarian Dialogue, 2004, p. 52). The existence of loopholes in the monitoring of transportation activities (including forged end-user certificates) is not the only cause of illicit arms and ammunition transfers. Ammunition dealers also take advantage of lax controls on weapons stocks and offshore financing (Small Arms Survey, 2004, pp. 143–47). When international arms dealer Leonid Minin was arrested in Italy on 5 August 2000, the police found in his hotel room documents showing that he—together with a Russian air cargo company, Aviatrend—had brokered a deal to supply 113 tons (five million rounds) of 7.62 mm ammunition to the former Côte d'Ivoire ruler General Robert Gueï. The ammunition went from Ukraine to Côte d'Ivoire with an end-user certificate signed by Gueï, before departing again for Monrovia, where it ended up in the hands of the Revolutionary United Front (RUF) (Traynor, 2001; UNSC, 2001, pp. 46–49). Earlier in 1999, Burkina Faso had re-exported to Liberia, in spite of the end-user certificate it had signed, the bulk of a shipment of 68 tons of Ukrainian weapons including '715 boxes of weapons and cartridges, and 408 boxes of cartridge powder' (UNSC, 2000, p. 35, paras. 203–07). Another example is a forged purchase order, which falsely identified the Panamanian National Police as purchaser, that was used in November 2001 to supply 2.5 million rounds of 7.62 mm ammunition and 3,000 AK-47s from Nicaragua to the Autodefensas Unidas de Colombia (AUC) in Colombia on the *Otterloo* freighter (OAS, 2003).

The efficiency of embargoes largely depends on the will of the international community to enforce them strictly. The embargo on Somalia, for instance, was established in 1992 but not monitored until 2002. In Côte d'Ivoire, the UN Group of Experts noted 'an improvement in UNOCI [United Nations Operation in Côte d'Ivoire] reporting and investigation of alleged sanctions violations since May [2005], although often there is no follow up by UNOCI' (UNSC, 2005, p. 24, para. 82). Another factor that reduces the impact of embargoes is the fact that combatants with the means to do so often rush to import weapons before an anticipated arms embargo comes into force. In the Rwandan case, the interim government appears to have engaged in intense purchasing of arms and ammunition in April 1994, shortly before an embargo was declared on 17 May (Human Rights Watch, 1999). Another example is the government of Côte d'Ivoire buying large quantities of arms and ammunition prior to the embargo established in November 2004 by UN Security Council Resolution 1572 (UNSC, 2005, p. 25, para. 85).

In the absence of arms embargoes, self-restraint on the part of the supplying countries can play an important role in averting potentially dangerous ammunition transfers. The 1998 European Union Code of Conduct on Arms Exports, which covers ammunition, politically binds member states to avoid exporting such material to countries that would use the proposed export aggressively against another country, where it could threaten regional security and stability, or where the material could be diverted (EU, 1998). Similarly, Australia and New Zealand, at one time the main suppliers of ammunition to Papua New Guinea, eventually became wary of fuelling conflict there and drastically limited their exports from 2002. Within two years of the introduction of these more restricted export licences, the price of ammunition had doubled in the Southern Highlands Province of Papua New Guinea (Alpers, 2005, pp. 78–79). Although lack of reporting on firearm-related incidents makes it hard to produce exact figures, this increase in prices coincided with a diminution of firearm-related injuries and deaths in the province, following a peak in the years 2000–01.[11]

Regional transfers

Ammunition transfers may originate from neighbouring countries wishing to tip the balance of forces in favour of their preferred side. In the Republic of Congo, for instance, Cobra forces supporting Denis Sassou-Nguesso against Pascal Lissouba received at least two major shipments of weaponry, including ammunition, from Angola and Gabon in September 1997 (Demetriou, Muggah, and Biddle, 2002, p. 13). The UN Security Council identified Burkina Faso, Liberia, and Niger as supply lines for arms and ammunition to the RUF in Sierra Leone (UNSC, 2000, p. 34, para. 195). Because of the importance of such regional transfers, international scrutiny must target not only the country at war, but also its neighbours.[12] In a recent report, Amnesty International observes that in 2003 four flights loaded with ammunition went from Tirana, Albania, to Kigali, Rwanda. The cargo included 3,590,000 rounds of 7.62 mm ('Soviet') ammunition commonly used in AK-47s and 85,000 rounds of 9 mm ammunition, which can be used in pistols or sub-machine guns (Amnesty International, 2005). Considering that Rwanda has been supporting armed groups in eastern Democratic Republic of the Congo (DRC)—notably the RCD [Rassemblement congolais pour la démocratie]-Goma and the Union of Congolese Patriots (Union des patriotes congolais, UPC)—and provided them with weapons and ammunition in 2003, it is possible that a sizeable part of this shipment may have fuelled violence in the Great Lakes region (UNSC, 2004b, p. 13–14, para. 29; Amnesty International, 2005). The United Nations Mission in the Democratic Republic of the Congo (MONUC) also found that arms and ammunition manufactured at the Nakasongola factory in Uganda had been delivered to a Congolese armed group in the Ituri district of DRC (Amnesty International, 2005). Uganda is known to have provided arms and training to most armed groups in this area (UNSC, 2004b, p. 12–13, para. 27).

In other words, when legally binding arms embargoes are put in place, they are often circumvented by neighbouring states supporting one side of the conflict. In the case of Somalia—under UN arms embargo since 1992—the UN Security Council in 2003 noted 'with serious concern the continued flow of weapons and ammunition supplies to Somalia, as well as allegations of the role of some of the neighbouring states in breach of the arms embargo' (UNSC, 2003a). In 2003, Liberia—then under UN arms embargo pursuant to Security Council Resolution 1343 (2001)—was another instance where arms were transferred to conflict parties and where 'weekly sanctions-busting flights of ammunition were arriving in Monrovia' (Vines, 2003, p. 256). The transfer from Iran to Guinea of ammunition that ended up in the hands of LURD and was used to shell Monrovia (mentioned above) is another case in point (Human Rights Watch, 2003b, p. 15).

Other common sources of supply are regional black markets. The usefulness of these markets to local armed groups depends on several factors, among them the number of active conflicts in the region and the choice of ammunition calibres made by other countries in the area. Arms and ammunition are available on these markets when neighbouring conflicts in the region come to an end, freeing up large quantities of military material for purchase. This was the case, for instance, in South and Central America in the mid-1990s, when the ammunition from several conflicts that had petered out ended up in the hands of the Fuerzas Armadas Revolucionarias de Colombia (FARC) in Colombia.[13] The ammunition calibres used by other countries is also an important issue: the end of the conflict in Peru provided FARC with large amounts of the 7.62 mm Soviet calibre ammunition for use in their AK-47 rifles. In recent years, however, the amount of available 7.62 mm rounds has declined in the region,[14] compelling FARC to buy it at relatively high prices on the black market or clash violently with the paramilitaries who still use that particular type of ammunition (Fundación Ideas Para la Paz, 2005). Venezuela's recent official switch from Belgian FALs and their NATO ammunition to AK-type Russian assault rifles is therefore worrying because it is likely to bring a fresh supply of 7.62 mm rounds to the region.[15]

Local transfers

Groups lacking support from external states usually rely heavily on procurement from local sources (Capie, 2004, p. 5). Capture from the enemy was the main source for arms and ammunition cited by former members of Malian armed groups, closely followed by small-scale purchases in neighbouring countries such as Mauritania.[16] Leakages from corrupt officials and local craft production must be added to this list.

The issue of ammunition stockpile security is important for countries at peace, and even more crucial for countries at war. Poor security at military storage facilities was responsible for the looting of weapons and ammunition during the coup in Fiji in May 2000 (Capie, 2003, p. 106). Similar incidents were also commonplace during the war in the Republic of Congo when, between 1993 and 1999, three different rebel groups or militias (the Ninjas, the Cobras, and the Cocoyes) repeatedly pillaged police and military arsenals (Demetriou, Muggah, and Biddle, 2002, pp. 10–11). Leakages from police and defence stockpiles represent another source of ammunition procurement (Capie, 2004, p. 5). In Papua New Guinea, most of the ammunition that ended up in the hands of Karints combatants came from these sources (Alpers, 2005, p. 76), and, in Cambodia, Khmer Rouge combatants could purchase ammunition from the government forces who were so badly paid that they resold their own supplies. Russian troops also exchanged ammunition for other goods in Chechnya (Gentleman, 2000). This problem is exacerbated by the fact that in many countries all security forces, including the regular police, carry assault rifles. This drives the proliferation of these weapons and their ammunition, increasing the chance of 'leakages' from local stockpiles (e.g. armouries in police stations). Armed groups who have state support may also have recourse to local sources. The Sudan Liberation Army (SLA) and Justice and Equality Movement (JEM), for instance, complemented the shipments they received from, among others, Chad, Eritrea, and Libya (UNSC, 2006, p. 25, para. 79) with a substantial amount of weapons and ammunition obtained from 'poorly guarded Sudanese Army garrisons and police posts' (UNSC, 2006, p. 26, para. 82).

A final local source of ammunition is craft production. The one advantage of manufacturing ammunition during a conflict is self-reliance. It is, however, a fairly marginal activity because it is time-consuming and requires raw materials (i.e. primers and explosives) that are difficult to produce and often no easier to import than a complete round of ammunition (see Chapter 2). The mortar rounds and hand grenades produced by FARC rural workshops in Colombia, however, demonstrate that during protracted conflicts a small ammunition production industry can be set up to supply the war (Dreyfus, forthcoming).

Use and misuse of ammunition during conflict

Stockpiling ammunition

Bringing ammunition to the theatre of conflict can be achieved in a number of ways, using means of transportation that range from donkeys crossing the Sahel,[17] to aircraft making intercontinental flights. In the case of illicit military transfers between Guinea and LURD in Liberia, some of the ammunition was carried by Liberian refugees who were forced by LURD to act as porters (Human Rights Watch, 2003b, p. 16). Some ammunition was also delivered by truck to the Guinean border, where it was transported on by LURD (Human Rights Watch, 2003b, p. 17). Ammunition can be easier to conceal than weapons because it can be divided into small quantities. In Iraq soldiers recently seized three trucks and four trailers transporting some 1,500 rounds of ammunition mixed with scrap metal that was to be destroyed (Task Force Liberty, 2005).

For rebel groups who, unlike their state counterparts, do not have proper arsenals, the issue of ammunition stockpiling can be problematic. Ammunition components are sensitive to moisture, heat, and dramatic temperature change. In adverse surroundings, such as the equatorial forest, they must be stored properly to keep them in working order. In Uganda the LRA stores the excess weapons and ammunition received from Sudan in large pits dug in northern Uganda and southern Sudan. Large storage pits, however, are, by their nature, immovable and cannot be used to resupply LRA battalions while they are on the move. For this latter purpose, smaller pits are dug for weapons and ammunition captured on the battlefield. These are guarded by local officers, and the material is covered in grease to prevent rusting and wrapped in plastic sheets for further protection.[18]

Caches can hold a considerable amount of ammunition at any one time. In Prijedor (Republika Srpska) in 2004, two arms caches were discovered in warehouses. The first contained 10 SA7 anti-aircraft missiles and the other held '37,200 rounds of 7.62 mm ammunition, 3,000 rounds of other ammunition, 12 mortar shells, 24 anti-tank rockets and an anti-aircraft gun' (BBC, 2004). Ammunition is usually stored with explosives. In northern Iraq, for instance, soldiers uncovered a weapons cache that contained '16 rocket propelled grenade rounds, one mortar round, one case of fuses, two bags of charges, one pound of C4 explosives, and a case of ammunition' (Task Force Freedom, 2005). Ammunition caches can be easier to detect than weapons caches because the smell of explosive materials can be detected by dogs that could be trained for this purpose (SEESAC, 2003b).

Ammunition caches can present a hazard to the population around the site. In May 2005 at least 28 people were killed and more than 70 injured when the ammunition that a local Afghan militia leader had stockpiled in the middle of a village, in a bunker near his house, exploded. The accident reportedly happened when some of the explosives were being moved (AP, 2005; IRIN, 2005). Such ammunition dumps, where the materiel is often old (and thus becoming volatile and potentially dangerous), are commonplace in Afghanistan in spite of the efforts undertaken by the UN and NATO to collect and destroy ammunition (IRIN, 2005). In Iraq, failure to properly secure ammunition caches has also resulted in civilian casualties (Human Rights Watch, 2003a).

Patterns of use in conflict

As argued above, ammunition shortages can be an issue for state and non-state actors alike, and can have many consequences. The first can be to put an end to the fighting as happened, for instance, in Liberia in late June 2003 when LURD ran out of ammunition and had to retreat (Human Rights Watch, 2003b, p. 2). This did not, however, lead to a de-escalation of the conflict because both parties used this respite to find more weapons and ammunition (in the case of LURD, from Guinea) and the fighting resumed with even more intensity (Human Rights Watch, 2003b, p. 2). A similar situation arose in Burundi during the civil war that raged there from 1993 to 2001. When faced with ammunition shortages, rebel groups retreated and avoided all contact with government forces until they could resupply. What little ammunition they had left was used to protect strategic positions.[19] Ammunition shortage can also lead to a change in combat strategy. Because one of the main sources of weapons and ammunition is seizure from enemy forces, such shortages can compel groups to launch risky attempts to obtain more ammunition from this source. Former combatants from Mali and Uganda responded to a lack of ammunition by launching small-scale attacks, such as ambushes, against government forces in order to gain materiel (Small Arms Survey and CECORE, 2004; Florquin and Pézard, 2005, p. 55). More generally, the significance of ammunition shortages depends on numerous factors. Ammunition shortage will be less of an issue if it is possible for insurgents to find safe havens in other states (e.g. because of a lack of control over borders or support from neighbouring states), if they have the support of large segments of the population, or if the state forces they oppose are not well trained and easily leak ammunition (through corrupt soldiers or poor security at storage facilities).

The existence or otherwise of good 'shooting discipline' in an armed group (i.e. being trained to open fire only in certain circumstances) often depends on the quality of command and control within the group, and whether there is a well-defined chain of authority. Research suggests that during the 1990–96

Weapons with a high rate of fire, such as machine guns, require a constant resupply of ammunition.

Tuareg insurgency in Mali, ammunition was scarce and the group enforced strict orders to avoid wastage of ammunition by combatants; for example, shooting in the air as a celebration was prohibited and severely punished (Florquin and Pézard, 2005, p. 56). Similarly, former Ugandan combatants in the Uganda National Rescue Front II (UNRF-II) reported that they were forbidden to use their ammunition to shoot at birds or animals (Small Arms Survey and CECORE, 2004). In Guinea in 2000 and 2001, child soldiers enrolled as 'young volunteers' in local militias by the Guinean military were given ammunition only when sent on a combat mission, and fired only under the orders and supervision of adults. In contrast, in Liberia and Sierra Leone child soldiers reported playing shooting games, which suggests that control on the use of ammunition within the group was much more lax (Wille, 2005, pp. 184, 205).

It is a reasonable assumption that shooting discipline would be enforced in groups where ammunition is scarce because of the need to ration its use, and in groups that seek long-term political gains (rather than short-term gains such as those derived from looting and banditry) because they have an incentive to control their firepower to avoid alienating the local population (Small Arms Survey, 2005, p. 196). This factor may explain former UNRF-II members' statements that they were forbidden to shoot in certain places such as markets and health centres, and in areas where large numbers of civilians were present.[20] The desire to gain international support or legitimacy for their cause may be another reason they would see value in exercising restraint.

Conversely, the magnitude of ammunition flows can be an indication of the severity of the fight to come. The UN Panel of Experts on Somalia estimated, for instance, that '[t]he potential for escalation is limited by a general reluctance to suffer casualties and by the cost of ammunition. . . . When a serious confrontation is anticipated, however, larger quantities of arms and, more importantly, ammunition enter the Mogadishu market' (UNSC, 2003c, p. 17, para. 71).

After the dust settles: post-conflict situations

Demobilization and disarmament

The purpose of DDR programmes is to reintegrate former combatants into civilian life and reduce insecurity. The removal of their weapons plays an important role in this process. Being the indispensable complement to any weapon, ammunition would be expected to be made part of such programmes. In the past, however, ammunition has been unevenly incorporated into DDR programmes (see the Annexe), ranging from a complete lack of concern for it (Mali) to cases where a certain number of ammunition rounds allowed former combatants to qualify for entry into the DDR programme (Liberia). Mali is an interesting case because it was 'the first country to deliberately adopt an integrated approach to development and security by linking weapons collection to the provision of development assistance, directly targeted at measures that would enhance community security' (Small Arms Survey, 2002, p. 288). Nonetheless, the 'flame of peace' that celebrated in 1996 the end of the Tuareg rebellion by publicly burning the weapons that had been used in the conflict (Poulton and Ag Youssouf, 1998, p. 120) was not accompanied by the destruction of ammunition. According to some former combatants, ammunition was kept and stockpiled by former combatants and civilians, and provided them with an incentive to obtain new weapons that could be used with their ammunition.[21]

More recent weapons collection programmes have tended to include ammunition. In Liberia, the United Nations Mission in Liberia (UNMIL) has collected and destroyed more than 5 million rounds of small arms ammunition, along with 20,000 weapons (UN News, 2004). By handing in 150 cartridges, an individual could qualify for entry into the DDR programme (Paes, 2005, p. 257). In the case of the arms collection programme undertaken by the Inter-African Mission to Monitor the Bangui Accords (MISAB) in the Central African Republic in 1997–98, the monetary reward offered for ammunition ranged from CFA francs 25 for a round of 5.56 mm, 7.5 mm, 7.62 mm, or 9 mm ammunition, to CFA francs 50 for a round of 12.7 mm or 14.4 mm ammunition, to CFA francs 500 for a grenade, and CFA francs 45,000 for a complete 81 mm mortar (Berman, forthcoming).[22] Within less than a year, MISAB had collected 430,271 rounds of small arms ammunition, mainly 7.5 mm French and 7.62 mm Soviet calibres (Berman, forthcoming). The DDR programme planned in Côte d'Ivoire is likely to include ammunition (UNSC, 2005, p. 7, para. 8).

In many cases, however, the status of ammunition is not clearly defined. In Sierra Leone in 2001, for instance, members of the Civil Defence Forces (CDF) who were in the process of being disarmed argued unsuccessfully that hand grenades, rocket-propelled grenades, and mines should qualify as weapons that attract financial benefits when they are handed in (Thusi and Meek, 2003, p. 29). In spite of these difficulties, the National Committee for Disarmament, Demobilization and Reintegration (NCDDR) succeeded in collecting 1.2 million rounds of ammunition during the four years of the programme (Thusi and Meek, 2003, p. 25). The sheer amount of ammunition in circulation in some cases may be quite discouraging with regard to collection and destruction efforts. In Afghanistan, the first phase of the DDR programme undertaken by the government with the help of the UN allowed for the collection of 1.7 million munitions of all types,[23] although there is still an estimated minimum of 30,000 tons of munitions in the country (AFP, 2005a).

Arms and ammunition reduction programmes

In addition to DDR programmes, some post-conflict recovery efforts have been targeted at civilians in order to ensure a weapons-free and safer environment

Albanian President Rexhep Meidani helps children collect bullets in the northern village of Blinisht, 85 km from Tirana. Some 50,000 cartridges and 22,000 bullets shot in 1997 were collected in this programme. © Reuters

for all communities. In many cases, the two types of programme (often called 'phase one' and 'phase two') complement each other. In Sierra Leone, for instance, a civilian disarmament programme (the Community Arms Collection and Destruction Programme, or CACD) which started in 2001 was seen as a complement to the ongoing DDR programme that had started three years before, because it covered other types of weapons (e.g. shotguns) and different categories of individuals (Thusi and Meek, 2003, pp. 29–30).

Civilian disarmament is not limited to post-conflict situations. A number of such programmes (usually gun buy-back programmes coupled with changes to legislation) have been implemented in so-called 'societies at peace' to reduce gun violence. Australia, Brazil (see Chapter 6), and the United Kingdom are examples of countries where such programmes have been implemented (Small Arms Survey, 2004, pp. 184, 188). Weapons collection in Albania is another such example. The civilian population looted an estimated 900 million to 1.6 billion cartridges from state arsenals in March 1997 (Van der Graaf and Faltas, 2001, p. 165; UNDP, 2004, p. 6) and 117 million rounds of ammunition were recovered between 1999 and 2004 (South East European Times, 2004).

Post-conflict weapons reduction programmes use a variety of means, including public awareness campaigns, changes to legislation (to facilitate legal registration of weapons and counter illicit ownership of arms), gun amnesties (to allow the collection of illicitly held weapons), regional border agreements (to limit illicit transfers), and implementation of practical schemes designed to convince people (either individuals or communities) to hand in their weapons and ammunition in exchange for money or other incentives (Small Arms Survey, 2005, p. 276). The success of these schemes depends on a proper identification of the factors driving the demand for arms and ammunition, and on ensuring that people's reasons for owning guns (lack of security, insufficient infrastructure, and mistrust in neighbouring communities or local authorities) are addressed. Because of the local specifics surrounding the factors determining demand, the design of such programmes must be tailored to the target community (Atwood, Glatz, and Muggah, 2006, p. 56).

As for DDR programmes, schemes to disarm civilians have not been consistent in their approach to ammunition (see the Annexe). In the 'Goods for Guns Programme', a voluntary weapons handover that took place in El Salvador between September 1996 and June 1999, grenades and mines were initially given an exchange value of USD 15. So many of them were handed in, however, that the exchange value had to be reduced to USD 3 in order for the programme to remain sustainable. No specific reward was provided for other types of ammunition (Laurance and Godnick, 2000, p. 19). The problems encountered during ammunition collection are usually the same as for weapons collection: the quality of the ammunition handed in is often poor (in Liberia there were cases where cartridge cases filled with sand were passed off as live ammunition), and there is a risk of fuelling demand by artificially raising the resale value of ammunition (Small Arms Survey, 2002, p. 306; Paes, 2005, p. 257). Such programmes may also appear to reward the individuals or communities who took up arms, while leaving behind those that did not (Centre for Humanitarian Dialogue, 2004, p. 30). One way to improve the implementation of such DDR programmes would be to link the amount of the payment or compensation made to the quality of the ammunition handed in, as is often already the case for weapons.[24]

Unexploded ordnance and ammunition destruction

The main purpose of ammunition collection is to ensure that it is removed from circulation. Considering the lack of stockpile security in many countries, destruction of the collected ammunition is the only way to ensure that this removal is final. However, the fact that ammunition contains explosive material makes it more difficult to collect and destroy than firearms. It must be subject to specific methods of destruction, which depend on the amount to be disposed of and its condition (UNDDA, 2001, pp. 25–49). When small quantities are concerned, ammunition can be burned or simply expended. More elaborate methods, however, must be employed for larger amounts (see Chapter 9).

Since ammunition is sometimes stored alongside high-power explosives, and has explosive qualities itself, it has to be carefully handled during its destruction process. In the case of Sierra Leone's disarmament programme, for instance, it was noted that although the United Nations Mission in Sierra Leone (UNAMSIL) and the NCDDR usually worked with NGOs to destroy the weapons that had been collected, '[i]n general UNAMSIL took responsibility for the destruction of ammunition and explosives, some of which were highly unstable when they were handed in' (Thusi and Meek, 2003, pp. 32–33.). In the Central African Republic, the first weapons destruction ceremony undertaken under the National Programme of Disarmament and Reintegration (Programme National de Désarmement et de Réinsertion, PNDR) on 15 June 2002 saw 714 weapons incinerated but, for security reasons, no ammunition was destroyed. This problem was solved by the time of the second ceremony, held one year later, during which '134,352 rounds of ammunition, 1,361 grenades, 27 mortar shells, 54 rockets and one anti-personnel mine' were destroyed along with 212 weapons (Berman, forthcoming). Disposing of ammunition safely is a complex task. In Takhar province (Afghanistan), two German soldiers from the International Security Assistance Force (ISAF) and six Afghan civilians were killed in June 2005 when ammunition accidentally exploded while being loaded on to a truck as part of a munitions collection programme (AFP, 2005b; see Chapter 9).

Considerable amounts of ammunition used in conflict theatres have never been collected or destroyed and remain where combatants abandoned them. The Pacific islands, for instance, are known to contain many remnants from the Second World War. US and Japanese ammunition can still be found in the Solomon Islands, particularly in Guadalcanal where major fighting took place and leftover ammunition was never destroyed (Capie, 2003, pp. 110–11). In particular, .50 calibre ammunition seems to have stood up better to time and adverse physical conditions than other types of ammunition commonly found in the area. The .50 rounds are used in the Solomon Islands with home-made weapons (Capie, 2003, p. 112). Other larger unexploded ammunition such as mortar rounds can be found in Papua New Guinea, presenting serious hazards to the local population, especially children, because of the risk of accidental detonation (Capie, 2003, p. 113; Alpers and Twyford, 2003, p. 25).

Conclusion and recommendations

The constant need for large quantities of ammunition in warfare suggests that regulating its supply could have a direct impact on the intensity of conflict and on the way ammunition is used or misused, in particular against civilians. The recommendations below are changes that, if implemented by the international community, could help verify this hypothesis and limit wartime abuses:

- Better monitor ammunition flows and improve scrutiny of end-user certificates for countries that border conflict zones or are known to support parties to a conflict;
- Mark ammunition more comprehensively to allow rounds used in embargoed countries, as well as in war crimes and other violations of international humanitarian law or human rights law, to be traced. This measure could also help to identify defence or police forces whose stockpiles are sources of ammunition leaked to conflict parties;
- Encourage better governance and reduce official corruption, as part of an endeavour to improve defence and police stockpile security;
- Make ammunition an integral part of all DDR programmes;
- Subject former theatres of conflict to extensive ammunition/unexploded ordnance (UXO) clean-up and destruction programmes, and systematically inform local populations in affected areas of the potential hazards represented by ammunition;
- Encourage exporting countries to show self-restraint in their transfers of ammunition to potentially unstable countries.

A Liberian girl prepares to hand over ammunition to the UN during a disarmament process in December 2003. For every 150 bullets, the UN paid USD 75. © Sven Torfinn/Panos Pictures

Annexe Post-conflict ammunition collection: a selection of initiatives

Barbara Gimelli Sulashvili and Stéphanie Pézard

Region	Country	Programme type	Duration	Implementing agency	Target group(s)	Were munitions specifically targeted?	Incentives offered for ammunition hand-in	Number of units of ammunition collected	Number of rounds destroyed
Africa	Niger[25]	Arms for development (AfD)	December 2001 to August 2004	UNDP	Civilians in the N'Guigmi district	Yes[26]	None; only communities who surrendered weapons could benefit from micro-projects	6 hand grenades 2 RPG rockets 20 rounds of 7.5 mm and 7.62 mm	All destroyed
	Liberia[27]	DDR[28]	7 December 2003 to 31 October 2004[29]	JIU, UNMIL, UNDP, other UN agencies and partners	Government of Liberia; LURD and MODEL	Yes	Entry into the DDR programme was conditional on the handing in of either • 2 grenades • 4 smoke grenades • 150 rounds of ammunition or • 1 rocket / mortar bomb of 60, 81, or 120 mm	6,486,136 rounds of small arms ammunition[30]	All destroyed or scheduled for destruction
	Republic of Congo[31]	DDR, arms collection	May 2000 to November 2002	IOM, UNDP, and Government of the Republic of Congo	Ex-combatants	No[32]	N / A[33]	Brazzaville, Cuvette, Plateaux, and Pool: 22,835 units of ammunition for small arms and light weapons[34] Niari, Bouenza, Lekoumou, and Kouilou: 4,714 units of ammunition for small arms and light weapons[35]	Some rounds have been destroyed using controlled explosions

	Sierra Leone[36]	DDR	October 1998 to January 2002	Government of Sierra Leone (NCDDR) and UNAMSIL	All combatants of the RUF, CDF, Sierra Leone army, and para-military groups	Yes	There is evidence that only weapons handover, but not ammunition turned in, counted in order for ex-combatants to become eligible for the DDR programme	1.2 million rounds	All of them
	Central African Republic (CAR)[37]	Voluntary Surrender	1997 to 2000	MISAB followed by MINURCA	Former mutineers and pro-government militias	Yes	Monetary incentives for turning in ammunition[38]	464,604 rounds of small arms ammunition, mainly 7.5 mm and 7.62 mm rounds	Some unserviceable ammunition was destroyed by MINURCA, but most of it was transferred to the CAR government
Asia-Pacific	Afghanistan[39]	ANBP: Ammunition Survey[40]	January 2005 to date	UNDP Afghanistan	AMF[41] and former members of armed groups	Yes[42]	None[43]	2.35 million rounds of unboxed ammunition 736,125 items of boxed ammunition[44]	All the loose and unsafe ammunition (equivalent to 5,000 tons) was destroyed[45]
	Solomon Islands[46]	Weapons collection: three periods of amnesty	October 2000 to August 2003[47]	RSIP, MEF, IFM, IPMT, PMC, PMC/NPC, RAMSI[48]	1st and 2nd amnesty: ex-combatants of the MEF and IFM 3rd amnesty (WFV): civilian communities	Yes	1st, 2nd, and 3rd amnesties: weapons amnesty[49] and general amnesty;[50] increased penalties for illegal weapons and ammunition possession after expiry of the 3rd amnesty period	To NPC (for the three amnesties): 17,267 rounds of mostly 5.56 mm and .22 calibres[51] To RAMSI (for the 3rd amnesty): over 300,000 rounds	RAMSI destroyed the 300,000 rounds of ammunition it collected

	Indonesia (Aceh)[52]	DDR	15 September 2005 to 31 December 2005[53]	GoI, GAM, monitored by AMM	Any illegal groups or parties, especially combatants from GAM	Yes	No specific incentives and no sanctions[54]	4,849 rounds of various calibres, including some RPG-7 grenades, 40 mm grenades, and home-made grenades[55]	All ammunition was destroyed immediately after collection
Europe	Georgia[56]	WED	End of 2001 to 2003	OSCE	Communities (civilians and ex-combattants)	Yes	Financial, administrative, and logistic support to community projects[57]	12,034 rounds of ammunition,[58] including shells, rockets, grenades, RPG missiles, and 66 anti-tank mines	All destroyed at the end of 2002 or in April 2004
	Bosnia-Herzegovina (Project Harvest)[59]	Voluntary surrender, search, and seizure	Operations regularly conducted throughout BiH since 1998	Armed forces, local police, and local authorities of BiH with the support of SFOR, replaced by EUFOR as of December 2004	Civilians	Yes	No reward, only amnesty from prosecution; SFOR once rewarded weapons handover with lottery tickets	1998 to 2001: More than 5,385,130 rounds of ammunition and 82,346 mortars, mortar rounds, hand and rifle grenades, and hand-made ordnance.[60] 2002 to February 2006: Over 9 million rounds <20mm; over 120,000 rounds 20–76 mm; almost 1,000 rounds >76 mm; over 125,000 hand grenades; over 15,000 mines[61]	All weapons and ammunition are destroyed by SFOR/EUFOR or BiH authorities if they have the facilities available

	Macedonia[62]	DD (Operation Essential Harvest)	27 August to 26 September 2001	NATO	Albanian insurgents from UCK	Yes	None	397,625 pieces of mines, explosives, and ammunition[63]	All of the collected ammunition was publicly destroyed
		Voluntary Surrender,[64] WEI	1 November to 15 December 2003	GoM[65]	Civilians	Yes	None[66]	100,219 rounds	All of the collected ammunition was destroyed [67]
	Serbia[68]	Voluntary surrender, search and seizure	25 March to 24 April 2003	GoS[69]	Civilians	No	None	2,005,459 rounds of ammunition	42,000 rounds of ammunition
Latin America and the Caribbean	El Salvador[70]	Voluntary weapons collection (Goods for Guns)	September 1996 to June 1999	MPCD (NGO founded by local businessmen)[71]	Individual civilians	Not initially, but this changed after the revision of the initial laws	No compensation for ammunition alone	129,696 rounds and 3,157 clips (equivalent to 94,710 rounds)[72]	All
	Guatemala[73]	Disarmament	3 March to 14 May 1997	URNG, monitored by MINUGUA	URNG combatants	Yes	Unlikely[74]	535,102 rounds of SAA ammunition (534,955 rounds of ammunition up to 12 mm, and 147 grenades)	The weapons and ammunition were turned in to the government authorities[75]

List of abbreviations

AfD	Arms for Development (Sierra Leone)
AMF	Afghan Military Forces
AMM	Aceh Monitoring Mission
ANBP	Afghanistan's New Beginnings Programme
AUC	Autodefensas Unidas de Colombia
BICC	Bonn International Center for Conversion
BiH	Bosnia and Herzegovina
CACD	Community Arms Collection and Destruction programme (Sierra Leone)
CAFF	Children associated with fighting forces
CAR	Central African Republic
CDF	Civil Defence Forces (Sierra Leone)
CNDD-FDD	Conseil National pour la Défense de la Démocratie/Forces pour la Défense de la Démocratie (Burundi)
DD	Disarmament and demobilization
DDR	Disarmament, demobilization, and reintegration
DIAG	Disbandment of illegal armed groups (Afghanistan)
DRC	Democratic Republic of the Congo
EUFOR	European Union Force in Bosnia and Herzegovina
FARC	Fuerzas Armadas Revolucionarias de Colombia
FROLINA	Front pour la Libération Nationale (Burundi)
FY	Fiscal Year
GAM	Gerakan Aceh Merdeka (Free Aceh Movement, Indonesia)
GoI	Government of Indonesia
GoM	Government of Macedonia
GoS	Government of Serbia
IANSA	International Action Network on Small Arms
IFM	Isatabu Freedom Movement (Solomon Islands)
IOM	International Organization for Migration
IPMT	International Peace Monitoring Team (Solomon Islands)
ISAF	International Security Assistance Force
JEM	Justice and Equality Movement (Sudan)
JIU	Joint implementation unit (Liberia)

Kaze-FDD	Kaze Forces pour la Défense de la Démocratie (Burundi)
KFOR	NATO Kosovo Force
Indumil	Industria Militar (Colombia)
LRA	Lord's Resistance Army (Uganda)
LURD	Liberians United for Reconciliation and Democracy
MEF	Malaita Eagle Force (Solomon Islands)
MINUGUA	United Nations Observer Mission in Guatemala
MINURCA	United Nations Mission in the Central African Republic
MISAB	Inter-African Mission to Monitor the Bangui Accords (Central African Republic)
MNLF	Moro National Liberation Front (Philippines)
MODEL	Movement for Democracy in Liberia
MONUC	United Nations Mission in the Democratic Republic of the Congo
MPCD	Movimiento Patriotico contra la Delinquencia (Patriotic Movement against Crime, El Salvador)
NATO	North Atlantic Treaty Organisation
NCDDR	National Committee for Disarmament, Demobilisation and Reintegration (Sierra Leone)
NGO	Non-governmental organization
NPC	National Peace Council (Solomon Islands)
OSCE	Organization for Security and Co-operation in Europe
PMC	Peace Monitoring Council (Solomon Islands)
PNDR	National Programme of Disarmament and Reintegration (Central African Republic)
RAMSI	Regional Assistance Mission to the Solomon Islands
RCD-Goma	Rassemblement congolais pour la démocratie
RPK	Ruchnoy Pulemyot Kalashnikova
RSIP	Royal Solomon Islands Police
RUF	Revolutionary United Front (Sierra Leone)
SAA	Small arms ammunition
SAW	Squad automatic weapon
SEESAC	South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons

SFOR	Stabilization Force (Bosnia and Herzegovina)
SLA	Sudan Liberation Army
UAE	United Arab Emirates
UCK	Ushtria Çlirimtare e Kosovës (National Liberation Army) (Kosovo)
UNAMSIL	United Nations Mission in Sierra Leone
UNDP	United Nations Development Programme
UNMIL	United Nations Mission in Liberia
UNOCI	United Nations Operation in Côte d'Ivoire
UNRF-II	Uganda National Rescue Front II
UPC	Union des patriotes congolais (DRC)
UPDF	Uganda People's Defence Forces
URNG	Unidad Revolucionaria Nacional Guatemalteca (Guatemalan National Revolutionary Unit)
UXO	Unexploded ordnance
WED	Weapons in exchange for development
WEI	Weapons in exchange for incentives
WFV	Weapon Free Villages campaign (Solomon Islands)

Endnotes

1 This is true for most small arms and light weapons, from assault rifles to mortars. For some weapons such as machine guns, however, the barrel needs to be replaced after heavy use because the rifling wears out.

2 Interview with Malian ex-combatants, Bamako, Mali, 2–3 September 2004.

3 Interview with Burundian ex-combatants, Bujumbura, Burundi, 1–2 February 2006.

4 Interview with Burundian ex-combatants, Bujumbura, Burundi, 1–2 February 2006.

5 Including 5.56 mm, 7.62 mm, 9 mm, and .50 calibres.

6 20 mm, 25 mm, 30 mm, and 40 mm calibres.

7 Interview by James Bevan, researcher at the Small Arms Survey, with former LRA fighters, Gulu, Northern Uganda, 18–27 May 2005.

8 Interview with Malian ex-combatants, Bamako, Mali, 2–3 September 2004.

9 Interview with Malian ex-combatants, Bamako, Mali, 2–3 September 2004.

10 Interview with Burundian ex-combatants, Bujumbura, Burundi, 1–2 February 2006.

11 Correspondence with Philip Alpers, gunpolicy.org, 12 August 2005.

12 This need has been underlined on numerous occasions at the international level. The increased use and proliferation of small arms was one of the three issues addressed by the UN Secretary-General in his 2004 report on 'ways to combat subregional and cross-border problems in West Africa' (UNSC, 2004a).

13 Correspondence with Jorge Restrepo, CERAC and Universidad Javeriana, 26 June 2005.

14 Correspondence with Pablo Dreyfus, Viva Rio, 15 June 2005. One reason for the lack of 7.62 mm rounds in Colombia is the fact that Indumil [Industria Militar] does not produce these types of rounds anymore (Fundación Ideas para la Paz, 2005).

15 Correspondence with Jorge Restrepo, CERAC (26 June and 20 August 2005), Pablo Dreyfus, Viva Rio (16 June and 18 August 2005), and Robert Muggah, Small Arms Survey (16 June 2005).

16 Interview with Malian ex-combatants, Bamako, Mali, 2–3 September 2004.

17 Interview with Malian ex-combatants, Bamako, Mali, 2–3 September 2004.

18 Interview by James Bevan, researcher at the Small Arms Survey, with former LRA fighters, Gulu, Northern Uganda, 18–27 May 2005.

19 Interview with Burundian ex-combatants from CNDD-FDD, Kaze-FDD, and Front pour la Libération Nationale (FROLINA), Bujumbura, Burundi, 1–2 February 2006.

20 Interview by James Bevan, researcher at the Small Arms Survey, with former LRA fighters, Gulu, Northern Uganda, 18–27 May 2005.

21 Interview with Malian ex-combatants, Bamako, Mali, 2–3 September 2004.

22 The equivalent of these amounts in 1997 USD is approximately 5 cents, 10 cents, USD 1, and USD 75, respectively.

23 UN figures as of 9 June 2005.

24 In the Central African Republic, for instance, different remunerations were offered between 1997 and 2002 depending on whether the weapons handed in were in good, fair, or poor condition. An assault rifle was therefore worth CFA francs 8,000 in good condition, CFA francs 5,000 in fair condition, and CFA francs 2,000 in poor condition (equivalent in 1997 USD to approximately USD 14, USD 9, and USD 3.5, respectively). The same differentiation did not exist, however, for ammunition (Berman, forthcoming).

25 Sources for the Niger case: UNDP, 2001; UNDP and Government of Niger, 2004; correspondence with Tankary Alou, UNDP-Niger, 20 December 2005.

26 Ammunition was, in principle, specifically targeted, but it was not included in the public awareness campaign that accompanied the collection of weapons.

27 Sources for the Liberia case: GoL, LURD, and MODEL, 2003; UNSC, 2003b; Nichols, 2005; UNDP Liberia, n.d.

28 Including weapons reduction, demobilization, and livelihood assistance.

29 The programme was suspended from 27 December 2003 to 15 April 2004.

30 An additional 3,513 rounds of heavy and small arms ammunition has been collected since the formal end of the disarmament period.

31 Sources for the Congo case: UNDP and IOM, 2000a, 2000b, 2000c, 2001; correspondence with Hervé Gonsolin, Principal Technical Counsellor, Arms for Development Project, UNDP Congo (Brazzaville), 15 February 2006.

32 Ammunition was mentioned in one instance, but was not a specific focal point of the programme. However, the project was formulated in such vague terms that ammunition could be part of the qualification for the DDR programme.

33 See note 32.

34 Broken down as follows: 507 full clips (equivalent to 15,210 rounds), 5,733 defensive grenades, 1,333 offensive grenades, 3 deafening grenades, 39 castor grenades, one 40 mm grenade, 9 anti-personal rockets, 6 anti-tank rockets, one 60 mm mortar shell, 500 rounds of miscellaneous ammunition.

35 Broken down as follows: 67 full clips (equivalent to 2,010 rounds), 9 defensive grenades, 6 offensive grenades, 15 anti-personal rockets, 2,674 rounds of miscellaneous ammunition.
36 Sources for the Sierra Leone case: GoSL and RUF, 1999; Ekundayo Rowe, 2003; Thokozani and Meek, 2003.
37 Source for the Central African case: Berman, forthcoming.
38 These monetary incentives went from USD 0.04 (CFA francs 25) for a 5.56 mm, 7.5 mm, 7.62 mm, or 9 mm round of ammunition to USD 1.60 (CFA francs 1,000) for a 81/82 mm or 120 mm shell.
39 Sources for the Afghanistan case: ANBP Web site; correspondence with Nikolay Vanchev, UNDP/ANBP/Ammunition Project, Afghanistan, 13 December 2005.
40 The ANBP is made up of three components: a DDR programme (targeting the regular army), a Disbandment of Illegal Armed Groups (DIAG) Programme, and an Ammunition Survey that covers the ammunition issue for both programmes. While the DDR programme was completed on 7 July 2005, the other two are ongoing. It is therefore too early to assess their final results.
41 Registered officers and soldiers.
42 For both the DDR and the DIAG programmes it is unclear whether the ammunition identified was mainly ammunition for small arms and light weapons or whether it was mixed with larger calibre ammunition.
43 Cooperative behaviour on the part of the target group could lead to a recommendation by ANBP that the region, city, or village be selected for development programmes implemented by UNDP, other UN agencies, as well as international and national NGOs.
44 This ammunition was found in 681 caches (survey as of 14 December 2005 of both the DDR and the DIAG programmes).
45 Destroyed as of 14 December 2005 by both the DDR and the DIAG programmes.
46 Sources for the Solomon Islands case: Townsville Peace Agreement, 2000; Muggah and Bevan, 2003; NPC, 2003; Nelson and Muggah, 2004; IANSA, 2005; correspondence with Bruce Edwards, Policy and Operations Advisor, NPC, 19 November 2005; intervention by M. Robert G. Aisi for the Pacific Islands Forum, UNGA 2006.
47 First weapons amnesty: October 2000 to July 2001; second weapons amnesty: April 2002 to May 2002; third weapons amnesty (Weapons Free Villages campaign): August 2002 to August 2003.
48 1st and 2nd amnesty: RSIP, MEF, IFM, monitored by IPMT and PMC; 3rd amnesty (WFV): PMC/NPC followed by RAMSI.
49 Related to theft and possession of arms and ammunition.
50 Related to criminal acts connected with armed violence over a defined time period.
51 Including 3,600 rounds for the first amnesty.
52 Sources on the Indonesia case: AMM, 2005; GoI and GAM, 2005; correspondence with Tarmo Kauppila, AMM, 25 November 2005; correspondence with Jüri Laas, AMM, 14 February 2006.
53 Expected date of completion.
54 However, non-compliance was pointed out as endangering the entire peace process (psychological pressure).
55 These figures are confirmed as of 14 February 2006, including the last phase of the programme.
56 Sources for the Georgia case: OSCE, 2002; correspondence with Lieutenant Colonel Zbigniew Fec, OSCE Mission in Georgia, 8 and 10 November 2005.

57 There was no set scale of rewards.

58 Rounds of ammunition ranged from 5.56 mm to 23 mm heavy machine gun and anti-aircraft ammunition. Most of it was 5.56 mm and 7.62 mm.

59 Sources for the Bosnia-Herzegovina case: SFOR, 2001; *SFOR Informer Online*, 2000, 2001; Dunphy, 2003; correspondence with Lieutenant Commander Jem Thomas, EUFOR spokesman, 7 November 2005 and 13 February 2006; correspondence with Adrian Wilkinson, Team Leader, SEESAC, 15 December 2005.

60 This estimation is based on the figures for the period from January 1999 to August 2001.

61 These figures include the ammunition collected by SFOR and EUFOR, but not those collected by BiH authorities.

62 Sources for the Macedonia case: NATO, 2001, 2002a, 2002b; Grillot, Paes, Risser, and Stoneman, 2004; correspondence from Hans Risser, UNDP, Belgrade, 8 November 2005; correspondence with Adrian Wilkinson, Team Leader, SEESAC, 15 December 2005; correspondence with Alain Lapon, UNDP/PCSS, Skopje, Macedonia, 15 December 2005.

63 Most of the ammunition collected seems to be small arms ammunition (statement by Brig. White-Spunner at the press briefing held at the NATO Press Centre in Skopje on 26 September 2001).

64 This programme followed the approval of the law on voluntary surrender and collection of firearms, ammunition, and explosive materials and for legalization of weapons in June 2003, as well as the revision of the legislation on the possession of firearms and ammunition.

65 The government of Macedonia was supported by UNDP and included observers from the OSCE and ICRC (International Committee of the Red Cross).

66 People were given a lottery ticket for every complete weapon surrendered; however, this did not include ammunition (including hand grenades) or explosives; lottery prizes included cars, computers, books, and scholarships.

67 Grillot, Paes, Risser, and Stoneman, 2004 also note that ‘The law on voluntary surrender and collection of firearms, ammunition, and explosive materials requires that all weapons surrendered be [. . .] destroyed no later than 90 days following the end of the amnesty period’ (p. 32).

68 Sources for the Serbia case: GoSM, 2003; SEESAC, 2003a, 2004; correspondence with Adrian Wilkinson, Team Leader, SEESAC, 15 December 2005.

69 The government of Serbia was supported by SEESAC and UNDP.

70 Source for El Salvador case: Laurance and Godnick, 2000.

71 This is an unusual case, because the initiative came from the local private sector, rather than the government or an international organization.

72 Calculation based on an average of 30 rounds per magazine.

73 Sources for the Guatemala case: GoG and UNRG, 1996; UNSC, 1996, 1997; Laurance and Godnick, 2000; BICC Web site, n.d.

74 For weapons handed over by the URNG to MINUGUA, incentives were an amnesty and a demobilization certificate. It is unlikely that there existed further incentives for ammunition.

75 It appears that ‘as no explicit provisions for the destruction of the weapons and ammunition were created, upon completion of the demobilization process, the weapons collected were turned over to the Guatemalan authorities’ (BICC Web site, n.d.).

Bibliography

AFP (Agence France Presse). 2005a. 'L'Afghanistan lance la phase de désarmement visant les milices illégales'. 11 June.

—. 2005b. 'Eight Die in Afghan Blast Accident'. Web edition. 26 June. <http://iafrica.com/news/specialreport/afghanistan/454870.htm>

Alpers, Philip. 2005. *Gun-running in Papua New Guinea: From Arrows to Assault Weapons in the Southern Highlands*. Small Arms Survey Special Report. Geneva: Small Arms Survey. June. <http://www.smallarmssurvey.org/Special%20Reports/SR%20PNG.pdf>

Alpers, Philip and Conor Twyford. 2003. *Small Arms in the Pacific.* Small Arms Survey Occasional Paper No. 8. Geneva: Small Arms Survey. March. <http://www.smallarmssurvey.org/OPs/OP08Pacifics.pdf>

AMM (Aceh Monitoring Mission). 2005. 'First Phase of Relocation and Decommissioning Completed'. Press release. 27 September. Accessed October 2005. <http://www.embassyofindonesia.org/beritaUTama/September/PRPhaseOnecompleted27092005.pdf>

Amnesty International. 2005. *Democratic Republic of Congo: Arming the East*. AFR 62/006/2005. 5 July. <http://web.amnesty.org/library/Index/ENGAFR620062005>

Amnesty International, IANSA (International Action Network on Small Arms), and Oxfam. 2004. *Tracking Lethal Tools*. Control Arms Campaign. December. ACT 30/022/2004. <http://web.amnesty.org/library/pdf/ACT300222004ENGLISH/$File/ACT3002204.pdf>

ANBP (Afghanistan's New Beginnings Programme) Web site. 2005. Accessed October 2005. <http://www.anbpafg.org/>

AP (Associated Press). 2005. 'Afghan Arms Dump Explosion Kills 28'. 2 May. <http://abcnews.go.com/International/wireStory?id=720802>

Atwood, David, Anne-Kathrin Glatz, and Robert Muggah. 2006. *Demanding Attention: Addressing the Dynamics of Small Arms Demand*. Small Arms Survey Occasional Paper No. 18. Geneva: Small Arms Survey. <http://www.smallarmssurvey.org/OPs/OP18%20Demand.pdf>

BBC (British Broadcasting Corporation). 2004. 'NATO force discovers arms caches in Bosnian Serb municipality'. 21 April.

Berman, Eric. Forthcoming. *Small Arms in the Central African Republic*. Geneva: Small Arms Survey.

BICC (Bonn International Center for Conversion) Web site. Stories: Guatemala. Accessed October 2005. <http://www.bicc.de/helpdesk/stories/guatemala.html>

Capie, David. 2003. *Under the Gun: The Small Arms Challenge in the Pacific*. Wellington: Victoria University Press.

—. 2004. 'Armed Groups, Weapons Availability and Misuse: An Overview of the Issues and Options for Action'. Background paper for a meeting organized by the Centre for Humanitarian Dialogue in advance of the Sixth Meeting of the Human Security Network, Bamako, Mali, 25 May. <http://www.armedgroups.org/images/stories/pdfs/capiebamakopaper061004.pdf>

Cargile, Cannon C. 2001. 'M249 SAW?' *Marine Corps Gazette*. April, pp. 26–28.

Centre for Humanitarian Dialogue. 2004. *Putting guns in their place: A resource pack for two years of action by humanitarian agencies*. October. Geneva: Centre for Humanitarian Dialogue. <http://www.hdcentre.org/datastore/PuttingGunsInTheirPlace.pdf>

Davis, Anthony. 2003. 'Philippine Security Threatened by Small Arms Proliferation'. *Jane's Intelligence Review*. 1 August.

Demetriou, Spyros, Robert Muggah, and Ian Biddle. 2002. *Small Arms Availability, Trade and Impacts in the Republic of Congo*. Special Report No. 2. Geneva: Small Arms Survey. April. <http://www.smallarmssurvey.org/SReports/SReport2.pdf>

Dreyfus, Pablo. Forthcoming. 'Political Economy of Illegal Arms Acquisition in Colombia'. In J. Restrepo et al. eds. *The Colombian Chimera: Assessing the Arms Trade and its Effects in Colombia*. Geneva: Small Arms Survey/DFAE

Dunphy, Christopher. 2003. 'Everyone is a Winner in this Raffle'. *SFOR Informer*. No. 164, 1 August. <http://www.nato.int/sfor/indexinf/164/p06a/t02p06a.htm>

Ekundayo Rowe, Sylvester. 2003. 'Sierra Leone: Pre-war and Post-war Security'. In *Disarmament in Conflict Prevention*. Occasional Paper. No. 7. United Nations Department for Disarmament Affairs. May.

EU (European Union). 1998. *European Union Code of Conduct on Arms Exports*. 8 June. <http://europa.eu.int/comm/external_relations/cfsp/sanctions/codeofconduct.pdf>

Florquin, Nicolas and Stéphanie Pézard. 2005. 'Insurgency, Disarmament and Insecurity in Northern Mali, 1990–2004'. In Eric Berman and Nicolas Florquin, eds. *Armed and Aimless: Armed Groups, Guns, and Human Security in the ECOWAS Region*. Geneva: Small Arms Survey. <http://www.smallarmssurvey.org/Books/A&A%20pdfs/Part%20I%2002%20Mali.pdf>

Fundación Ideas Para la Paz, 2005. 'Guayana Calibre 7.62'. *Siguiendo el conflicto: hechos y análisis de la semana*. No. 6. 22–31 March.

Gentleman, Amelia. 2000. 'Chechen village lives and dies with the enemy'. *Guardian*. <http://www.guardian.co.uk/chechnya/Story/0,2763,192580,00.html>

GoG (Government of Guatemala) and URNG (Unidad Revolucionaria Nacional Guatemalteca). 1996. 'Agreement on the Definitive Ceasefire between the Government of Guatemala and the Unidad Revolucionaria Nacional Guatemalteca (URNG)'. Oslo. 4 December. Annexe in UNSC (United Nations Security Council). 1996. S/1996/1045 of 17 December.

GoI (Government of Indonesia) and GAM (Free Aceh Movement). 2005. 'Memorandum of Understanding between the Government of the Republic of Indonesia and the Free Aceh Movement'. 15 August. Accessed October 2005. <http://www.thejakartapost.com/RI_GAM_MOU.pdf>

GoL (Government of Liberia), LURD (Liberians United for Reconciliation and Democracy) and MODEL (Movement for Democracy in Liberia). 2003. 'Comprehensive Peace Agreement between the Government of Liberia and the Liberians United for Reconciliation and Democracy (LURD) and the Movement for Democracy in Liberia (MODEL) and the Political Parties'. Accra, Ghana. 18 August. <http://www.usip.org/library/pa/liberia/liberia_08182003_cpa.html>

GoSL (Government of the Republic of Sierra Leone) and RUF (Revolutionary United Front). 1999. 'Lomé Peace Agreement between the Government of the Republic of Sierra Leone and the Revolutionary United Front of Sierra Leone'. Lomé, Togo. 7 July. <http://www.c-r.org/accord/s-leone/accord9/Lome.shtml>

GoSM (Government of Serbia and Montenegro). 2003. 'Report of Serbia and Montenegro on the Implementation of the UN Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All its Aspects'. Accessed October 2005. <http://disarmament2.un.org/cab/nationalreports/2003/SerbiaandMontenegro.pdf>

Grillot, Suzette, Wolf-Christian Paes, Hans Risser, and Shelly O. Stoneman. 2004. *A Fragile Peace: Guns and Security in Post-conflict Macedonia*. Special Report. Geneva: UNDP, SEESAC, BICC, Small Arms Survey. <http://www.smallarmssurvey.org/Special%20Reports/SR%20Macedonia.pdf>

Human Rights Watch. 1999. *Acknowledging Genocide*. <http://www.hrw.org/reports/1999/rwanda/Geno15-8-02.htm>

—. 2002. *Playing With Fire: Weapons Proliferation, Political Violence, and Human Rights in Kenya*. May. <http://www.hrw.org/reports/2002/kenya/Kenya0502.pdf>

—. 2003a. 'Iraq: Basra: Unprotected Munitions Injure Civilians'. Human Rights News. 6 May. <http://hrw.org/english/docs/0000/00/00/iraq6022.htm>

—. 2003b. *Weapons Sanctions, Military Supplies, and Human Suffering: Illegal Arms Flows to Liberia and the June-July 2003 Shelling of Monrovia*. Briefing Paper. 3 November. <http://hrw.org/backgrounder/arms/liberia/liberia_arms.pdf>

IANSA (International Action Network on Small Arms). 2005. *Examining Implementation of the UN Programme of Action*. London: IANSA <http://www.iansa.org/documents/2005/red-book/red-book-2005.pdf>

IRIN (United Nations Integrated Regional Information Network). 2005. 'Afghanistan: Investigation team reaches site of Baghlan ammunition explosion'. 4 May. <http://www.irinnews.org/report.asp?ReportID=46951&SelectRegion=Asia&SelectCountry=AFGHANISTAN>

KFOR (NATO Kosovo Force). 2003. 'UN-Sponsored Weapons Amnesty'. Press Release. #03-35. Pristina, 30 August. <http://www.nato.int/kfor/press/pr/pr/2003/08/06.htm>

Laurance, Edward J. and William H. Godnick. 2000. 'Weapons Collection in Central America: El Salvador and Guatemala'. Chapter contribution for the Bonn International Center for Conversion (BICC). January. <http://sand.miis.edu/research/2000/jan2000/bicc_elsgua.pdf>

McLaughlin, Abraham. 2004. 'US engages Africa in terror fight.' *Christian Science Monitor*. 17 September. <http://csmonitor.com/2004/0917/p06s01-woaf.html>

Muggah, Robert and James Bevan. 2003. 'Reconsidering Small Arms in the Solomon Islands'. Unpublished background paper. Geneva: Small Arms Survey.

NATO (North Atlantic Treaty Organisation). 2001. 'Transcript of the Press Conference held on 26 September 2001'. <http://www.afsouth.nato.int/nhqs/transcripts/transcripts_2001/september_01/t_press_26_sep_01_Lange.htm>.

—. 2002a. 'Operation Essential Harvest'. 16 December. <http://www.afsouth.nato.int/operations/skopje/harvest.htm>

—. 2002b. 'Task Force Harvest Background Information'. 16 December. <http://www.afsouth.nato.int/operations/skopje/harvest_BACKGROUND.htm>

Nelson, Carol and Robert Muggah. 2004. *Solomon Islands: Evaluating the Weapons Free Village Campaign*. Independent report commissioned by the Small Arms Survey. November.

Nichols, Ryan. 2005. 'Disarming Liberia: Progress and Pitfalls'. In Eric G. Berman and Nicolas Florquin, eds. *Armed and Aimless: Armed Groups, Guns, and Human Security in the ECOWAS Region*. Geneva: Small Arms Survey. <http://www.smallarmssurvey.org/Books/A&A%20pdfs/Part%20I%2004%20Liberia.pdf>

NPC (National Peace Council). 2003. *Weapons Database*. 31 July to 21 August 2003.

OAS (Organization of American States). 2003. *Report of the General Secretariat of the Organization of American States on the Diversion of Nicaraguan Arms to the United Defense Forces of Colombia*. 6 January. Permanent Council doc. 3687/03. <http://www.oas.org/OASpage/NI-COarmas/NI-COEnglish3687.htm>

OSCE (Organization for Security and Co-operation in Europe). 2002. *Annual Report*. Accessed October 2005. <http://www.osce.org/publications/osce/2004/10/10607_27_en.pdf>

Paes, Wolf-Christian, 2005. 'The Challenges of Disarmament, Demobilization and Reintegration in Liberia'. *International Peacekeeping*. Vol. 12, No. 2. Summer, pp. 253–61.

Pappalardo, Joe. 2005. 'Pentagon Taking Steps to Avert Ammunition Crisis'. *National Defense Magazine*. July. <http://www.nationaldefensemagazine.org/issues/2005/jul/pentagon_taking.htm>

Poulton, Robin-Edward and Ibrahim ag Youssouf. 1998. *A Peace of Timbuktu: Democratic Governance, Development and African Peacemaking*. Geneva: UNIDIR (United Nations Institute for Disarmament Research).

SEESAC (South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons). 2003a. 'Support to Republic of Serbia National Weapons Amnesty'. *Activity Report*, 14 April. <http://www.seesac.org/reports/ar001.htm>

—. 2003b. *SALW Ammunition Detection Study*. Belgrade. 30 September. <http://www.seesac.org/reports/SALW_Ammunition_Detection_Study.pdf>

—. 2004. *South Eastern Europe SALW Monitor*. Belgrade. Accessed October 2005. <http://www.seesac.org/target/Serbia.pdf>

SFOR (Stabilization Force in Bosnia and Herzegovina). 2001. Fact Sheet: Project Harvest. November. <http://www.nato.int/sfor/factsheet/opharv/t001116f.htm>

SFOR Informer Online. 2000. 'Project Harvest Ongoing and Ready to Reap'. 13 September. <http://www.nato.int/sfor/indexinf/96/harvongo/t000914e.htm>

—. 2001. 'Project Harvest 2000 Results'. 10 January. <http://www.nato.int/sfor/indexinf/104/s104p02b/t0101102b.htm>

Small Arms Survey. 2002. *Small Arms Survey 2002: Counting the Human Cost.* Oxford: Oxford University Press.

—. 2004. *Small Arms Survey 2004: Rights at Risk.* Oxford: Oxford University Press.

—. 2005. *Small Arms Survey 2005: Weapons at War.* Oxford: Oxford University Press.

Small Arms Survey and CECORE (Center for Conflict Resolution). 2004. 'Weapon Use by Former UNRF-II Combatants in Uganda'. Unpublished background paper. Geneva: Small Arms Survey. December.

Southeast European Times. 2004. 'Albanian Government Calls for Accelerated Weapons Collection'. 25 November [from *Albanian Daily News*, 24 November 2004]. <http://www.setimes.com/cocoon/setimes/xhtml/en_GB/document/setimes/newsbriefs/ 2004/11/24/nb-05>

Task Force Freedom, Multinational Force: Northwest Public Affairs Office. 2005. 'Multi-national Forces Seize Weapons Cache'. 14 May. <http://www.globalsecurity.org/military/library/news/2005/05/mil-050514-mnfi-mnci03.htm>

Task Force Liberty. 2005. 'Ammunition found in vehicles at traffic control point'. News Brief for 19 May. <http://www.42id.army.mil/drumbeat/TF%20Liberty%20News%20Briefs%2019%20May.doc>

Thokozani Thuzi, and Sarah Meek. 2003. 'Disarmament and Demobilization in Sierra Leone'. In Mark Malan et al. *Sierra Leone: Building the Road to Recovery*. ISS monograph No. 80. March. <http://www.iss.co.za/AF/Arms/102sl.html>

Townsville Peace Agreement. 2000. 'Townsville Peace Agreement between the Malaita Eagle Force and the Isatabu Freedom Movement, the Solomon Islands Government, the Malaita Provincial Government, and the Guadalcanal Provincial Government'. 15 October. <http://www.commerce.gov.sb/Gov/Peace_Agreement.htm>

Traynor, Ian. 2001. 'The International Dealers in Death'. *Guardian*. 9 July. <http://www.guardian.co.uk/international/story/0,3604,518691,00.html>

UNDDA (United Nations Department for Disarmament Affairs). 2001. *A Destruction Handbook: Small Arms, Light Weapons, Ammunition and Explosives*. New York: United Nations. <http://disarmament.un.org/ddapublications/desthbk.pdf>

UNDP (United Nations Development Programme). 2001. 'Projet pilote de collecte d'armes illicites et de développement dans l'arrondissement de N'Guigmi'. Project Document. Niamey, Niger: UNDP. August.

—. 2004. *Support to Security Sector Reform Programme (SSSR) 3rd Quarterly Report*. July–September. <http://www.salwc.undp.org.al/download/reports/qr/2004/3.pdf>

UNDP and Government of Niger. 2004. 'Situation générale des fiches techniques (outils) servant au PACD, élaborées par l'expert national en collecte et destruction d'armes illicites'. Project Document. Niamey, Niger: UNDP.

UNDP and IOM (International Organization for Migration). 2000a. 'Internal Report on the Project "Ex-Combatants Reintegration and Small Arms Collection in the Republic of Congo"'. May.

—. 2000b. 'Internal Report on the Project "Ex-Combatants Reintegration and Small Arms Collection in the Republic of Congo"'. June.

—. 2000c. 'Internal Report on the Project "Ex-Combatants Reintegration and Small Arms Collection in the Republic of Congo"'. December.

—. 2001. 'Internal Report on the Project "Ex-Combatants Reintegration and Small Arms Collection in the Republic of Congo"'. June.

— Liberia. n.d. 'UNDP Liberia Programmes: Disarmament, Demobilization, Rehabilitation and Reintegration (DDRR)'. <http://www.lr.undp.org/ddrr.htm>

UNGA (United Nations General Assembly). 1999. *Report of the Group of Experts on the Problem of Ammunition and Explosives*. A/54/155 of 29 June. <http://www.smallarmssurvey.org/source_documents/UN%20Documents/Other%20UN%20Documents/A_54_155.pdf>

—. 2006. Preparatory Committee for Review Conference on Small Arms Trade, United Nations General Assembly, DC/3005, 11 January. Accessed January 2006. <http://www.un.org/News/Press/docs/2006/dc3005.doc.htm>

UN News. 2004. 'Liberia: Former Top Aide to Taylor Surrenders Weapons to UN Peacekeepers'. 6 September. <http://www.globalsecurity.org/military/library/news/2004/09/mil-040906-unnews01.htm>

UNOCHA (United Nations Office for the Coordination of Humanitarian Affairs). 2005. 'Afghanistan: UN to Deal with Ammunition Stockpiles'. 4 January. Accessed October 2005. <http://www.irinnews.org/print.asp?ReportID=44901>

UNSC (United Nations Security Council). 1996. Central America: Efforts Towards Peace. S/1996/1045 of 17 December.

—. 1997. Resolution 1094 (1997). S/RES/1094 of 20 January.

—. 2000. *Report of the Panel of Experts appointed pursuant to Security Council resolution 1306 (2000), paragraph 19, in relation to Sierra Leone*. S/2000/1195 of 20 December.

—. 2001. *Report of the Panel of Experts pursuant to Security Council resolution 1343 (2001), paragraph 19, concerning Liberia*. S/2001/1015 of 26 October. <http://www.un.org/Docs/sc/committees/Liberia2/1015e.pdf>

—. 2003a. 'In presidential statement, Security Council condemns continued fighting in Somalia, and calls for end to violence'. Security Council Press Release SC/7686. 12 March. <http://www.un.org/News/Press/docs/2003/sc7686.doc.htm>
—. 2003b. Resolution 1509 (2003). S/RES/1509 of 19 September.
—. 2003c. *Report of the Panel of Experts on Somalia pursuant to Security Council resolution 1474 (2003)*. S/2003/1035 of 4 November.
—. 2004a. *Report of the Secretary General on ways to combat subregional and cross-border problems in West Africa*. S/2004/200 of 12 March.
—. 2004b. *Special Report on the Events in Ituri, January 2002–December 2003*. S/2004/573 of 16 July. <http://www.monuc.org/downloads/S_2004_573_2004_Engl.pdf>
—. 2005. *Report of the Group of Experts submitted pursuant to paragraph 7 of Security Council resolution 1584 (2005) concerning Côte d'Ivoire*. S/2005/699 of 7 November.
—. 2006. *Report of the Panel of Experts established pursuant to paragraph 3 of resolution 1591 (2005) concerning the Sudan*. S/2006/65 of 30 January.
US GAO (United States Government Accountability Office). 2005. *Defense Ammunition: DOD Meeting Small and Medium Calibre Ammunition Needs, but Additional Actions Are Necessary*. July. GAO-05-687. <http://www.gao.gov/new.items/d05687.pdf>
Van der Graaf, Henny J. and Sami Faltas. 2001. 'Weapons in Exchange for Development: An Innovative Approach to the Collection of Weapons in Albania'. In Sami Faltas and Joseph Di Chiaro III, eds. *Managing the Remnants of War*: *Micro-Disarmament as an Element of Peace-building*. BICC Disarmament and Conversion Studies No. 5. Baden-Baden: Nomos Verlagsgesellschaft, pp. 159–82.
Vines, Alex. 'Monitoring UN sanctions in Africa: the role of panels of experts'. In Vertic. 2003. *Verification Yearbook 2003*. London: Vertic, chapter 14. <http://www.vertic.org/assets/YB03/VY03_Vines.pdf>
Wille, Christina. 2005. 'Children associated with fighting forces (CAFF) and small arms in the Mano River Union (MRU)'. In Eric Berman and Nicolas Florquin, eds. 2005. *Armed and Aimless: Armed Groups, Guns, and Human Security in the ECOWAS Region*. Geneva: Small Arms Survey. <http://www.smallarmssurvey.org/Books/A&A%20pdfs/Part%20I%2006%20CAFF%20in%20MRU.pdf>

Part 3

PRIORITIES FOR ACTION

A US Marine positions C-4 charges as he prepares to destroy ordnance found at a former army ammunition depot in western Iraq, January 2005. © Bob Strong/Reuters

9

The Three Ds: Disposal, Demilitarization, and Destruction of Ammunition

Adrian Wilkinson

Introduction

There are currently insufficient donor resources to make more than a small dent in the global stockpile of ammunition that needs to be disposed of. In order to change the status quo and develop effective and relevant national and international policies to address the problem of ammunition disposal, policy-makers, governments, donors, implementing agencies, and other stakeholders must develop a basic understanding of the challenges involved.[1] Among these issues are the scale of the problem, policy requirements, and technical issues surrounding the disposal, demilitarization, and destruction of ammunition and explosives.[2]

This chapter is primarily designed to clarify these main issues. It does not cover technical solutions, nor does it present a full technical assessment of the risks and hazards involved.

Instead, this chapter serves to educate all stakeholders about the issues so that they can develop long-term strategies to tackle the problem and assist in building realistic and safe local capacities.

In this context, the chapter examines the importance of relevant definitions, explains why ammunition disposal should be on the international political agenda, and identifies the scale of the problem (the risks and hazards presented by large stockpiles of ammunition are covered in Chapter 8). The chapter also considers international efforts made thus far and concludes with a set of priorities for policy-making.

Definitions and challenges of ammunition disposal

In such a technical area, it is important that the international community agrees on common definitions (see Box 1). Agreement will not only facilitate diplomatic and political negotiations, but it can also serve legal and safety purposes. For example, if a country states that it has 'disposed' of a proportion of its ammunition stockpile, the international community should know that disposal does not necessarily cover demilitarization or destruction of the ammunition. Rather, the disposed ammunition could have been sold to a conflict region.

There is a tendency for donors, implementing agencies, and other stakeholders to regard weapons and ammunition as a single task area. The reality is that the destruction of weapons is a relatively straightforward—albeit logistically challenging—task. The destruction of ammunition requires a more detailed technical response because the risks and hazards are greater than those for weapons, and the stockpiles are larger in terms of weight and number. The multi-item destruction by explosive demolition of very large quantities of ammunition, as opposed to that of a single item of Unexploded Ordnance (UXO), requires a level of training that ordinary field engineers or Explosive Ordnance Disposal (EOD) technicians do not necessarily possess.

If the demolition is not prepared correctly, ammunition can be projected off the worksite by explosive effects—a process known as 'kick out'—effectively

Box 1 Key definitions

Disposal

'The removal of ammunition and explosives from a stockpile utilising a variety of methods, (that might not necessarily involve destruction). Logistic disposal may or may not require the use of RSP.'[3] (UNMAS, 2001, p. 15).

Demilitarization

'The complete range of processes that render weapons, ammunition and explosives unfit for their originally intended purpose. Demilitarization not only involves the final destruction process, but also all the other transport, storage, accounting and pre-processing operations that are equally as critical to achieving the final result.' (SEESAC, 2006a, Annexe 2).

Destruction

'The process of final conversion of ammunition and explosives into an inert state that can no longer function as designed.' (SEESAC, 2006a, Annexe 2).

spreading UXO contamination to the local area. An additional problem is the fact that this 'kicked out' ammunition could have been subjected to external forces similar to those found when fired from a weapon.[4] Under the effect of these forces, the ammunition could end up in an armed condition and therefore be unsafe (these effects are the same as when an ammunition depot explodes; see Chapter 8). Such problems can be avoided by proper planning at the risk assessment stage. It is also necessary to seek professional explosive engineering advice to ensure that the location chosen for the destruction will not put the civilian population, their property, and surrounding infrastructure at risk.

For the destruction of larger stockpiles of ammunition in non-conflict environments, destruction by demolition is often not an option. The potential for environmental and noise pollution, and the sheer quantities of ammunition involved, will often mean that an industrial demilitarization approach is more effective and cost-efficient. This industrial demilitarization of ammunition combines the skills of production management with those of mechanical, chemical, and explosive engineering. It is a highly specialized operation and, again, appropriate independent technical advice should be sought before planning such an activity.

From the perspective of the control of small arms and light weapons, the United Nations (UN) definition includes weapons and related ammunition types of 100 mm calibre and below (UNGA, 1997, para. 26). The destruction factors and issues surrounding the destruction of calibres above 100 mm are similar, however, and it makes sense when planning destruction under the auspices of small arms and light weapons control to ensure that the systems developed are capable of supporting the destruction of the larger calibres, which present similar risks and hazards.

Why should ammunition disposal be a global political issue?

Stockpiles of conventional ammunition in post-conflict environments, and ammunition that is surplus to new national security requirements and therefore awaiting destruction in many developing states, pose potentially significant security and safety risks. The population and environment close to ammunition depots are put at risk by such stockpiles and sustainable development is hampered.

Of equal importance is the risk of leakages from these stockpiles; illicit trafficking and uncontrolled proliferation, especially to terrorists and other criminal groups, could fuel armed violence within communities and compromise the security of neighbouring states. The destruction of these stockpiles should thus be considered a conflict prevention measure, a confidence and security building measure, and a post-conflict human security issue. (For the safety arguments in favour of ammunition destruction as a human security issue see Chapter 8.)

To date the demilitarization and destruction of ammunition in developing and post-conflict countries have been carried out in a number of contexts, which include:

- Compliance with the Mine Ban Treaty (MBT) for the destruction of anti-personnel mines;
- National requests as part of Confidence and Security Building Measures (CSBM) such as the Nairobi Declaration, the North Atlantic Treaty Organisation (NATO) Partnership for Peace (PfP), or the Organization for Security and Co-operation in Europe (OSCE) Document on Conventional Ammunition;
- Destruction activities to support demobilization, disarmament, and reintegration (DDR) in immediate post-conflict states;
- Destruction activities to support small arms and light weapons control interventions; and
- Destruction activities to support armed forces restructuring as part of wider security sector reform (SSR).

Donor support for the destruction of elements of ammunition stockpiles as part of confidence and security building measures is understandable and should be supported. There is also an argument, however, that the impact on the reduction of risk to the civil population (the human security task area) or the physical security of small arms and light weapons (the proliferation of small arms and light weapons task area) should also be considered. One problem is that the term small arms and light weapons means different things to different stakeholders and there is therefore a lack of consistency when responses are planned or funded.

Small arms ammunition is often given priority because donors have budgets to support the destruction of these particular items.[5] Larger calibre ammunition and bulk explosives, which can present greater explosive and security risks, are afforded a lower priority by donors. While this is understandable from a political perspective because of the range of international and local agreements concerning small arms and light weapons, it may not be the most effective or efficient methodology for approaching the destruction of a national stockpile in a holistic manner.

Additionally, in some cases of commercially-led destruction for profit, ammunition was selected purely on the basis of its ease of destruction—or of the potential financial return on scrap recovery or reuse of explosives—and minimal consideration was paid to selecting ammunition on security or humanitarian grounds.[6]

What is the scale of the problem?

Over the past decade the amount of surplus ammunition in the national stockpiles of many countries has increased dramatically as a result of a reduction in the size of their armed forces. There are huge quantities of excess ammunition from the cold war era, mainly in the countries of the former Soviet Union although the stockpiles of Iran, Iraq, India, and China are also thought to be very large and could also be a cause for concern. Because of their relative remoteness, the Warsaw Pact states in Central and Eastern Europe were used to host a number of strategic industries for the Soviet Union, including ammunition factories. As a result they have inherited significant amounts of armaments and ammunition.

Ukraine, for example, as a past base for strategic reserves of weapons and ammunition, had a large military industrial complex. It is now faced with a huge challenge in terms of ammunition stockpiles that pose a threat to the entire region. Estimates suggest that up to 2.5 million tonnes of ammunition may be stored in Ukrainian ammunition depots designed to store far less than that amount.[7] A significant proportion is therefore stored in exposed and inappropriately equipped storage facilities, which can only result in greater risk to communities and accelerate the deterioration of the ammunition. In Belarus, available information suggests that government agencies hold more than 48,000 tonnes of small arms ammunition alone, although it is not clear how much of this is designated as surplus (Faltas and Chrobok, 2004, p. 120). In Russia, 140 million rounds of small arms ammunition were reportedly designated for disposal in 2002–05 (Pyadushkin and Pukhov, 2004, p. 109).

The 'forgotten legacy' of the cold war ammunition stockpiles is gradually coming to the fore. The initial problem is estimating the size of the ammunition stockpile because of a combination of insufficient national data and a culture of secrecy. Records kept in many developing or post-conflict countries have not been reliably maintained, and ammunition stockpiles are regarded as national secrets because some nations argue that knowledge of a stockpile level provides an indicator of the state's war-fighting capability. Even where information on the disposal of surplus ammunition is made available, figures provided are inconsistent and depend on the source used. Inefficient or non-existent accounting systems make it impossible to immediately calculate the global requirement for the destruction of surplus or unstable stocks of ammunition.

This lack of accountability, when combined with a perception that stockpile levels are a secret national security issue, makes assessing the global or regional problem, and hence developing plans to deal with it, very difficult. Until states provide more transparency about the scale of the problem, the international community can only attempt to define it in terms of 'order of magnitude' rather than in any statistically accurate manner. The true scale of the problem will only be known once the future ammunition requirements of armed forces undergoing restructuring are identified, more effective ammunition management systems are implemented where necessary, and there is improved transparency in what is still a highly sensitive issue from a security perspective.

Ammunition stockpiling issues exist at differing levels in other regions throughout the world, including Latin America, South Asia, Central Asia, and South Eastern Europe (see Table 1). Afghanistan, for example, still has large stockpiles of ammunition as a legacy of the events of the past 30 years. After an initial assessment, the United Nations Development Program (UNDP) Afghanistan New Beginnings Programme (ANBP) is trying to collect or dispose of more than 100,000 tonnes of ammunition at identified sites. The programme aims to identify serviceable ammunition for the new Afghan Army, as well as ammunition that is dangerous and unstable (IRIN, 2005), but it is being forced to take technical risks because of a lack of qualified personnel and resources and does not necessarily present 'best practice' in dealing with the problem.

After three major conflicts since 1980, Iraq also has massive ammunition stockpiles, which were estimated at 650,000 tonnes after the invasion by the

US-led coalition.[8] US military estimates suggest that 400,000 tonnes have been secured by the US military, leaving 250,000 tonnes unaccounted for. This situation was created by the failure of the coalition forces to make operational plans and commit assets to secure ammunition storage sites during the ground campaign in 2003. The widespread looting of these unsecured sites fuelled the subsequent insurgency in Iraq. This suggests that there is a need for the development of a concept of operational disarmament that could inform military planners of future operations.

Table 1 Indicative ammunition and explosive stockpile statistics*

Country[9]	Estimated stockpile (tonnes)	Estimated demilitarization requirement (tonnes)	Remarks/source
Central and Eastern Europe (CEE)/Central Asia			
Belarus		97,000	Declared to OSCE (2004)
Kazakhstan		36,000	Declared to NATO PfP (2005)[10]
Ukraine	2,500,000	130,000	Declared to NATO PfP (2004)
Middle East/Central Asia			
Afghanistan	100,000		Identified under UN-backed ANBP[11]
Iraq	650,000		See AP (2004)
South Eastern Europe (SEE)			
Albania	180,000	140,000	NATO EODASST Author's personal information (1999)
Bosnia and Herzegovina	67,000	32,000	Ammunition Demilitarization Study[12]
Bulgaria	153,000	76,099	Declared to OSCE (2004)
Serbia and Montenegro	More than 100,000[13]		SEESAC estimate

* The information in this table covers only those states where there is a currently declared stockpile disposal issue to be resolved and where information is available. It should in no way be considered to be a definitive analysis. The large gaps in information only serve to illustrate the current dearth of publicly available verifiable data.

Ammunition disposal options[14]

There were traditionally five methods for disposing of surplus ammunition: sale, gift, increased training use, deep-sea dumping, and destruction. International security concerns, international legislation, and practical considerations, however, indicate that the most effective option remains the physical destruction of ammunition.

Selling or giving away ammunition is the most cost-effective means of disposal, but there are factors that need to be considered: (*a*) any sale or gift should comply with international export control and transfer best practice; (*b*) the quality of ammunition nearing the end of its useful shelf life will not be as high as newly manufactured ammunition. This makes it unattractive to reputable end users because it is unlikely to meet their performance standards. Any end user wishing to purchase ammunition of this age should be the subject of the deepest scrutiny; and (*c*) in order to comply with international transportation regulations and guidelines, the ammunition should be physically inspected to ensure that it is safe to export or transfer beyond national borders: this will mean additional costs. The sale or gift of surplus ammunition is strongly discouraged by much of the international community because, in effect, it only transfers the problem elsewhere.

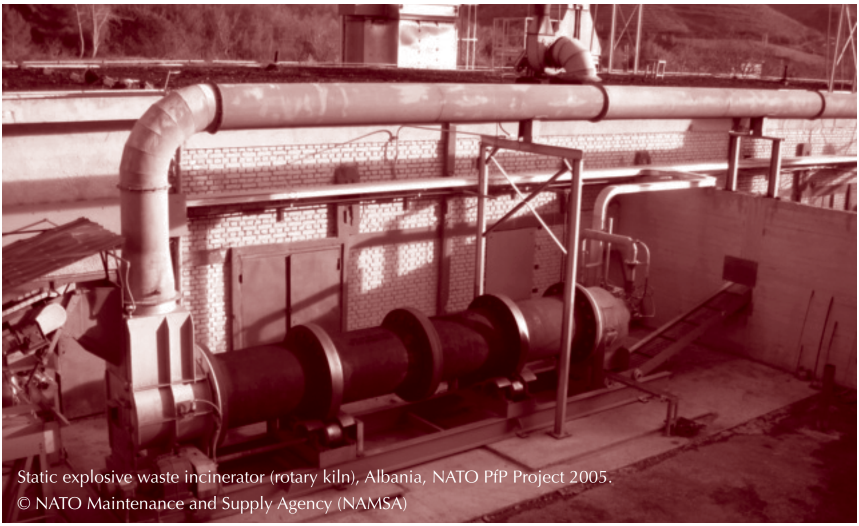
Increasing training use may initially seem a desirable option, but associated factors may make it undesirable. When ammunition is used it creates additional wear on equipment such as gun barrels, vehicle automotive systems, and so on. This reduces the life of the parent equipment and results in additional maintenance costs. These additional costs should be balanced against the value of the training obtained from firing surplus ammunition stocks. Any significant increase in training may also negate security and confidence building measures with neighbouring states. Furthermore, only limited stocks can be disposed of in this manner because the associated costs of training, and the time taken, would be an uneconomic means of destroying a large proportion of a surplus ammunition stockpile.

Dumping ammunition at sea is the subject of international agreements[15] because it is considered to be either hazardous or industrial waste. Even if a state is not party to such an agreement, it is unlikely that it would receive international donor assistance to dispose of its surplus ammunition in this manner.

There would also potentially be a very strong negative reaction from international environmental groups.

The most realistic disposal method is therefore destruction. Stockpile destruction can be defined as 'the process of final conversion of weapons, ammunition and explosives into an inert state that can no longer function as designed' (SEESAC, 2006a, Annexe B). The effective management of stockpile destruction planning and operational activities aims physically to destroy ammunition in a safe, cost-effective, and efficient manner.

Physical destruction methods available range from relatively simple Open Burning and Open Detonation (OBOD) techniques to highly sophisticated industrial processes. The detailed arguments for and against each process are beyond the scope of this chapter but it is important to note that selection of the most appropriate destruction technique will depend primarily on a range of factors that include: (*a*) the donor resources available; (*b*) the physical condition of the stockpile; (*c*) the quantity of ammunition in terms of economies of scale; (*d*) national capacities; and (*e*) national explosive safety and environmental legislation.[16] A summary of available industrial demilitarization technologies is provided in Annexe 1.



Static explosive waste incinerator (rotary kiln), Albania, NATO PfP Project 2005.
© NATO Maintenance and Supply Agency (NAMSA)

Of the above, the most influential factors have usually been the donor resources available and economies of scale. The more ammunition there is for destruction and the wider the range of available, affordable, and efficient technologies, the more likely it is that an industrial demilitarization facility can be developed. Industrial scale demilitarization has many advantages, including mechanical disassembly, incineration in environmentally controlled systems, and the ability to operate 24 hours per day and 365 days per year. Its major disadvantage is the high capital set-up costs of design, project management, construction, and commissioning. Operating costs are generally lower than OBOD (once amortization of the development capital is discounted). It must be remembered that the physical destruction process for ammunition is only one process in the complete demilitarization cycle. This operational cycle is complex, comprehensive, wide-ranging, and includes activities such as transportation and storage, processing operations, equipment maintenance, staff training, and accounting. The full demilitarization cycle is shown schematically in Annexe 2.

It inevitably takes time to develop a safe, effective, and efficient industrial demilitarization capability within a state that also reflects the safety and environmental concerns of donors, but this should not prevent the initial steps being taken to support the development of such facilities. In many regions this sort of capacity must be developed from the semi-dormant and under-resourced state ammunition production facilities, which requires infrastructure investment, staff training, and demilitarization equipment procurement. It is likely that the solution is a balance whereby OBOD should be used to destroy potentially unstable stocks in the short term while, at the same time, a facility is developed in those nations with large stockpiles. For those countries with insignificant stockpiles, OBOD will remain the only economically practical option.

A solution that is often proposed at international conferences is the development of a regional demilitarization facility. While this seems an attractive concept for donors and the recipient country, it raises a number of political and technical difficulties. The large stockpiles present in many countries in the region mean that national economies of scale could justify a national demilitarization capacity. Many states within the region would support a regional facility if it were in their own country, because it would represent a major economic investment and a potential source of income. They are however unlikely to commit funds for destruction at a regional facility 'next door'. Technically, the most efficient means of transporting ammunition and explosives is usually by rail. The effectiveness of the rail infrastructure and the distance ammunition is required to travel would therefore have a significant impact on the location of any regional demilitarization facility. Last, the international donor community is unlikely to have the resources to pay for destruction of the total surplus stockpile, which would become an economic issue between countries.

It is difficult to estimate the destruction costs for ammunition because there are so many factors to consider, including: (*a*) the type of ammunition; (*b*) economies of scale; (*c*) existing indigenous capacity and resources; (*d*) explosive and environmental legislation; (*e*) the training levels of local staff; (*f*) the economic level of the host nation; (*g*) the fact that destruction projects often include weapons and ammunition at an overall fixed cost, as opposed to costs per ammunition type; and (*h*) donor priorities. This makes estimating the costs of an intervention to support the destruction of ammunition difficult when large stockpiles are involved, particularly when there is not an effective ammunition management system in place. Experience in Eastern Europe has indicated that assessments by properly qualified and experienced technical personnel are a valuable prerequisite for demilitarization planning. Donors must be prepared to fund the costs of these assessments. It is also important that donors recognize

Table 2 **Indicative ammunition destruction and demilitarization costs, in USD**

Ammunition calibre	Lower range		Upper range		Remarks
	Cost per tonne (AUW)	Country	Cost per tonne (AUW)	Country	
Small arms ammunition (less than 12.7 mm)	90	Albania[17]	800	UK[18]	Demilitarization
Medium calibre (60 mm–122 mm)	540	Albania[19]	1,000	Paraguay[20]	Open detonation (includes equipment procurement)
Guided missiles	Unknown	Georgia	2,000	Germany[21]	

that the costs associated with structural development, technical training, and equipment procurement mean that while initial costs per tonne are high, subsequent destruction is a lot cheaper as the economies of scale take effect and national capacity is built. Table 2 sets out indicative costs but should not be considered authoritative for planning purposes.

Initiatives to address ammunition disposal[22]

International frameworks

Specific references to the management and destruction of ammunition stockpiles in the framework of international legislation or agreements are less than comprehensive. Relevant instruments either do not mention ammunition explicitly, or the instrument is limited in scope to small arms and light weapons with an emphasis on weapons. Ammunition is generally regarded as a secondary consideration. Although there is no specific provision for ammunition under the most comprehensive instrument at the global level, the *UN Programme of Action on Small Arms and Light Weapons* (PoA), some argue that ammunition can be inferred to fall under the same umbrella as weapons.[23] This would include destruction of stockpiles (UNGA, 2001b, art. 18 and art. 19). The scope of this instrument and others at the global and regional level (see below) is limited to *illicit* trade, however, and fails to address national surpluses of ammunition in detail.

At the global level also, the scope of the UN Firearms Protocol includes an obligation to destroy illicitly manufactured and trafficked firearms that extends explicitly beyond small arms and light weapons to include their ammunition (UNGA, 2001a, art. 6), but not the medium- and large-calibre ammunition which account for over 70 per cent of national stockpiles.

These two instruments apart, the ammunition stockpile destruction issue is uncoordinated at the global level. While the recent decision by the UN General Assembly to include 'problems arising from the accumulation of conventional ammunition stockpiles in surplus' on the provisional agenda of its 60th session might be an indication of the increased importance of the issue to the UN,[24] nothing substantive has happened since.

Regional frameworks

At the regional level, the Council of the European Union Joint Action of 12 July 2002 explicitly identifies small arms and light weapons ammunition as a cause for concern and recognizes the importance of the safe storage, and the quick and effective destruction, of small arms and light weapons ammunition (EU, 2002, Preamble and art. 4). The 2001 Protocol on the Control of Firearms, Ammunition and Other Related Materials in the South African Development Community (SADC) Region also stresses the need to maintain effective control over ammunition—and not just that related to small arms and light weapons—especially during peace processes and in post-conflict situations, and to establish and implement procedures to ensure that firearms ammunition is securely stored, destroyed, or disposed of in a way that prevents it from entering into illicit conflict.

The 1997 Inter-American Convention against the Illicit Manufacture and Trafficking in Firearms, Ammunition, Explosives and Other Related Materials also explicitly includes ammunition and explosives. The OSCE went furthest in directly addressing the destruction of ammunition by adopting in November 2003 the OSCE Document on Stockpiles of Conventional Ammunition.[25] This document outlines detailed procedures for assistance from other OSCE participating states with the destruction of ammunition. The role of those states in a position to do so in assisting other states with their efforts to destroy surplus weapons (and ammunition) is also incorporated into the UN framework.[26] The EU too is committed, under the EU Joint Action, to provide financial and technical assistance 'as appropriate' to countries requesting support with programmes and projects to control or eliminate surplus small arms and their ammunition (EU, 2002, art. 4(a) and 6).

Strategic and operational guidelines

As mentioned above, the physical destruction of ammunition is a highly specialized task that can only be efficiently and effectively undertaken by appropriately trained and qualified personnel. Detailed guidance on the practicalities involved can be found in a number of documents and guides. The UN Department for Disarmament Affairs (DDA) *Destruction Handbook: SALW, Ammunition and Explosives* (UNDDA, 2001) is designed to assist planners in the field to choose

Canadian soldiers place explosive charges to destroy recoilless rifle rounds at the Indigo Range, south of Kabul, Afghanistan. June 2005. © Levon Sevunts/WPN

methods of destruction that are most appropriate to the theatre of operations they find themselves in.

The OSCE has developed best practice guides for small arms and light weapons, which are really strategic-level guidelines. The equivalent guide for ammunition will be published soon. The South Eastern Europe Regional Micro-Disarmament Standards and Guidelines (RMDS/G) have been developed by South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC) to support the operational and programme level. This means that national governments and international organizations in South Eastern Europe have strategic guidelines (OSCE) and operational procedures (SEESAC) available to assist them to develop safe, efficient, and effective destruction programmes.

The UN Mine Action Service, through the Geneva International Center for Humanitarian Demining (GICHD), has developed International Mine Action Standards (IMAS) that cover the destruction of stockpiles of anti-personnel mines, but these standards are generic in outlook and can be effectively applied to cover the destruction of most types of ammunition (SEESAC, 2006a). Their aim is not to provide 'template solutions', but to inform national authorities of the technical and logistic issues involved in stockpile destruction, and to outline the advantages and disadvantages of the various available options.

The problem is not the lack of technical guidance, but the global shortage of qualified technical staff experienced in the best international technical practice in demilitarization project development and operations. Few people have had the experience of establishing a demilitarization capability or facility from scratch in post-conflict environments. The technical standards of staff in those countries with large ammunition stockpiles are often not in accordance with best international practice. Commercial industry experience is often limited to its own techniques and the military are generally not trained in demilitarization. Consequently, with a few exceptions, programmes in post-conflict or developing countries are often not designed in the most safe, effective, and efficient manner. Because no UN department has overall responsibility for the coordination of ammunition destruction, and regional organizations are often competing for the limited amount of donor funding available, there is no international strategy or policy to deal with the issue, or international standards for planning and conducting ammunition destruction, although high quality national and regional guidelines do exist which could easily be adopted with only a few changes to reflect global needs.

International support for ammunition destruction initiatives

The UN Secretary-General reported in 1999 that the UN, supported by donors, had been involved in the safe storage, disposal, and destruction of weapons, but stated that 'the number and scale of such programmes remains small compared with the apparent requirements' (UNGA, 1999, para. 66). In spite of some limited progress there is a huge disparity between even known needs and international donor support.

Although there is a growing political awareness of the issue, to date, the international response has been limited in terms of financial support for surplus ammunition stockpile destruction. Significant support has been provided for the destruction of anti-personnel mines (APM) in support of Article 7 of the MBT, and it is likely that this support will continue.[27] The United States has funded the destruction of significant quantities of man-portable air defence systems (MANPADS), primarily as part of its counter-proliferation programme.

In terms of wider ammunition stockpile destruction, the donor and international response has been limited because of: (*a*) the amount of finance required; (*b*) the fact that it is not a major issue for some donors; (*c*) other donor mandates not allowing for it; and (*d*) only a limited number of major donors being engaged in the issue. The most extensive engagements at the operational level have probably been through the UNDP Small Arms Demobilization Unit (SADU)[28] and the NATO PfP Trust Fund,[29] while the OSCE has primarily been engaged at the political level (OSCE, 2003). A summary of known projects specifically dealing with ammunition stockpile destruction is included in Annexe 3.

It is perhaps not surprising that some, but not all,[30] donors have a tendency to provide assistance to states in their own geographical region. Reports by states under the PoA indicate, for instance, that European donor countries give support primarily in Central and Eastern Europe (Kytömäki and Yankey Wayne, p. 111). Current levels of assistance must be dramatically increased if the true scale of the problem is to be seriously addressed. This presents challenges in terms of donor—and wider—awareness, increasing understanding of the complexity of the issues involved, and commitment—in terms of both financial and technical resources.

Conclusion

It is unlikely that the international donor community could fund the destruction of all surplus ammunition within a single region, let alone the much larger global stockpiles. The stockpiles stored in the wider Europe as a legacy of the cold war probably present the largest challenge, but the impact of poorly controlled stockpiles at the community level is also a major issue—as the tragic event of January 2002 in Lagos, Nigeria, demonstrates.[31]

Prioritization for future ammunition destruction is complicated and the hard priorities of available national and donor resources versus threat should be considered. These could include:

- Destruction of ammunition that is at greatest risk of proliferation or is ‘attractive’ to terrorists and criminals. The detailed ammunition types will inevitably be subject to the judgement of individual donors (see Chapter 8);

- Identification of ammunition that poses the greatest risks to the civilian community in terms of explosive safety;
- Ensuring the physical security of ammunition in order to reduce the risks of proliferation;
- Destruction of ammunition that presents a direct explosive safety risk to the civilian population and can therefore be justified on humanitarian grounds alone; or
- Capacity building of national institutions to continue longer-term, nationally financed, safe, efficient, and effective destruction of ammunition to appropriate technical standards.

While a number of successful donor-assisted programmes have been carried out, the major donor base is still quite limited. International political momentum to identify the true size of the problem needs to be generated, and governments should be encouraged to accurately audit ammunition stockpiles and share data. Old ammunition in decaying stockpiles is a human security issue, and also a proliferation threat because criminals and terrorists do not care about ammunition stability or performance.

Finally, wherever possible, ammunition stockpile destruction must be coordinated with other small arms and light weapons control or security sector reform programmes and initiatives. There is significant synergy, and the opportunities for rationalizing administrative costs should be explored for each project. This will require better coordination than exists today between international organizations, donors, and other stakeholders.

Annexe 1 Summary of ammunition demilitarization technologies[32]

Process operation	Technology	Advantages	Disadvantages	Remarks
	Pre-processing operations			
Manual disassembly	• None	• Low level of capital investment required	• Labour intensive • Low production rates	The use of human resources to physically dismantle ammunition by manual labour using simple hand tools.
Mechanical disassembly	• Pull apart • De-fusing • De-priming	• High production rates • Lower staff requirements	• Medium level of capital investment required	The use of mechanically operated systems to dismantle ammunition. Some of the available technologies are shown in the table, but systems tend to be specifically designed to deal with each type of munition.
Robotic disassembly	• Ammunition dependent	• High production rates • Lower staff requirements	• Highly capital investment • Reliability	A fully automated disassembly system. This system would only be economically viable for very large production runs due to the high start-up costs.
Mechanical breakdown	• Bandsaw • Guillotine • Cracker mill • Rock crusher • Punch	• Lower staff requirements • Medium production rates • No secondary waste stream at this phase of the demilitarization cycle	• Explosive safety risks of initiation • Medium capital investment • Wide range of equipment required to deal with all ammunition types	This process is mainly concerned with techniques required to expose the explosive fillings of ammunition prior to the destruction phase.

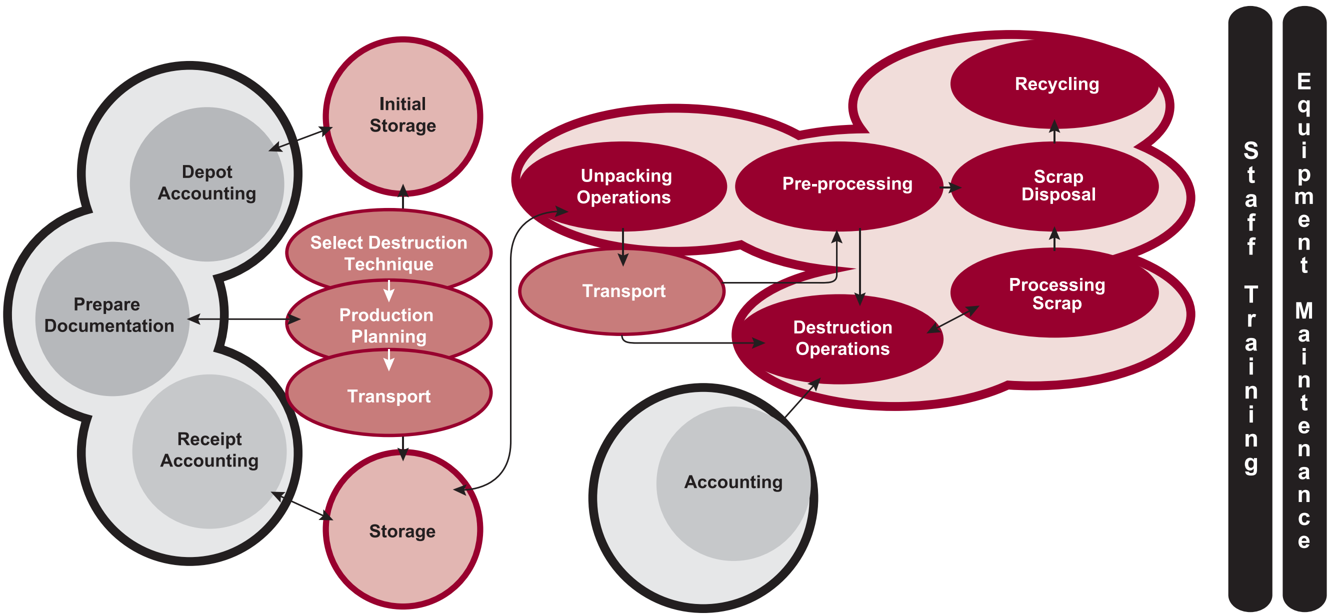
Cryofracture	• Liquid nitrogen cooling	• Environmentally benign • High production rates • Can be used for virtually all ammunition types • Low level of capital investment required for equipment • No secondary waste stream at this phase of the demilitarization cycle	• Large process area requirements • Costs of liquid nitrogen • Health and safety issues for staff • Fracture forces necessary are unpredictable	This process is used to break down ammunition into small enough pieces to be processed through an incineration destruction method. The liquid nitrogen changes the mechanical properties of the munition casing to a more brittle phase by cooling it to –130^{0}C. The munition can then be easily shattered using simple mechanical shear or press techniques.
Hydro-abrasive cutting	• Entrainment systems • Direct injection systems	• Lower staff requirements • Can be used for virtually all ammunition types • Safety	• High capital investment • Complex filtration systems for waste water required • Grit sensitivity of explosive after cutting	The use of water and abrasives at pressures from 240 to 1,000 Bar to cut open ammunition by an erosive process.
	Destruction operations			
Explosive removal	• Hot steam melt out	• Simplicity	• Low capital investment • Restricted to certain explosive types	
	• Microwave melt out	• Efficiency • Low secondary waste stream	• High capital investment • A developing technology	

Incineration	• Rotary kiln furnace	• Efficiency • Low staff requirements • High production rates	• Limited to small calibre ammunition, propellant, and pyrotechnics • Significant pre-processing required for larger calibres • Small arms ammunition lead residue and pyrotechnic effluent can pose considerable environmental problems	The kiln is made up of four 1.6 metre long, 1 metre outer diameter retort sections bolted together. The 6 to 8 cm thick walls of the kiln are designed to withstand small detonations. The kiln contains internal spiral flights, which move the waste in an auger-like fashion through the retort as the kiln rotates.
	• Car bottom furnace	• Ideal for explosive residue • Low staff requirements	• Medium levels of capital investment required • Cannot destroy most ammunition types • A system to support destruction rather than a system in its own right	Used to destroy small amounts of explosive or explosive residue left after flush-out pre-processing techniques. It can also be used to destroy explosively contaminated packing material, for instance.
Incineration	• Hearth kiln furnace	• Low staff requirements • Medium production rates	• Limited ammunition types possible	A static high temperature kiln.
	• Plasma arc furnace	• Low staff requirements • High production rates	• High capital investment • High power requirement • A developing technology • Pre-processing still required	A plasma torch, at temperatures in the region of 4,000^{0}C to 7,000^{0}C, is used to heat a container into which waste products are fed. The plasma is an ionized gas at extremely high temperature, which is used to initiate rapid chemical decomposition by the action of this extreme heat. The material is currently fed in a slurry form, although research is ongoing into the destruction of entire munitions.

Contained detonation		• Limited pre-processing requirements • Can deal with many ammunition types • Medium production rates	• Medium staff requirements • High donor explosive requirements • Medium levels of capital investment required • Explosive content limited	The destruction of ammunition and explosives by detonation in an enclosed chamber. The evolving gases are then processed by an integral pollution control system.
	Pollution control systems[33]			
Volatile Organic Compound (VOC) destruction	• Afterburner	• Proven technology • Very low staff requirements	• High fuel requirements	This oxidizes entrained organic compounds, ash, and metal fragments. In order to achieve this, it must operate above 850^{0}C for over 2 seconds to destroy VOC; the VOC then burn to CO_2, H_2O, and acid gas. All organic particulate is destroyed.
Acid gas neutralization	• Addition of Sodium Bicarbonate	• Operates over wide temperature range • Produces safe and inert solid waste • Reacts well with NOX[34] • Readily available	• Large supplies necessary	Produces safe and inert solids such as Sodium Chlorate (common salt), Sodium Sulphate, and Sodium Nitrate for disposal.

Particulate removal	• Baghouse	• Simple and cheap technology	• Prone to baghouse fires • Filtration efficiency • Medium capital investment	
	• Dry Ceramic Filtration	• Fire resistant • Filters down to one micron • Supports a bed of sorbent for improved gas adsorption	• Medium levels of capital investment required	Dry ceramic filtration is now regarded as one of the most efficient filtration systems currently available. It has the capacity to remove particulate matter down to one micron.
	• Liquid Filtration	• Filtration efficiency	• High capital investment • Liquid waste stream requires further processing	
	Scrap processing operations			
Scrap processing	• Crusher			System requirements depend on waste stream from destruction process. There are many systems available.
	• Shredder			
	• Compacter			
	• Cracker			

Annexe 2 The ammunition demilitarization cycle



Annexe 3 Ammunition destruction projects[35]

Date	Country	Agency	Donor(s)	Project	Details		Remarks
					Quantity	Cost (USD)	
Complete							
1999	Albania	UK DfID	UK	Feasibility study	N/A	60,000	Used to develop NATO PfP Albania Project (2003)
2001	Democratic Republic of Congo	UNDP	UNDP TTF	Destruction of grenades	2,587 grenades		
2002	Albania	NAMSA	CA, AU, BE, HU, NL, NO, SZ, UK	APM destruction	1,600,000 APM	790,000	Included infrastructure and equipment development
2002	Moldova	NAMSA	NL, CA, GE, HU, LU, PL, UK, US	APM destruction Rocket fuel	12,000 APM 325 tonnes	1,100,000	
2002	Ukraine	NAMSA	CA, NL, HU, PL	APM destruction	400,000 APM	800,000	Included infrastructure and equipment development
2003	Bulgaria	UNDP	UNDP TTF	5.54 mm small arms ammunition 100 mm HEAT	750,000 rounds 2,475 rounds	85,000	Costs also covered small arms and light weapons destruction, and included equipment development

2003	Paraguay	UNDP	UNDP TTF	Destruction of unsafe ammunition up to 100 mm	80 tonnes	80,000	Direct cost on-site and exclusive of two planning missions
2004	Georgia	NAMSA	LU, CA, CZ, DA, FN, NL, NO, SW, SZ, TU, UK	Missiles	525 missiles	1,089,000	Includes UXO clearance funding
2004	Serbia and Montenegro	UNDP	UNDP TTF	Small arms ammunition	0.6 tonnes	100	To support amnesty collection only
2005	Uganda	UNDP	UNDP TTF	Destruction of unsafe ammunition up to 100 mm	400 tonnes		
Ongoing							
2003	Albania	NAMSA	CA, CZ, ES, GR, HU, IR, LU, NL, NO, PL, SW, SZ, UK, US, EU	Small arms and light weapons ammunition	11,000 tonnes	6,400,000	Due for completion 2007
2004	Bosnia and Herzegovina	UNDP	NL, UK	Ammunition demilitarization facility	33,000 tonnes	10,000,000	USD 1,400,000 committed to date
2005	Paraguay	UNDP	UNDP TTF	Destruction of unsafe ammunition up to 100 mm	86 tonnes		

2005	Tajikistan	OSCE	FR (in kind)	Destruction of unsafe ammunition	20 tonnes	4,000	Part of larger stockpile security and small arms and light weapons destruction project
2005	Belarus	EU	EU	Destruction of PFM 1 Series APM	6,000,000 APM	7,000,000	
2005	Serbia and Montenegro	NAMSA	AU, BL, CA, CH, CZ, HU, IR, NL, NO, SW	APM destruction	1,300,000 APM	1,900,000	
2006	Belarus	NAMSA	CA, LI	APM destruction	600,000 APM		
2006	Ukraine	NAMSA	AU, BL, CH, EU, GE, LI, LU, NL, NO, SL, TU, UK, US	Ammunition	135,000 tonnes	90,000,000	Only partially funded
Proposed or under development							
?	Kazakhstan	NAMSA	NL, US	MANPADS	400 missiles	?	
?	Uzbekistan	NAMSA		Rocket fuel Ammunition	1,068 tonnes 5,400 tonnes	?	At pre-feasibility stage
?	Ukraine	OSCE		Rocket fuel (Oxidizer)	11,677 tonnes	?	

List of abbreviations

ANBP	Afghan New Beginnings Programme
APM	Anti-Personnel Mines
ASEAN	Association of South East Asian Nations
AUW	All Up Weight
BCPR	Bureau for Crisis Prevention and Recovery
CEE	Central and Eastern Europe
CSBM	Confidence and security building measure
DDA	Department for Disarmament Affairs (UN)
DDR	Disarmament, demobilization, and reintegration
DERA	Defence Evaluation and Research Agency
EOD	Explosive Ordnance Disposal
EODASST	Explosive Ordnance Disposal and Ammunition Support Training Team (NATO)
FSC	Forum for Security Cooperation (OSCE)
GICHD	Geneva International Center for Humanitarian Demining
HEAT	High Explosive Anti-Tank
IMAS	International Mine Action Standards
MANPADS	Man-Portable Air Defence Systems
MBT	Mine Ban Treaty
NAMSA	NATO Maintenance and Supply Agency
NATO	North Atlantic Treaty Organisation
OBOD	Open Burning and Open Detonation
OSCE	Organization for Security and Co-operation in Europe
PCS	Pollution Control System
PfP	Partnership for Peace (NATO)
PoA	*UN Programme of Action on Small Arms and Light Weapons*
RMDS/G	Regional Micro-Disarmament Standards and Guidelines (SEE)
RSP	Render Safe Procedures
SADC	Southern African Development Community
SADU	Small Arms and Demobilization Unit (UNDP)
SALW	Small arms and light weapons
SEE	South Eastern Europe

SEECI	South Eastern Europe Cooperation Initiative
SEESAC	South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons
SSR	Security sector reform
TTF	Thematic Trust Fund (UNDP)
UK DfID	United Kingdom Department for International Development
UK FCO	United Kingdom Foreign and Commonwealth Office
UNDP	United Nations Development Programme
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

Endnotes

1 This chapter uses the term ammunition generically to include ammunition, explosives, and propellants.

2 The chapter draws on previous work contained in Greene, Holt, and Wilkinson (2005), Hughes-Wilson and Wilkinson (2001), SEESAC (2004; 2005), and Wilkinson (2004).

3 Render Safe Procedures (RSPs) are specialist techniques to make ammunition and UXO safe to move or handle.

4 Spin, set back, centripetal, and set forward forces.

5 Ammunition of 12.7 mm calibre and below.

6 The Alliant Techsystems programme in Ukraine during the early 1990s is one such example.

7 Yevgeny Marchuk, Ukraine Defence Minister, quoted in Rosbalt News Agency, 2004.

8 Anthony Cordesman, Centre for Strategic and International Studies, Washington, quoted in AP, 2004.

9 The United States, most of Western Europe, and some countries in South East Asia already have a developed industrial demilitarization capacity for the destruction of ammunition and explosives, which is why they were not included in this table.

10 The ammunition surplus for destruction being considered under the auspices of the NATO PfP is only a small proportion of the actual stockpile that will require destruction.

11 This represents only a proportion of the true extent of ammunition stockpiles in Afghanistan.

12 Ammunition demilitarization study conducted in Bosnia and Herzegovina for SEESAC by Threat Resolution Ltd. in 2004.

13 SEESAC estimate, 2005.

14 Some of the information in this section is summarized from SEESAC, 2006.

15 The Oslo Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, February 1972, and subsequent amendments; the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 29 December 1972,

and subsequent amendments; and the 1998 Convention for the Protection of the Marine Environment of the North-East Atlantic (also known as the 'OSPAR Convention').

16 This is covered in detail in SEESAC, 2004.

17 Extracted from SEESAC APD 50 Commercial in Confidence Report for the UK FCO (United Kingdom Foreign and Commonwealth Office), 30 July 2005 (confidential document).

18 UK Demilitarization Facility, DERA (Defence Evaluation and Research Agency), Shoeburyness, 2001 (author's information).

19 Extracted from SEESAC APD 50 Commercial in Confidence Report for the UK FCO (United Kingdom Foreign and Commonwealth Office), 30 July 2005 (confidential document).

20 Remi Vezina, Ammunition Technical Officer, UNDP, BCPR (Bureau for Crisis Prevention and Recovery), SADU (Small Arms and Demobilization Unit), 2005.

21 Presentation by NAMSA (NATO Maintenance and Supply Agency), Standing Committee to the Mine Ban Treaty, Geneva, 2002.

22 Some of the information in this section is summarized from Greene, Holt, and Wilkinson, 2005.

23 In this respect it should be noted that the 1997 report of the UN Panel of Governmental Experts defined the scope of categories of small arms and lights weapons as including ammunition and explosives (UNGA, 1997, Annexe, para. 26).

24 First Committee of the UN General Assembly, UN Doc. A/C.1/59/L.48, 14 October 2004, adopted without a vote.

25 Adopted at the 407th Plenary Meeting of the OSCE Forum for Security Cooperation (FSC).

26 See UNGA, 2001b, art. 14: 'Upon request, States and appropriate international or regional organizations in a position to do so should provide assistance in the destruction or other responsible disposal of surplus stocks. . . .'. See also UNGA, 1999, para. 111–12.

27 NATO PfP or SEECI (South Eastern Europe Cooperation Initiative) projects, implemented through NAMSA, in Albania, Moldova, and Ukraine.

28 Ammunition destruction projects have been conducted in Central and Latin America, Africa, and South Eastern Europe through UNDP Country Office projects.

29 Excluding the two major APM destruction projects (Albania and Ukraine), NAMSA has completed one project for ammunition destruction in Moldova. Significant projects are ongoing in Albania, Georgia, and Ukraine.

30 The US, for example, reports providing assistance to destroy over 44 million rounds of ammunition in Albania, Angola, Bulgaria, Serbia and Montenegro, Guinea, Lesotho, Mozambique, the Philippines, Romania, and Senegal, among other countries. It is reported that other projects are under way and/or under negotiation. See Greene, Holt, and Wilkinson, 2005, p. 24.

31 An external fire caused the detonation of an ammunition depot on the outskirts of Lagos, resulting in more than 1,500 fatalities.

32 Other technologies such as molten salt oxidation, biodegradation, etc. are developing, but production facilities are very limited and the technology is still at the experimental stage.

33 A PCS (Pollution Control System) that meets EU environmental emission limits requires a combination of the technologies shown.

34 Nitrogen Oxides.

35 Only those projects dealing purely with ammunition destruction are included. Those dealing with stockpile management can be found in Chapter 8.

Bibliography

AP (Associated Press). 2004. '377 Tons Small Part of Absent Iraq Explosives: Missing Pre-war Stockpiles May Total 250,000 tons'. 31 October. Accessed March 2006. <http://www.msnbc.msn.com/id/6376212>

EU (European Union). 2002. Council Joint Action of 12 July 2002 on the European Union's contribution to combating the destabilising accumulation and spread of small arms and light weapons and repealing Joint Action 1999/34/CFSP. Official, 2002/589/CFSP. <http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_191/l_19120020719en00010004.pdf>

Faltas, Sami and Vera Chrobok. 2004. *Disposal of Surplus Small Arms: A Survey of Policies and Practices in OSCE Countries*. Bonn: BICC, BASIC, Saferworld, Small Arms Survey. January. <http://www.bicc.de/publications/other/small_arms_saferworld/small_arms_report.pdf>

Greene, Owen, Sally Holt, and Adrian Wilkinson. 2005. *Biting the Bullet 18: Ammunition Stocks, Promoting Safe and Secure Storage and Disposal*. Bradford: CICS, IANSA, Saferworld, SEESAC. February. <http://www.international-alert.org/pdfs/btb_brf_18.pdf>

Hughes-Wilson, John and Adrian Wilkinson. 2001. *Safe and Efficient Small Arms Collection and Destruction Programmes: A Proposal for Practical Technical Measures*. New York: UNDP. July. <http://www.undp.org/bcpr/smallarms/docs/sa_prac_meas.pdf>

Kytömäki, Elli and Valerie Yankey Wayne. 2004. *Implementing the UN Programme of Action on Small Arms and Light Weapons: Analysis of the Reports Submitted by States in 2003*. Geneva: UNIDIR.

IMAS (International Mine Action Standards). 2001. *Guide for the Destruction of Stockpiled Anti-Personnel Mines*, 11.10. Geneva: Geneva International Center for Humanitarian Demining (GICHD). <http://www.mineactionstandards.org/IMAS_archive/archived/Amended/IMAS_1110_1.pdf>

IRIN (United Nations Integrated Regional Information Networks). 2005. 'Afghanistan: UN to Deal with Ammunition Stockpiles.' 7 January. Accessed March 2006. <http://www.irinnews.org/report.asp?ReportID=44901&SelectRegion=Central_Asia&SelectCountry=AFGHANISTAN>

OSCE (Organization for Security and Co-operation in Europe). 2003. *Document on Stockpiles of Conventional Ammunition*. FSC.DOC/1/03. Vienna: OSCE. 19 November. <http://www.osce.org/documents/fsc/2003/11/1379_en.pdf>

Pyadushkin, Maxim and Ruslan Pukhov. 2004. 'Russia'. In Sami Faltas and Vera Chrobok. <http://www.bicc.de/publications/other/small_arms_saferworld/small_arms_report.pdf>

Rosbalt News Agency. 2004. 'Ukraine has Trouble with Ammunition Utilization'. Rosbalt News Agency, St Petersburg, Russia, 7 June.

SEESAC (South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons). 2004. *Ammunition Destruction: OBOD Environmental Factors*. Belgrade: SEESAC. 30 May.

—. 2005. *Defence Conversion: the Disposal and Demilitarization of Heavy Weapon Systems*. Belgrade: SEESAC. 31 October.

—. 2006a. *RMDS/G 05.20: SALW Destruction Activities*. Belgrade: SEESAC. 1 March. <http://www.seesac.org/resources/0520e.pdf>

—. 2006b. SEE RMDS/G 05.20. 3rd edition. 1 March 2003.

UNDDA (United Nations Department for Disarmament Affairs). 2001. *A Destruction Handbook: Small Arms, Light Weapons, Ammunition and Explosives*. New York: United Nations. <http://www.un.org/spanish/Depts/dda/desthbk.pdf>

UNGA (United Nations General Assembly). 1997. 'Report of the Panel of Governmental Experts on Small Arms.' UN doc. A/52/298 of 27 August. <http://www.un.org/Depts/ddar/Firstcom/SGreport52/a52298.html>

—. 1999. *Report of the Group of Governmental Experts on Small Arms*. UN Doc A/54/258 of 19 August. <http://www.smallarmssurvey.org/source_documents/UN%20Documents/Other%20UN%20Documents/A_54_258.pdf>

—. 2001a. Protocol Against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, Supplementing the United Nations Convention against Transnational Organized Crime (UN Firearms Protocol). Adopted on 31 May. Reproduced in UN Document A/RES/55/255 of 8 June. <http://www.unodc.org/pdf/crime/a_res_55/255e.pdf>

—. 2001b. *Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects*. UN Document A/CONF.192/15. July. <http://www.smallarmssurvey.org/source_documents/UN%20Documents/UN%202001%20Conference/A_CONF.192_15.pdf>

UNMAS (United Nations Mine Action Service). 2001. Glossary of Mine Action Terms and Abbreviations. IMAS 04.10. Geneva: GICHD. <http://www.gichd.org/fileadmin/pdf/glossary/IMAS_04_10_Glossary_Ed1.pdf>

Wilkinson, Adrian. 2004. 'Preface.' In Sami Faltas and Vera Chrobok, pp. 9–11. <http://www.bicc.de/publications/other/small_arms_saferworld/small_arms_report.pdf>

Destroyed buildings in the Ikeja army barracks in Lagos, Nigeria, January 2002. The damage was caused by the explosion of an ammunition dump. © George Esiri/Reuters

8

Stockpile Management of Ammunition

Adrian Wilkinson

Introduction

The safe, efficient, and effective management of national stockpiles of conventional ammunition and explosives enhances military and police capabilities.[1] It is also an essential element of counter-proliferation and of ensuring the safety of explosives. Efficient logistic and operational processes improve stockpile security and optimize safety. Conversely, poor stockpile management results in the deterioration of ammunition leading to an unsafe environment for local communities. Effective stockpile management also assists stockpile security, reducing illicit proliferation or theft and identifying losses quickly. In order to manage a stockpile properly, there must be a firm understanding of the principles of stockpile management, and of the nature of the ammunition contained in the stockpile.

Stockpile management is an important national responsibility and is one of the most effective mechanisms for ensuring safe storage, security, and a reduction in the risks of illicit proliferation to conflict zones or organized crime. This chapter concentrates primarily on the large national stockpiles of states, and also on production facilities. Private stockpiles are usually small and should be covered by the safety legislation applied to national stockpiles. The chapter is a starting point for those who wish to understand why safe, effective, and efficient ammunition stockpile management is such an important global political issue, and how it could be enhanced by national and international initiatives.[2] It is not intended to cover the technical requirements of stockpile management in any detail because 'best practice' guides are readily available (OSCE, 2003a).

Stockpile management is a wide-ranging term when applied to ammunition. It can be defined as those procedures and activities regarding ammunition safety and security, including accounting, storage, transportation, and handling.[3] It includes:

- Definition of stockpile types;
- Determination of required stockpile levels;
- Location of stockpiles;
- Financial management of stockpiles;
- Accounting for ammunition;
- Safety, storage, and transport of ammunition;
- Security of stockpiles; and
- Disposal, demilitarization, and destruction of surplus ammunition.[4]

Experience has shown that it is unlikely that many states could achieve international best practice (often equated with 'NATO standards')[5] of ammunition storage infrastructure without significant capital investment. Donors have, to date, shown a reluctance to fund such projects since, although they improve safety and security, they can also improve the operational capacity of armed forces. Yet stockpile management is about much more than infrastructure development. It also includes the development and implementation of appropriate processes, procedures, and staff development, all of which contribute to the safe, effective, and efficient management of ammunition stocks.

Developing the capacity of individuals to international best practice levels is expensive and, once trained, these individuals become highly marketable in the international community.[6] A balance must be struck, however, if standards of explosive safety and security are to be improved in many states. Relatively low levels of donor investment in tailored infrastructure, procedural developments, and staff training can make a significant impact on risk reduction. It is this that should be the initial aim of donor programmes, rather than trying to achieve 'NATO standards' of storage or ammunition management as the first priority.[7] Such investment should only be determined by qualified and competent personnel. The donor community should agree on what that competency level should be.[8] In some regions there have been inappropriate interventions that have had little lasting impact.

Box 1 Shelf life vs. stability

Shelf life is defined as the length of time an item of ammunition may be stored before the performance of that ammunition degrades. **Stability** represents the physical and chemical characteristics of ammunition that affect its safety in storage, transit, and use.

The fact that shelf life has expired is often used by states at international meetings and conferences to justify the use of donor resources to fund stockpile destruction. This is technically inaccurate since shelf life only provides an indication of the performance of ammunition, and not necessarily of its safety and stability in storage.

The safety and stability of ammunition and explosives can only be established by a comprehensive 'ammunition surveillance system' that uses as its methodology both physical inspection by trained personnel and chemical analysis. Only then can safety in storage be properly assessed. The use of ammunition surveillance can then be used to extend shelf life if appropriate.

Ammunition may deteriorate or become damaged unless it is correctly stored, handled, and transported. As a result, it may fail to function as designed and become dangerous in storage, handling, transit, and use. Stockpile management, in accordance with best international practices, is an important component in ensuring that a government (or international organization) fulfils its duty of care by ensuring that an ammunition stockpile is looked after correctly.

The concept of 'shelf life' versus 'stability' is important to understand as there are some misconceptions about this issue in the wider donor and international community (see Box 1).

Defining types of ammunition stockpiles

There may be a range of ammunition stockpiles in a country under the control of separate organizations such as the police, military forces (both active and reserve), border guards, ammunition producing companies, and so on. Each should have the following generic parts:

- **Operational ammunition:** the ammunition necessary to support the routine operations of the organization or agency over an agreed period of time.
- **War reserve ammunition:** the ammunition necessary to support the operations of the organization or agency in an external conflict or general war over an agreed period of time, often 30 days at intensive expenditure rates.

- **Training ammunition:** the ammunition necessary to support routine training in the organization or agency, usually an agreed percentage of the war reserve holdings which can be up to 15 per cent of the war reserve.
- **Experimental ammunition** (if the state produces ammunition).[9]
- **Production ammunition:** ammunition awaiting sale and still under the control of the manufacturer.[10]
- **Ammunition awaiting disposal:** ammunition and explosives identified as unserviceable, unstable, or surplus to requirements.

The total of all of these generic parts at all locations within a country could be referred to as the 'national stockpile'.

All ammunition in the national stockpile should be classified by its physical and chemical condition. Box 2 presents one possible system of classification.[11] The condition of the ammunition is used to define its degree of serviceability and any constraints imposed on its use. Using the classification system in Box 2, it is possible that ammunition classified as B4 (shelf life expired) is not an urgent priority for disposal. Further technical investigation might extend its shelf

Box 2 Example of a classification system for a national ammunition stockpile (based on the system currently used in the UK)

Classification of ammunition condition:

Condition A: Serviceable stocks available for use

Condition B: Stocks banned from use pending a technical investigation

- B1 – Unrestricted handling and movement;
- B2 – Subject to handling or movement constraint;
- B3 – Applicable to certain lot and batch numbers only;
- B4 – Shelf life expired.

Condition C: Stocks unavailable for use pending technical inspection, repair, modification, or test

- C1 – Minor processing or repair required;
- C2 – Major processing or repair required;
- C3 – Awaiting inspection only;
- C4 – Awaiting manufacturers processing or repair.

Condition D: Stocks for disposal

- D1 – Surplus but serviceable stocks;
- D2 – Unserviceable stocks.

Box 3 Condition Groups (CG) (based on the system currently used in the UK)

Critical: defects affecting safety in storage, handling, transportation, or use;

Major: defects that affect the performance of the ammunition and that require remedial action to be taken;

Minor: defects that do not affect the safety or performance of the ammunition but are of such a nature that the ammunition should not be issued prior to remedial action having been taken;

Insignificant: any defect that does not fall into any of the above categories but could conceivably deteriorate if no remedial action is taken;

Technical: any defect that requires further technical investigation.

life because, for example, it could identify that propellant performance is still within ballistic limits. Shelf life is an indication of the performance capability of the ammunition. Only physical inspection and ammunition surveillance can determine its safety or stability in storage.

When ammunition is subject to inspection and surveillance,[12] which is part of good stockpile management practice, it is inevitable that defects will be found. These defects will determine which 'Condition Group' the ammunition is placed in, and can be categorized accordingly (see Box 3). National authorities should therefore develop an ammunition stockpile management system that allows the condition of the ammunition to be clearly defined. Only in this way can disposal or destruction be prioritized on safety and security grounds.

Accounting for ammunition

Ammunition accounting is perhaps one of the most important components of stockpile security and safety. Accurate ammunition accounts are an essential part of stockpile management as a control measure in their own right because they can quickly identify stock losses. They are also essential to the effective technical surveillance of ammunition. Inventory management and accounting control procedures must be implemented at all levels of responsibility for stockpile facilities and there should be an organized system of regular reporting in order that accountability, transparency, and confidence can be maintained.

Ideally, a computerized and networked inventory system should be developed to meet the ammunition accounting needs of the national system. Such systems greatly facilitate accounting and audit procedures because information is easily accessible and can be recovered rapidly. If such as system is not possible, paper-based accounting systems can also be very effective—although they are more labour intensive and time-consuming.

Physical stock checks must be conducted at all ammunition stockpiles on a regular basis. Both quantities and lot or batch numbers should be checked. Significant resources are required in order to ensure accuracy and timeliness but without independent stock checks the whole credibility and accuracy of the accounting system is undermined: fraud becomes possible and stock losses go undetected. It is also critical that any stock losses are investigated as soon as possible by an independent authority and that the relevant security agencies are

A teenager hawks bullet cartridges for Kalashnikov rifles on the side of the main north–south highway south of Tirana, Albania. He took the cartridges from an abandoned army depot nearby and sold them for USD 3 each.
© BC Albania Lezhe/Reuters

informed. The issue of stock losses is a sensitive one and national authorities are often not prepared to release details. Media allegations are not usually commented on by governments so the true picture is often difficult to identify. One recent example, quoted in the Bosnian newspaper *Nezavisne Novine*, suggests that *inter alia* 50,400 rounds of small arms ammunition, 126 high-explosive hand grenades, and 8 Zolja handheld rocket launchers disappeared between the Safet Zajko Barracks in Hadzici and Iraq (SEESAC, 2006). The ammunition was meant to support the Bosnia and Herzegovina Army deployment to Iraq but never arrived. The newspaper sources doubted whether it had ever left Bosnia and Herzegovina.

There is no such thing as perfect accuracy in an ammunition account. It only takes one person to issue the right type of ammunition from the wrong batch or lot number and the accuracy of the ammunition account is compromised. If a nation insists that their stockpiles are 100 per cent accurate, and that they can account for every item of ammunition, their credibility should be questioned: they either do not understand the complexities of ammunition accounting, or their systems lack the accuracy necessary for safe and secure storage. Either scenario should be of concern to the international community.

The location of ammunition stockpiles

The safe storage of ammunition is a national responsibility. There are no specific international regulations or codes of practice that directly relate to it. However, international organizations do have consolidated literature that covers this technical area. The 'NATO Allied Ammunition Storage and Transportation Publications 1 and 2 (AASTP-1 and 2): Safety Principles for the Storage and Transport of Military Ammunition and Explosives' (NATO, n. d.) is an excellent example that covers location requirements and explosive safety distances.

The environmental requirements (temperature, humidity, and vibration) of ammunition vary, and are dependent on their intended storage conditions (including shelf life), transportation, handling, and use. The performance of explosives will be unpredictable and their safety will be reduced if the manufacturers' environmental conditions are not met while in long-term storage. Some substances used in ammunition attract and hold moisture, which may result in the degradation of explosive performance. It may also cause them to become

Aerial photograph of a NATO Standard Ammunition Storage Area. © Army School of Ammunition, UK

dangerous to handle because of the potential for the formation of sensitive explosive crystals between the fuse and main body of the munition. Rain, dampness, and humidity can cause enormous damage to ammunition in a short time. According to the AASTP-1 and 2, every effort should be made to ensure dry conditions during storage and transportation. In general, while in storage, explosives should be kept dry and well ventilated, as cool as possible, and free from excessive or frequent changes in temperature. They should also be protected from direct sunlight and kept free from constant or excessive vibration.

The financial management of stockpiles

Ammunition is an expensive commodity. It could be regarded as a national 'insurance' policy in the event of conflict: it is hoped that it will never be needed, but lengthy production times and national security commitments mean that it must be procured in advance and available on demand. This all comes at a cost, which includes:

- Initial procurement costs (including research, development, and purchase costs);

- Additional training requirements for simulators and training manuals, and so on;
- Stockpile security costs;[13]
- Stockpile storage costs;
- Stockpile maintenance and repair costs; and
- Final disposal costs.

The national authority should develop financial accounting systems to identify the true cost of the procurement, maintenance, and final disposal of the defence stockpile. Once the ammunition has reached the end of its useful shelf life, it may well be the case that disposal of the ammunition is a cheaper option, in the mid- to long-term, than continued storage. The financial accounting system should be sophisticated enough to enable such decisions to be made.

Determination of required stockpile levels[14]

It is the national right and responsibility of governments to assess their own security situation in accordance with their legitimate security needs, and hence to decide on the size and structure of their military and security forces in order to achieve these tasks as well as to decide how these forces should then be equipped.[15]

The determination of national ammunition stockpile levels is intrinsically linked to any security sector reform initiatives that may be taking place. The determining factors for the size of a national stockpile will therefore be the constitutional mandate,[16] the force structure, the strategic concept of deployment,[17] and equipment levels. Once these have been determined, the physical quantity of ammunition necessary to support the force's requirements can be determined.

One method of calculating the required size of a national stockpile is to use the concept of Daily Ammunition Expenditure Rates (DAER). The DAER for a specific type of ammunition is the amount of ammunition that a single piece of equipment, for instance an artillery gun, will use in one day of combat or conflict at a certain level of intensity. These figures should be determined by operational analysis and are usually classified. For example, it could be decided that the DAER for an 81 mm mortar, at Intensive War rates, is 70 rounds per day. Therefore, 16,800 rounds of ammunition would be required in order to sustain a Mortar Section of 8 mortars over a 30-day period at Intensive War rates. A sample spreadsheet for calculating DAERs is presented in Table 1.

The size of defence stockpile required can thus be calculated from an analysis of the DAER sustainability requirements needed to support the national defence and security strategy. For example, it might be decided that the initial defence stockpile should be made up of the following DAER components:

- Operational Stocks (Police): 20 DAER at PSO rates
- Operational Stocks (Military): 10 DAER at General War (Light) Rates
- War Reserve: 25 DAER at General War (Intensive) Rates
- Training Stocks: 10 per cent of Defence Stockpile

The rate of ammunition usage in training, or during operations, and the condition of the ammunition over a period of time will then determine the restocking requirements of the defence stockpile. National authorities may choose to select a percentage Re-Order Level (ROL), at which point new stocks are procured while surplus stocks are then disposed of.

Table 1 Example of DAER calculation

Equipment	DAER			Force equipment level	Number of days	Force DAER sustainability requirement		
	PSO	GW (L)	GW (I)			PSO	GW (L)	GW (I)
Assault Rifle 5.45 mm Ball	20	60	120	600	30	360,000	1,080,000	2,160,000
Rocket Anti Tank RPG 7	1	4	20	100	30	3,000	12,000	60,000
Mortar 60 mm High explosive (HE)	1	10	20	40	30	1200	12,000	24,000
152 mm Gun HE	0	50	200	20	30	0	30,000	120,000

Notes: PSO= Peace Support Operations; GW(L)= General War (Light Rates); GW(I)= General War (Intensive Rates).

Ammunition safety

Risks and hazards presented by large ammunition stockpiles

The perceptions that members of the international community have of the hazards and risks associated with ammunition and explosives are usually linked to their knowledge of the explosive effects of the military, commercial, or 'terrorist' use of explosives. This knowledge is constrained by limited media coverage of the hazards associated with inappropriate stockpile management and also by the secrecy that surrounds this issue.

It is an unfortunate fact that ammunition storage can never be 100 per cent safe, that is, there can never be a total absence of risk, and the best that can be achieved is 'tolerable risk' (see Box 4). Tolerable risk can only be achieved by deploying a wide range of technical responses that are outside the scope of this chapter. It is appropriate, however, to highlight that, in terms of national stockpiles, the hazard is the physical presence of the ammunition while the risk is primarily dependent on: the physical and chemical condition of the ammunition; the training and education of the personnel responsible for the storage and surveillance of the stockpiles; the handling, repair, maintenance, and disposal systems in place; and the storage infrastructure and environment.

Tolerable risk can only be achieved if ammunition management systems and storage infrastructure are of an appropriate standard or in accordance with best practice. A recent desk study by the Geneva International Centre for Humanitarian Demining (GICHD), supplemented by subsequent research, identified

Box 4 Definitions: hazard vs. risk

Hazard: A potential source of harm.

Risk: A combination of the probability of occurrence of harm and the severity of that harm.

Tolerable Risk: Risk that is accepted in a given context based on the current values of society.

Risk Analysis: The systematic use of available information to identify hazards and estimate risk.

Risk Evaluation: A process based on risk analysis to determine whether tolerable risk has been achieved.

Risk Assessment: The overall process comprising a risk analysis and a risk evaluation.

Source: ISO, 1999

a number of recent explosive events that occurred because of inappropriate explosive storage or safety procedures (GICHD, 2002).[18] The study clearly indicates that in almost all post-conflict environments and in many developing countries there is a physical risk to communities from the presence of abandoned, damaged, or inappropriately stored and managed stockpiles of ammunition. Table 2 summarizes the findings of recent research undertaken by GICHD and the South Eastern and Eastern Europe Clearinghouse for the Control of Small arms and Light Weapons (SEESAC). It should be emphasized, however, that these are only the known incidents. The research data was obtained from Internet searches and a limited response to a formal request for information.[19] There are likely to be many more incidents that have yet to be identified. It should also be noted that three significant incidents—one in Nigeria in 2002 and two in North Korea in 2004—strongly affect the statistics for those particular years.

There are many possible causes of undesirable explosions in ammunition depots, but these can usually be attributed to the following generic areas: deterioration of the physical or chemical condition of the ammunition and explosives; unsafe storage practices and infrastructure; unsafe handling and transportation practices; or deliberate sabotage.

Regrettably, the dramatic consequences of an ammunition explosion normally make the key witnesses to the event its first victims. Therefore any subsequent investigation tends to concentrate on the practices and regulations in force at

Table 2 Major explosive events at ammunition depots, 2000–05

Year	Number of countries	Number of explosive events	Casualties	
			Fatalities	Injuries
2000	4	4	111	236
2001	10	16	70	243
2002	11	16	more than 1,586[20]	558
2003	9	18	163	354 or more
2004	9	18	91[21]	more than 1,292[22]
2005	13	17	138	more than 477

Source: GICHD and SEESAC research

the time. Because a degree of technical knowledge is required in order to carry out an effective investigation, the authority responsible for ammunition management and storage is usually also the investigating authority. This affects the impartiality and independence of the investigation and leads to a reluctance to allocate responsibility. The limited information available suggests several major causes for recent explosions (see Table 3).[23]

If the three major identified causes are statistically valid for all ammunition depot explosions, which would not seem unreasonable, then it is clear that the risk of undesirable explosions could be significantly reduced with sound training, the development of appropriate ammunition management systems, and the short-term prioritization of stocks for destruction and their subsequent destruction on a priority basis.

The number of explosions with an unknown cause is more of a concern. This suggests either a lack of transparency on the part of the authorities or a shortage of the technical skills required to properly investigate such incidents. In either case, the remedial action necessary to prevent a recurrence is unlikely to take place, and further explosions can be expected.

The casualties, and the damage to and impact on communities, from an explosion in an ammunition depot can be devastating. The economic costs of

Table 3 **Suggested causes of recent ammunition depot explosions (2000–05)**

Cause	Total	%
Cause not known or unconfirmed	26	30.6
Fire[24]	22	25.9
Movement or handling	17	20.0
Auto-ignition of propellant[25]	7	8.2
Lightning strike	5	5.9
Sabotage	4	4.7
Ammunition instability	2	2.4
Human error or lack of security	2	2.4

Source: GICHD 2002, p. 12, updated with SEESAC data from 2003–04

Afghans search for survivors through the ruins of a house that was destroyed by a blast at an illegal ammunition dump in the northern province of Baghlan, 120 km north of Kabul. © Sayed Khalid/Reuters

the subsequent Explosive Ordnance Disposal (EOD) clearance can be far greater than the prior implementation of safer procedures, limited infrastructure development, and stockpile disposal would have been. It is difficult to identify the real costs of clearance because, in cases where this has been necessary, government financial systems have lacked the sophistication to calculate accurately the real costs. A comparison with the costs of humanitarian mine and Unexploded Ordnance (UXO) clearance would not be inappropriate in terms of costs per square metre.[26]

It is also important to remember that there will inevitably have been a number of 'near misses', where an undesirable explosive event has been prevented or contained by the ammunition management or storage practices in place at the time. A major problem, however, is that during conflict, in post-conflict environments, or during force restructuring as part of security-sector reform, the specialist technical personnel that should be responsible for ammunition management may well have become casualties or left the armed forces. These personnel are difficult to replace without a comprehensive and effective training programme.

There are also economic costs in terms of the capital value of the stockpile itself. Although this is really a factor for national consideration, the international donor community should be interested because national finances for replacement stocks could potentially have been allocated to social and economic development. The ammunition explosion in Bharatpur, India, on 28 April 2000 resulted in an estimated ammunition stock loss of USD 90 million (GICHD, 2002, p. 12). The explosion was the result of a fire at the ammunition depot, which was exacerbated by excessive vegetation. Ironically, the grass had not been cut for two years as a cost-saving measure.

Table 4 **Sample ammunition destruction priorities from a security perspective**

Ammunition type	Priority	Remarks
MANPADS	1	Risk to civil aviation
Detonators	1	Risk of use in Improvised Explosive Devices (IED)
Bulk Explosives	1	
Anti-Tank Mines	1	Similar risks to bulk explosives
Anti-Personnel Mines	1	Mine Ban Treaty requirement
Small Arms Ammunition	1	Up to 14.5 mm calibre, general conflict, increases risk of Close Quarter Assassination (CQA)
High Explosive Hand- or Rifle-Grenades	1	
Anti-Tank Missiles[27]	1	Vehicle / helicopter attacks and ambushes
Anti-tank rockets[28]	1	
Artillery ammunition (high explosive)	2	Can be used in place of bulk explosive in IED[29]
Mortar ammunition (high explosive)	2	
Tank ammunition (high explosive)	2	
Artillery ammunition (carrier/smoke)	3	
Mortar ammunition (carrier/smoke)	3	
Tank ammunition (non-explosive)	3	
Surface to Air Missiles (system-based)	3	
Free Flight Rockets (FFR)	3	
Anti-Tank Missiles (system-based)	3	
Pyrotechnics	3	

Note: This table only considers Land Service Ammunition (LSA).

Stockpile Security

Detailed strategic guidance on the physical security of ammunition stockpiles is well documented in the OSCE *Best Practice Guide on National Procedures for Stockpile Management and Security* (OSCE, 2003a). The technical issues related to ensuring appropriate security are therefore not discussed in this chapter. The security risks attached to the proliferation of ammunition and explosives to terrorist groups, warring factions, and criminals are also widely documented.[30] This chapter therefore concentrates on the security aspects of proliferation in relation to prioritizing ammunition disposal.

Arguably, every type of ammunition or explosive could be utilized by terrorists, armed groups, warring factions, or criminals. From a practical perspective, however, certain types must be considered to be much more desirable and useful to such organizations. The destruction of surplus stocks of these particular ammunition types should therefore be a priority, with the 'less desirable' ammunition types having a lower destruction priority unless there is a clear humanitarian priority based on its future stability in storage.[31] Table 4 recommends generic destruction priorities based on security considerations—although local security concerns, terrorist tactics, armed forces restructuring, national defence priorities, and market forces may well affect the order of priority.

International initiatives for ammunition stockpile management

There is no international law that covers stockpile management of ammunition because the implementation of appropriate standards and procedures is a national responsibility. Consequently, such standards and procedures vary widely and many do not conform to international 'best practice'. There are, however, a number of international or regional agreements that can be applied to ammunition stockpile management to varying degrees (see Box 5).

The UN Secretary-General reported in 1999 that the UN, supported by donors, had been involved in the safe storage, disposal, and destruction of weapons but stated that 'the number and scale of such programmes remains small compared with the apparent requirements' (UNGA, 1999, para. 66). In spite of some limited progress there is still a huge disparity between even known needs and international donor support.

Box 5 International and regional agreements and instruments

In Sec. II, Para. 18 of the *United Nations Programme of Action on Small Arms and Light Weapons* (UNGA, 2001) participating states agreed 'to regularly review, as appropriate, subject to the respective constitutional and legal systems of States, the stocks of small arms and light weapons held by armed forces, police and other authorized bodies and to ensure that such stocks declared by competent national authorities to be surplus to requirements are clearly identified, that programmes for the responsible disposal, preferably through destruction, of such stocks are established and implemented and that such stocks are adequately safeguarded until disposal'. In this instance it was understood that the term small arms and light weapons included ammunition of less than 100 mm calibre. The agreement does not cover heavier calibres, for which no international agreement exists.

At the regional level the OSCE Document on Stockpiles of Conventional Ammunition (OSCE, 2003c) is perhaps the most wide-ranging instrument at the moment. In this instrument states 'recognize the security and safety risks posed by the presence of stockpiles of conventional ammunition, explosive material and detonating devices in surplus and/or awaiting destruction in some States in the OSCE area'. The document goes on to 'establish a practical procedure, requiring minimal administrative burden, to address these risks by providing assistance for the destruction of these stockpiles and/or upgrading stockpile management and security practices'.

The European Union has also been active in this area, committing member states to building consensus in relevant international forums, and in a regional context as appropriate, on the following (EU, 2002, article 4):

- 'Assistance as appropriate to countries requesting support for controlling or eliminating surplus small arms and their ammunition on their territory, in particular where this may help to prevent armed conflict or in post-conflict situations';
- 'The promotion of confidence-building measures and incentives to encourage the voluntary surrender of surplus or illegally-held small arms and their ammunition, (. . .) such measures to include compliance with peace and arms control agreements under combined or third party supervision (. . .)'; and
- 'The effective removal of surplus small arms encompassing safe storage as well as quick and effective destruction of these weapons and their ammunition, preferably under international supervision'.

In spite of growing political awareness of the issue, to date, the international response to ammunition stockpile management as a global issue has been extremely limited in terms of financial support. The reasons for this are linked to the amount of finance required for infrastructure development, as well as the fact that it is not a major issue for some donors, and that other donor mandates do not allow for it. Finally, there are only a limited number of major donors engaged in the issue. The only known international initiatives support-

Table 5 **International initiatives supporting stockpile management**

Date	Country	Agency	Donor(s)	Project	Remarks
1998	Albania	NATO IS [International Staff]	NATO	Ammunition management training	EODASTT*
2000	Cambodia	European Union	European Union	EUSAC–stockpile safety and security	
2002	Albania	EOD Solutions	United Kingdom United States	Ammunition management training	
2005	Tajikistan	OSCE	Various	Stockpile security	
Planned or possible					
2006	Belarus	OSCE	Switzerland United Kingdom	Stockpile security	Negotiations ongoing. Not fully funded.

* EODASTT is the NATO EOD and Ammunition Support Training Team that was deployed in Albania from September 1998 to July 2000.

ing ammunition stockpile management at the operational level are summarized in Table 5. Current levels of assistance will need to be dramatically increased if the true scale of the problem is to be seriously addressed. This presents serious challenges in terms of donor (and wider) awareness, understanding the complexities of the issues involved, and commitment of both financial and technical resources.

Conclusion

In common with virtually all other aspects of the ammunition issue, the management of ammunition stockpiles has not yet been accorded sufficient priority as a thematic issue on the global political agenda. Yet the risks of proliferation, theft, and illicit trade have long been recognized, and ammunition continues to sustain conflict around the world. Unless specifically targeted as a security and proliferation issue, this trend will continue.

It is not so much a lack of national political will when it comes to improving ammunition stockpile management (although this does exist in certain countries) as a lack of national capacity. This can only be developed with the financial and technical assistance of donors, which is sadly lacking. Of equal importance is the acceptance by developing and post-conflict states that the systems they inherited are not up to the task. A fundamental change of attitude towards stockpile management, and the development of an ethos of explosive safety, are prerequisites for success in any stockpile management programme. Without this, any funds spent on infrastructure development will have only minimal effect.

Stockpile management is as much about developing and implementing appropriate procedures and processes as it is about storage and security infrastructure. Developing and implementing processes and procedures is usually cheaper than infrastructure improvements although, in some cases, both will be necessary in order to ensure an adequate level of safety and security.

Concrete steps are required now to broaden donor interest, participation, funding, and support. These steps should initially include building international political momentum to identify the true size of the problem. Governments should be strongly encouraged to increase transparency with the international community in their ammunition management systems, and to accept that many of their systems are not up to the task and require radical reform. Such steps should lead to the inclusion of ammunition stockpiles as a separate generic issue in arms control instruments, small arms and light weapons agreements or protocols, and funding plans.

Annexe Explosive events in ammunition depots, 1997–2005[32]

This annexe contains details of known or suspected explosive events at ammunition storage areas over the past eight years. The data has been obtained from a range of open sources, and is therefore only as accurate as the relevant sources. National authorities should be contacted for further definitive information. The table is intended to illustrate the risks and hazards posed by stockpiled ammunition to civilian communities.

No.	Date	Country	Location	Casualties		Remarks/possible cause	Source
				Fatal	Injured		
1997							
1	March 97	**Albania**	15 locations	56	59	Human error and security	NATO Ammunition Storage and Disposal Implementation Team[33]
2	07 Nov. 97	**Russia**	Vladivostok	?	?	Not known	BBC, 1997
1998							
3	21 Feb. 98	**Russia**	Volgograd	0	0	Not known	GICHD, 2002
4	21 Feb. 98	**Russia**	Engels	0	0	Not known	GICHD, 2002
5	02 June 98	**Iran**	Saltanat-Abad	?	?	Sabotage or security	People's Mojahedin Organization of Iran, 1998
6	18 June 98	**Russia**	Ural Mountains	14	17	Lightning	GICHD, 2002
7	17 July 98	**Sudan**	Khartoum	0	?	Not known	BBC, 1998
8	01 Dec. 98	**Philippines**	Tarlac City	0	?	Fire	Philippine Headline News Online, 1998
1999							
9	09 Oct. 99	**Afghanistan**	Mazar-e-Sharif	7	12	Movement or handling	GICHD, 2002
2000							
10	14 April 00	**Congo**	Kinshasa	101	more than 200	Fire	BBC, 2000a
11	29 April 00	**India**	Bharatpur	2	10	Fire	BBC, 2000b

12	26 May 00	**Afghanistan**	Kabul	0	?	Not known	BBC, 2000c
13	24 Oct. 00	**Iran**	Mashhad	8	10	Not known	BBC, 2000d
2001							
14	03 Mar. 01	**Guinea**	Conakry	10	Not known	Not known	GICHD, 2002
15	29 April 01	**India**	Panthankot	0	0	Spontaneous combustion (?)	BBC, 2001a
16	29 April 01	**USA**	Arkansas	?	?	Not known	GICHD, 2002
17	20 May 01	**Yemen**	Al-Bayda	14	50	Not Known	GICHD, 2002
18	24 May 01	**India**	Mirdhwal / Suratgarh	1	5	Fire	BBC, 2001b
19	08 June 01	**Vietnam**	Hoa They	0	4	Not known	GICHD, 2002
20	08 June 01	**Russia**	Ramenskoye	0	0	Electrical fault	NATO/MSIAC, n.d.
21	23 June 01	**Russia**	Nerchinsk	5	1	Lightning	GICHD, 2002
22	11 July 01	**Afghanistan**	Darulaman	?	3	Not known	BBC, 2001c
23	21 July 01	**Russia**	Buryatia, Siberia	3	4	Fire / lightning strike	Deutsche Presse-Agentur, 2001
24	08 Aug. 01	**Kazakstan**	Balkhash, Almaty	0	0	Spontaneous combustion	BBC, 2001d; Taukina, 2001
25	16 Aug. 01	**India**	Tamil Nadu	25	3	Not known	GICHD, 2002
26	06 Sep. 01	**Kazakhstan**	Almaty	0	0	Fire	Central Asia – Caucasus, 2001
27	27 Sep. 01	**Indonesia**	Java	1	?	Not known	NATO/MSIAC, n.d.

28	25 Oct. 01	**Thailand**	Korat (Pak Chong)	19	90	Handling / propellant auto-ignition	NATO/MSIAC, n.d.
2002							
29	05 Jan. 02	**Sierra Leone**	Tongo Field	6	12	Handling	Sierra Leone Web, 2002
30	11 Jan. 02	**India**	Bikaner	2	12	Handling	NATO/MSIAC, n.d.
31	27 Jan. 02	**Nigeria**	Lagos	1,500+	Not known	Fire	GICHD, 2002
32	29 Jan. 02	**Thailand**	Pak Chong	?	?	Unstable ammunition awaiting destruction	BBC, 2002a
33	07 Mar. 02	**Afghanistan**	Kandahar	0	0	Fire	NATO/MSIAC, n.d.
34	08 Mar. 02	**Sri Lanka**	Kankesanturai	0	0	Ammunition stability	GICHD, 2002
35	28 Mar. 02	**Thailand**	Aranyaprathet	0	5	Propellant auto-ignition	NATO/MSIAC, n.d.
36	05 May 02	**Guinea**	Conakry	?	?	Not known	BBC, 2002b
37	28 June 02	**Afghanistan**	Spin Boldak	32	70	Sabotage (?)	BBC, 2002c
38	10 July 02	**Russia**	Buryatia	3	11	Fire / lightning strike	NATO/MSIAC, n.d.
39	10 Aug. 02	**Afghanistan**	Jalalabad	26	90	High temperature (?)	NATO/MSIAC, n.d.
40	16 Oct. 02	**Russia**	Vladivostok	0	0	Demolitions	NATO/MSIAC, n.d.
41	30 Oct. 02	**Mozambique**	Beira	?	?	Lightning (?)	International Federation of Red Cross and Red Crescent Societies, 2004
42	12 Nov. 02	**Nicaragua**	Managua	5	5	Handling	NATO/MSIAC, n.d.
43	20 Nov. 02	**Ecuador**	Riobamba	7	274	Handling	NATO/MSIAC, n.d.

2003							
44	23 Jan. 03	**Peru**	Tumbes	7	98	Not known	NATO/MSIAC, n.d.
45	23 Mar. 03	**Ecuador**	Guayaquil	0	12	Not known	NATO/MSIAC, n.d.
46	26 April 03	**Iraq**	Zafaranyah	12	?	Fire or sabotage	BBC, 2003a
47	05 May 03	**Vietnam**	Thay Nguyen	2	31	Fire	NATO/MSIAC, n.d.
48	June 03	**Russia**	Mari El	5	0	Not known	Mosnews.com, 2005
49	01 June 03	**India**	Jodphur	0	0	Fire	NATO/MSIAC, n.d.
50	09 June 03	**Iraq**	Karbala	0	0	Not known	AFP, 2003
51	09 June 03	**Iraq**	Ad Diwaniyah	3	2	Not known	AFP, 2003
52	22 June 03	**Iraq**	Najaf	40	0	Handling	NATO/MSIAC, n.d.
53	28 June 03	**Iraq**	Haditha	30	6	Not known	NATO/MSIAC, n.d.
54	30 June 03	**Iraq**	Haditha	15	4	Handling	Soldier's Blog, n.d.
55	12 July 03	**Russia**	Vladivostok	0	13	Firecracker in ASA	NATO/MSIAC, n.d.
56	16 July 03	**Angola**	Menongue	2	15	Fire	
57	03 Aug. 03	**Afghanistan**	Aqcha	13	20+	Handling	BBC, 2003b
58	17 Aug. 03	**Iraq**	Tikrit	12	0	Handling (?)	NATO/MSIAC, n.d.
59	04 Sep. 03	**Iraq**	Rutbah	3	16	Not known	NATO/MSIAC, n.d.
60	19 Sep. 03	**Afghanistan**	North of Kabul	6	0	Not known	NATO/MSIAC, n.d.
61	19 Sep. 03	**Afghanistan**	East of Kabul	9	0	Not known	NATO/MSIAC, n.d.
62	10 Oct. 03	**Ukraine**	Artyomovsky	?	?	Fire	Signs of the Times, 2003

2004							
63	Feb. 04	**North Korea**	Seonggang	1,000?	Not known	Unconfirmed	Greene, Holt, and Wilkinson, 2005
64	Feb. 04	**Paraguay**	Asuncion	0	0	Fire	Greene, Holt, and Wilkinson, 2005
65	01 Feb. 04	**Iraq**	Karbala	20	0	Not known	NATO/MSIAC, n.d.
66	19 Feb. 04	**India**	Amritsar	0	30	Not known	NATO/MSIAC, n.d.
67	25 Feb. 04	**Philippines**	Quezon City	0	4	Fire	NATO/MSIAC, n.d.
68	09 April 04	**Vietnam**	Ho Chi Minh City	1	4	Excessive heat	AFP, 2004a
69	22 April 04	**North Korea**	Ryongchon	54	1,200+	Transport	GlobalSecurity.org, n.d.
70	02 May 04	**Iraq**	Kirkuk	0	0	Security or sabotage	Information Clearing House, 2004
71	06 May 04	**Ukraine**	Novobogdanovka	5	9	Human error	ITAR-TASS, 2004a
72	10 July 04	**India**	Amlanagar	0	2	Fire	Ndtv.com, 2004
73	11 July 04	**Afghanistan**	Herat	5	31	Sabotage	AFP, 2004b
74	26 Aug. 04	**India**	Chowdar	0	0	Fire	The International News, 2004
75	06 Nov. 04	**Taiwan**	Chishan	3	0	Handling	NATO/MSIAC, n.d.
76	07 Dec. 04	**Russia**	Chechyna, Achkhoi-Martan	0	0	Fire	ITAR-TASS, 2004b
77	29 Dec. 04	**Taiwan**	Kinmen	0	0	Fire	NATO/MSIAC, n.d.

2005							
78	09 Jan. 05	**Iraq**	As Suwayrah	8	11	Handling / demolitions	GlobalSecurity.org, 2005
79	23 Feb. 05	**Sudan**	Juba	80	250+	Extreme heat	IRIN, 2005
80	23 Feb. 05	**Nigeria**	Kaduna	4	?	Unknown	Biafra Nigeria World News & Archives, 2005
81	04 Mar. 05	**Ivory Coast**	Abidjan	2	1	Unknown	NATO/MSIAC, n.d.
82	31 Mar. 05	**Cambodia**	Andong Chenh	6	20	High temperature	NATO/MSIAC, n.d.
83	01 April 05	**Lebanon**	Majadel	0	0	Lightning	NATO/MSIAC, n.d.
84	10 April 05	**Italy**	Baiano di Spoleto	0	5	Not known	NATO/MSIAC, n.d.
85	02 May 05	**Afghanistan**	Bajgah	28	13+	Illegal storage or sabotage?	BBC, 2005
86	17 May 05	**Russia**	Kronstadt	0	6	Handling	Mosnews.com, 2005
87	18 June 05	**Guatemala**	Guatemala City	0	0	Fire	NATO/MSIAC, n.d.
88	25 June 05	**Afghanistan**	Rustaq	7	16	Handling (electrical spark?)	NATO/MSIAC, n.d.
89	23 July 05	**Ukraine**	Novo-Bogdanovka	0	0	Grass fire	ITAR-TASS, 2005
90	09 Sep. 05	**Taiwan**	Matsu	0	0	During demilitarization operations	NATO/MSIAC, n.d.
91	09 Sep. 05	**Taiwan**	Tashu	3	0	Ammunition production	NATO/MSIAC, n.d.
92	12 Sep. 05	**Philippines**	Taguig City	0	107	Lightning?	NATO/MSIAC, n.d.
93	30 Sep. 05	**Russia**	Kamchatka	0	1	Internal fire (?)	TRIntel, 2005

List of abbreviations

AASTP	NATO Allied Ammunition Storage and Transportation Publications
CCW	Convention on Certain Conventional Weapons
CG	Condition Groups
CQA	Close Quarter Assassination
DAER	Daily Ammunition Expenditure Rate
ERW	Explosive Remnants of War
EOD	Explosive Ordnance Disposal
EODASTT	NATO EOD and Ammunition Support Training Team
EUSAC	European Union Assistance Team for Small Arms Management in Cambodia
FFR	Free Flight Rocket
GICHD	Geneva International Centre for Humanitarian Demining
HE	High Explosive
IED	Improvised Explosive Device
ISO	International Standardization Organization
LAW	Light Anti-Armour Weapon
LSA	Land Service Ammunition
MANPADS	Man-Portable Air Defence Systems
MSIAC	Munitions Safety Information Analysis Centre (NATO)
NAMSA	NATO Maintenance and Supply Agency
NATO	North Atlantic Treaty Organization
NATO IS	North Atlantic Treaty Organization International Staff
OSCE	Organization for Security and Co-operation in Europe
PSO	Peace Support Operations
RMDS/G	Regional Micro-Disarmament Standards and Guidelines
ROL	Re-Order Level
RPG	Rocket-Propelled Grenade
SAM	Surface to Air Missile
SEESAC	South Eastern and Eastern Europe Clearinghouse for the Control of SALW
USD	United States Dollar
UXO	Unexploded Ordnance

Endnotes

1 The term ammunition is used generically in this chapter to include ammunition, explosives, and propellants. Conventional ammunition of all calibres is covered in this chapter because the methods and techniques for stockpile management should apply equally to all ammunition types.

2 The chapter draws on previous work contained in Greene, Owen, Sally Holt, and Adrian Wilkinson. 2005. Biting the Bullet 18: Ammunition Stocks, Promoting Safe and Secure Storage and Disposal. Bradford: Bradford University / IANSA / Saferworld / SEESAC. February.

3 This definition parallels the one for small arms and light weapons stockpiles that can be found in SEESAC, 2004, p. 12.

4 See Chapter 9.

5 The NATO AASTP-1 and 2 is generally regarded by technical specialists as one of the most comprehensive documents covering the principles of safe storage and transport of ammunition. It is international best practice. Other Best Practices Guides do exist, such as those from the Organization for Security and Co-operation in Europe (OSCE), but these are not as technically detailed as NATO AASTP-2.

6 Once qualified these individuals often leave their own armed forces to work for international organizations and NGOs. For example, of the 14 Albanian Officers trained by NATO in Explosive Ordnance Disposal in 1998, only two are still in that role within the Albanian Armed Forces. The Head left to work for the NATO Maintenance and Supply Agency (NAMSA) and the Deputy Head left to work for the UN.

7 The term 'NATO Standard' is often misquoted or misused as a means of attracting donor support by organizations that lack the technical capacity to make recommendations for improvements based on risk analysis and sound first principles.

8 Competency standards are now becoming the accepted means to assess an individual's suitability for a particular task. An individual's competency is based on a balanced combination of their training, education, and operational experience. Just because an individual has 20 years' experience does not necessarily mean that they are competent, if the initial training was inappropriate or is now out of date.

9 These holdings are minimal.

10 These may be available to the military during general war, but would not form part of the war reserve because their availability could not be guaranteed.

11 Best ammunition management practice also recommends that ammunition should be classified by their Dangerous Goods Classification and UN Serial Number, Hazard Division, Compatibility Group, and Hazard Classification Code.

12 An economic and accurate surveillance of ammunition and its quality, within known confidence levels, can be achieved by taking a relatively small, random sample from a large bulk quantity.

13 To include infrastructure, depreciation of infrastructure, operating costs, and staff costs over the anticipated life of the ammunition.

14 OSCE, 2003b provides further background information on how to identify surplus ammunition and explosives.

15 A state may also have a requirement under treaty obligations, such as NATO agreements, to maintain a defence stockpile capable of sustaining its armed forces for a certain period of time during a conflict or general war. This will obviously have a major influence on determining defence stockpile levels if treaty obligations are to be met.

16 Such mandates can include defence of national territory, assistance with national civil emergency tasks, participation in conflict prevention, and so on.
17 For example, the number of days required to sustain the various levels of conflict.
18 See the Annexe for details.
19 Letter from Ambassador Chris Sanders, CCW Co-ordinator for ERW, Netherlands Delegation to the Conference on Disarmament, 27 September 2002. The letter was sent to all delegations of states parties to the 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 (CCW). Responses were received from: Brazil, Bulgaria, Costa Rica, Denmark, Germany, the Holy See, Japan, Latvia, Liechtenstein, Netherlands, Norway, and Romania.
20 There were 1,500 fatalities as a result of one event in Lagos, Nigeria.
21 This figure does not include unconfirmed reports of more than 1,000 casualties in North Korea.
22 This figure includes more than 1,200 injuries from a separate confirmed explosion in North Korea.
23 The causes are as allocated in official reports or confirmed press reports. They may not be totally accurate because the efficiency of the incident investigations could not be verified by the GICHD study team.
24 The cause of fire is not identified in the data available. A percentage of this figure will relate to external fires resulting in explosions, such as the one that occurred in Nigeria in 2002, but some causes will be fires accidentally started during inappropriate activities within ammunition storage areas, or unidentified auto-ignitions of propellant.
25 The high incidence of auto-ignition of propellant is because a major source document for the GICHD study was an evaluation of the risks of auto-ignition. It is a major risk where ammunition surveillance is limited or non-existent, but a minor risk where appropriate ammunition surveillance practices are in place. There is technical disagreement among various organizations as to how accurate this particular component may be but, until there is evidence to the contrary, it is not possible to resolve this issue.
26 The costs of mine and UXO clearance vary according to a range of factors, including location, national economy, topography, type of contamination, and so on. An 'average' figure is thus difficult to identify, although many sources would suggest that USD 1 per square metre is a sound average (email from Alistair Craib, BARIC Consultants, 28 February 2006).
27 Only self-contained shoulder-launched systems (e.g. 66 mm LAW).
28 Shoulder-launched rocket propelled anti-tank grenade type systems (e.g. RPG).
29 A 'standard' IED in Chechyna consists of 2 x 152 mm high-explosive artillery shells initiated by command wire or radio control.
30 See SEESAC, 2005 for further detailed examples.
31 One example would be an analysis of a propellant that showed that the stabilizer had been consumed during storage—a natural effect—and that the risks of autocatalytic ignition leading to spontaneous combustion were extreme. In other words, that a fire leading to explosions was inevitable in the short term.
32 This table is compiled by SEESAC and updated on a regular basis. There is no intention to allocate or imply blame for any of the explosive events referred to in this paper. States are applauded for their transparency in allowing lessons to be learned from these unfortunate events. The possible cause allocated is that mentioned in the source. This should be treated with caution because only a full investigation by appropriate specialists can confirm the cause of the event.
33 Author's documentation, October 1998.

Bibliography

AFP (Agence France Presse). 2003. 'Explosion at Iraq Ammunition Depot Kills Three.' 10 June.

—. 2004a. 'One Dead, Four Injured in Vietnam Ammunition Depot Blast. ' 9 April.

—. 2004b. 'At Least 5 Killed in Blast in Western Afghanistan.' 11 July.

BBC (British Broadcasting Corporation). 1997. 'Two Russian Army Commanders Arrested After Vladivostok Blast.' Web edition, 14 November. <http://news.bbc.co.uk/1/hi/world/monitoring/31161.stm>

—. 1998. 'World: Africa Ammo Depot in Sudan Blows Up.' Web edition, 18 July. <http://news.bbc.co.uk/1/hi/world/africa/134969.stm>

—. 2000a. 'Congo Mourns Airport Dead.' Web edition, 17 April. <http://news.bbc.co.uk/1/hi/world/africa/716625.stm>

—. 2000b. 'Huge Loss in Arms Depot Fire.' Web edition, 2 May. <http://news.bbc.co.uk/1/hi/world/south_asia/733374.stm>

—. 2000c. 'Blast at Kabul Ammo Dump.' Web edition, 26 May. <http://news.bbc.co.uk/1/hi/world/south_asia/764883.stm>

—. 2000d. 'Blast hits Iranian Army Dump.' Web edition, 25 October. <http://news.bbc.co.uk/1/hi/world/middle_east/990602.stm>

—. 2001a. 'Huge Blaze at Indian Arms Depot.' Web edition, 30 April. <http://news.bbc.co.uk/1/hi/world/south_asia/1304432.stm>

—. 2001b. 'Fire at Indian Ammunition Depot.' Web edition, 25 May. <http://news.bbc.co.uk/1/hi/world/south_asia/1349144.stm>

—. 2001c. 'Kabul Ammunition Depot Blast.' Web edition, 11 July. <http://news.bbc.co.uk/1/hi/world/south_asia/1433925.stm>

—. 2001d. 'Kazakh Ammunition Dump Ablaze.' Web edition, 10 August. <http://news.bbc.co.uk/1/hi/world/monitoring/media_reports/1483215.stm>

—. 2002a. 'Thai Ammunition Dump Explodes Again.' Web edition, 29 January. <http://news.bbc.co.uk/1/hi/world/asia-pacific/1788647.stm>

—. 2002b. 'Explosions Heard in Guinean Capital.' Web edition, 5 May. <http://news.bbc.co.uk/1/hi/world/africa/1969572.stm>

—. 2002c. 'Bodies Recovered from Afghan Blast.' Web edition, 29 June. <http://news.bbc.co.uk/1/hi/world/south_asia/2073985.stm>

—. 2003a. 'Anger over Baghdad Arms Blast.' Web edition, 27 April. <http://news.bbc.co.uk/1/hi/world/middle_east/2977711.stm>

—. 2003b. 'Afghan Blast Kills 13.' Web edition, 4 August. <http://news.bbc.co.uk/1/hi/world/south_asia/3123227.stm>

—. 2005. 'Commander "Has More Arms Dumps".' Web edition, 5 May. <http://news.bbc.co.uk/1/hi/world/south_asia/4516291.stm>

Biafra Nigeria World News & Archives. 2005. 'Explosions Rock Kaduna Ammunition Depot.' Web edition, 24 February. <http://news.biafranigeriaworld.com/archive/this-day/2005/02/24/explosions_rock_kaduna_ammunition_depot.php>

Central Asia: Caucasus Analyst. Biweekly Briefing. 2001. 'Another Ammunition Depot Fire Reported In Kazakhstan.' 12 September. <http://www.cornellcaspian.com/analyst/NB.htm>

Deutsche Presse-Agentur. 2001. 'Panic in Siberia as Shells Fall from Burning Ammo Dump. ' 21 July.

EU (European Union). 2002. Council Joint Action 2002/589/CFSP on the European Union's Contribution to Combating the Destabilising Accumulation and Spread of Small Arms and

Light Weapons and Repealing Joint Action 1999/34/CFSP. Official Journal L 191/1. 12 July. <http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_191/l_19120020719en00010004.pdf>

GICHD (Geneva International Center for Humanitarian Demining). 2002. Explosive Remnants of War (ERW): Undesired Explosive Events in Ammunition Storage Areas. Geneva: GICHD. November. <http://www.gichd.ch/fileadmin/pdf/publications/ERW_No2.pdf>

GlobalSecurity.org. 2005. 'Explosion at Ammunition Storage Point.' News Release. No. 05-01-09x. <http://www.globalsecurity.org/military/library/news/2005/01/mil-050109-mnfi-mnci18.htm>

—. n.d. 'Train-wreck and Explosion.' <http://globalsecurity.org/military/world/dprk/ryongchon-imagery.htm>

Greene, Owen, Sally Holt, and Adrian Wilkinson. 2005. Biting the Bullet 18: Ammunition Stocks, Promoting Safe and Secure Storage and Disposal. Bradford: CICS, IANSA, Saferworld, SEESAC. February. <http://www.international-alert.org/pdfs/btb_brf_18.pdf>

Information Clearing House. 2004. 'Huge Explosions Shake US Base in Kirkuk as Resistance Rocket Blows up US Ammunition Depot.' 2 May. <http://www.informationclearinghouse.info/article6578.htm>

International Federation of Red Cross and Red Crescent Societies. Appeal 2004. 'Mozambique.' Appeal no. 01.15/2004. <http://www.ifrc.org/docs/appeals/annual04/011504.pdf>

IRIN (United Nations Integrated Regional Information Networks). 2005. 'Sudan: Several Killed as Ammunition Depot Explodes in Juba.' 25 February. <http://www.irinnews.org/print.asp?ReportID=45780>

ISO (International Organization for Standardization).1999. Safety Aspects: Guidelines for their Inclusion in Standards. Guide 51 (E).

ITAR-TASS. 2004a. 'Ukranian Military Depot Explodes.' Web edition, 7 May. <http://www.atsnn.com/story/48190.html>

—. 2004b. 'Chechen Munitions Depot Fire Liquidated.' Web edition, 7 December.

—. 2005 'Ammunition Detonates At Artillery Depots In Ukraine.' Web edition, 23 July. <http://www.sgpproject.org/Personal%20Use%20Only/UKRConventionalWeaponsSecurity.html>

Mosnews.com. 2005. 'Russian Town Sealed off After Fire, Explosions at Navy Ammunition Dump.' 17 May. Accessed 27 February 2006. <http://www.mosnews.com/news/2005/05/17/kronstadtfire.shtml>

NATO (North Atlantic Treaty Organization). n.d. Allied Ammunition Storage and Transportation Publications 1 and 2 (AASTP-1 and 2): Safety Principles for the Storage and Transport of Military Ammunition and Explosives. Brussels.

NATO/MSIAC (Munitions Safety Information Analysis Center). n.d. MSIAC Web site. <http://www.nato.int/related/msiac/>

Ndtv.com. 2004. 'Explosives, ammunition destroyed in IAF depot fire.' 10 July. <http://www.ndtv.com/morenews/showmorestory.asp?slug=IAF+depot+fire+destroys+explosives&id=56886>

OSCE (Organization for Security and Co-operation in Europe). 2003a. Best Practice Guide on National Procedures for SALW Stockpile Management and Security. 19 September. FSC GAL/43/03/Rev 3. <http://www.fas.org/asmp/campaigns/smallarms/OSCEhandbook.pdf>

—. 2003b. Best Practice Guide on the Definition and Indicators of a Surplus of Small Arms and Light Weapons. 19 September. FSC. GAL/36/03/Rev. 3. <http://www.fas.org/asmp/campaigns/smallarms/OSCEhandbook.pdf>

—. 2003c. Document on Stockpiles of Conventional Ammunition. 19 November. FSC DOC/1/03. <http://www.osce.org/documents/fsc/2003/11/1379_en.pdf>

People's Mojahedin Organization of Iran. 1998. 'Mortar Attack on Clerical Regime's Defense Industries Organization, its Central Warehouse and Central Ammunition Depot.' 3 June. <http://www.iran-e-azad.org/english/pmoi/980603.html>

Philippine Headline News Online. 1998. 'Blasts Destroy Tarlac AFP Ammo Depo'. 1 December. <http://www.newsflash.org/199812/ht/ht000602.htm>

SEESAC (South Eastern and Eastern Europe Clearinghouse for the Control of Small arms and Light Weapons). 2004. RMDS/G 05.50: Ammunition and Explosives Stockpile Management. Belgrade: SEESAC. March. <http://www.seesac.org/resources/0550e.pdf>

—. 2005. South Eastern Europe SALW Monitor 2005. Belgrade: Saferworld and SEESAC.

—. 2006. Weekly Media Summary 23–31 January. <http://www.seesac.org/wms2006/2006-01-29.htm>

Sierra Leone Web. 2002. News Archives. 7 January. <http://www.sierra-leone.org/slnews0102.html>

Signs of the Times. 2003. 'Blasts in Ukrainian arms depot.' 11 October. Accessed 27 February 2006. <http://signs-of-the-times.org/signs/signs277.htm>

Taukina, Rozlana. 2001. 'Fire Sweeps Kazakstan Military Depot.' Associated Press. 8 August. <http://www.washingtonpost.com/wp-srv/aponline/20010808/aponline211303_000.htm>

The International News. 2004. 'Fire at Indian ammunition depot.' Web edition, 27 August. <http://www.jang.com.pk/thenews/aug2004-daily/27-08-2004/main/main13.htm>

TRIntel: News, views and opinion from Threat Resolution Intelligence. 2005. 'Kamchatka Ammunition Depot Fires Trigger Explosions.' October. Accessed 1 March 2006. <http://www.trltd.com/trintel/kamchatka_ammunition_depot_explosion.php>

UNGA (United Nations General Assembly). 1999. Report of the Group of Governmental Experts on Small Arms. UN doc. A/54/258 of 19 August. <http://www.smallarmssurvey.org/source_documents/UN%20Documents/Other%20UN%20Documents/A_54_258.pdf>

—. 2001. *Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects.* UN doc. A/CONF.192/15 of 19 July 2001. <http://www.smallarmssurvey.org/source_documents/UN%20Documents/UN%202001%20Conference/A_CONF.192_15.pdf>

A Filipino port police official arranges confiscated ammunition at the Manila International Container Port in the Philippines, April 2005.
© Cheryl Ravelo/Reuters

7

Following the Lethal Trail: Identifying Sources of Illicit Ammunition Holger Anders

Introduction

Ammunition for small arms and light weapons is frequently intercepted as part of illicit transfers, or recovered from ammunition caches or the sites of armed attacks. Markings, which are often found on such ammunition, provide details of the year and place of manufacture as well as a code for the manufacturer. These markings also indicate that the ammunition was produced legally but subsequently diverted into the illicit sphere. Reliable identification of the origins and supply chain of ammunition in the legal sphere strengthens the ability of states to identify sources of proliferation, combat illicit ammunition flows and transfers, and prevent future diversions.

Arms control specialists have argued since the late 1990s that states have only a limited capacity to trace illicit ammunition. This is because, even if the manufacturer can be identified, it is often not possible to identify reliably the first and subsequent recipients of the ammunition in the legal sphere. Consequently, the last legal holder of the ammunition and the point of diversion into the illicit sphere remain unknown. Specialists therefore argue that states should develop common minimum standards in the areas of marking, record keeping, and international cooperation to enable tracing of illicit ammunition in order to combat its transfer and proliferation (Stohl, 1998, p. 26; UNGA, 1999, p. 17, para. 106; Berkol, 2001, pp. 3–4).

This chapter examines the scope for tracing as a means of combating the proliferation of illicit ammunition for small arms and light weapons and discusses the key requirements, aims, and costs of relevant measures. It reviews existing standards and practices for ammunition marking and record keeping, and considers their implications for the traceability of ammunition. This chapter also investigates the different aims of and requirements for tracing in more detail, and examines the central arguments about the cost-efficiency of measures required for tracing illicit ammunition.[1] The conclusion argues that common minimum standards targeting ammunition produced for and traded in state actor markets could make a significant and cost-effective contribution to identifying sources of diversions and illicit flows to regions of armed conflict.

Existing standards on ammunition marking and record keeping

The tracing of recovered illicit ammunition may be understood as the capacity to track ammunition recovered from the illicit sphere back to its legal manufacturer and through its line of supply to the last known legal holder and the point at which it became illicit.[2] Advocates of the control of small arms proliferation argue that key requirements for such tracing include adequate marking of ammunition with information that allows the competent authorities to identify reliably its manufacturer, as well as accurate record keeping on transfers to allow the manufacturer to identify reliably the ammunition's first recipient. In the case of retransfers of ammunition, the first recipient would equally need to be in a position to identify reliably the next recipient in the chain, and so on (Control Arms, 2004, p. 13–15). This section reviews existing standards and practices in these areas and identifies the extent to which these may already allow tracing of recovered illicit ammunition.

Marking ammunition

It is rarely acknowledged in policy debates that international standards on ammunition tracing could be built on a substantial amount of existing regulation and good practice. For example, many states have a military sector with modern procurement practices and that operates national defence standards, which define technical and safety requirements for ammunition that is produced for their national armed forces. The standards also specify the markings a manufacturer must apply to ammunition bodies and ammunition packaging. Such markings are required *inter alia* to 'facilitate the withdrawal of life-expired or defective ammunition [. . .] if it becomes necessary' and to 'facilitate the establishment of technical records and surveillance' (United Kingdom, 1994, part 1, para. ii, secs. b–c). States operating such standards include the NATO member states, as well as Brazil, China, Colombia, Pakistan, Russia, South Africa, and Switzerland.[3]

Police forces and other non-military state actors that order ammunition from a manufacturer often also have standards that contain specifications for the markings that must be applied to the ammunition.[4] Furthermore, in several states, including Brazil and the 13 members of the Permanent International Commission for the Proof of Small Arms and Ammunition (Commission Permanente Internationale, CIP),[5] there are regulations on marking ammunition produced for non-state actor markets for activities such as sport shooting, hunting, and personal protection.[6]

A basic principle behind this marking is that the user of the ammunition is provided with identifying information on the ammunition itself or on the ammunition packaging in case performance-related problems occur in connection with the ammunition.[7] The packaging of ammunition for state and non-state actor markets is marked with a manufacturer's identification and the particular production run (see below) in NATO and CIP member states and the states mentioned above. These markings allow the user to communicate with the manufacturer should problems occur and, in turn, allow the manufacturer to investigate whether, for example, faulty components such as primers or powder loads have been used in a particular production run.[8]

Ammunition from a single production run is known as a 'lot'. Should the lot be broken up into smaller quantities, these smaller quantities are known as 'sub-lots' or 'batches'. Such a lot or batch is defined as a discreet quantity of ammunition industrially assembled 'in practically identical manufacturing conditions using identical components from controlled sources' (UNGA, 1999, p. 6, para. 21). Identical conditions and components are necessary to ensure that the ammunition in the lot will function in a uniform manner. Differentiation between production runs is essential to the clear identification of a particular run and the components used should, as suggested above, malfunctions or other performance-related problems occur with ammunition from this particular run.[9]

Marking packaging

As indicated above, it is a widespread practice in the ammunition industry to mark ammunition packaging to allow the manufacturer and the production run in which the ammunition was produced to be identified.[10] Lot identification by marking a lot code on the packaging is a standard requirement for ammunition produced for the national armed forces and other state actors in NATO member states as well as in, for example, Brazil, China, Colombia, Pakistan, Russia, South Africa, and Switzerland.[11] Other marks applied to the packaging of ammunition produced under contract for state actors in these states include an identification of the manufacturer, the type or calibre of the ammunition, the quantity contained in the package, and the year of manufacture.[12] The same markings, including a lot code, are also applied to the packaging of ammunition for non-state actor markets in CIP states and a number of states that are not CIP members such as Brazil, Pakistan, and South Africa.[13]

Marking ammunition bodies

Another widespread practice is for the outer casing (body) of ammunition other than small arms ammunition to be marked with information containing the same identification markings as its packaging.[14] This includes mortar ammunition, rockets for light weapons, and rifle grenades. Defence standards in NATO member states and the other states with equivalent standards listed above require the body of such ammunition to be marked with a manufacturer's identification, lot number, and year of production.[15]

In contrast, the bodies (cartridge cases) of small arms ammunition (defined as ammunition with a calibre smaller than 12.7 mm used e.g. in pistols, revolvers, carbines, assault rifles, and sub- and light-machine guns) are generally marked without a lot number.[16] Small arms ammunition is produced not only for military forces, but also for other state actors such as the police and customs agencies as well as for non-state actor markets. Specifically, although their packaging will generally contain a lot identification (see above), the cartridges for small arms ammunition are often only marked with manufacturer information and, for military markets, the year of production or, for non-military markets, the calibre.[17] One reason for the frequent absence of a lot number on cartridge cases is the general absence of a stipulation by customers that these marks should be applied.[18]

Box 1 Marking small arms ammunition cartridges in Brazil[24]

On 22 December 2003 the Brazilian legislature passed Federal Law No. 10,826, known as the Statute of Disarmament (Office of the President of the Republic, OPR, 2003). Technical regulations for its implementation are regulated by Decree No. 16 of 28 December 2004 (Brazil, 2004). The new law establishes that cartridges produced in Brazil for public legal entities must be marked with information that identifies the lot number and the entity that purchased the ammunition. Public legal entities are defined as law enforcement agencies (Brazil is a federal country with 64 police forces plus a federal police force)[25] and the armed forces. Lots for these clients are manufactured only in response to a specific request by the client.[26] Each sub-lot (batch) of 10,000 rounds or less must be marked with a unique code and will be transferred to a single entity (Brazil, 2004, arts. 2 and 3). The regulation has been in force since 1 January 2005 for .40 and .45 ammunition and since July 2005 for 5.56 mm, 7.62 mm, 9 mm, .380, .38, and .50 cartridges (Brazil, 2004, art. 4).

For example, a batch of 10,000 rounds of 5.56x45 mm ammunition for assault rifles is manufactured for the Brazilian Army by the main domestic manufacturer, Companhia Brasileira de Cartuchos (CBC). The batch number is engraved using laser technology on the base of each cartridge after the assembly of the ammunition components and will only be sold to the Brazilian Army.[27] Domestic manufacturers are obliged to keep adequate records that allow for the reliable identification of the recipient of the marked ammunition (Brazil, 2004, art. 6.1–7). Ammunition of the calibers named above imported into Brazil by public legal entities also has to conform to the marking requirements stipulated under Brazilian law (Brazil, 2004, arts. 7.2–3). This means that recovered illicit ammunition that was diverted from the jurisdiction of public legal entities in Brazil can be reliably tracked from the manufacturer to its first recipient.

The new Brazilian legislation was the result of a decade of campaigning for a federal law on the tight control of the circulation and use of small arms and ammunition. The specific focus on ammunition in this campaign was driven by concerns about diversions of ammunition from the stockpiles of state actors (Dreyfus, 2004, p. 3). One of the key challenges for campaigners for ammunition tracing standards such as the Brazilian NGO Viva Rio was scepticism in the Brazilian Congress and in industry regarding the technical feasibility of marking cartridge cases for small arms ammunition to identify the state actor that ordered the ammunition. In particular, CBC claimed that such marking was not possible because there would not be enough space on the base of the cartridge case. To advise pro-Statute Congress members, Viva Rio demonstrated that this was factually incorrect by showing that CBC had marked ammunition cartridge cases with information identifying the recipient for state actors in the 1950s (Dreyfus, 2004, p. 7).

Headstamps of .45 ammunition. © Oleg Volk www.olegvolk.net / Courtesy of www.a-human-right.com

There are, however, exceptions to the general practice of marking small arms ammunition cartridges. In particular, state actors in several states do require manufacturers to mark small arms ammunition cartridges with a lot code. In Brazil a standard for marking lot numbers on cartridges applies to small arms ammunition produced for any public legal entity (see Box 1). In Austria and Germany it applies to small arms ammunition produced for the national armed forces and certain police forces.[19] In France it applies to small arms ammunition produced for the national gendarmerie.[20] In Colombia it applies to 5.56 mm ammunition produced for the national armed forces.[21]

In addition, certain of these customers ask manufacturers to ensure that the ammunition packaging and bodies marked with a unique lot number are only transferred to them.[22] This means that ammunition with a particular lot number will be transferred only to a single recipient. In turn, this can greatly enhance the ability of customers to keep tight control over ammunition under their authority. Should ammunition with the unique lot number be recovered from the illicit sphere, the customer can be certain that the ammunition was diverted from its control.[23]

Record keeping on transfers

Marking ammunition can only contribute to the reliable tracing of recovered ammunition if complemented by adequate record-keeping practices. It is notable in this context that, at least among ammunition manufacturers with modern management practices, it is usual to keep electronic records that allow the reliable identification of the recipients of ammunition produced under contract.[28] Modern manufacturers competing on regional and international state actor markets can usually identify the individual army battalion and army or police depot to which an ammunition order was transferred.[29]

This practice is often complemented by requirements under national defence standards. For example, the 1998 US Defense Standard on Ammunition Lot Numbering stipulates that each ammunition lot produced for the US Department of Defense be identified by a unique alphanumeric code. The identity code must be used in all correspondence and records pertaining to a lot, including manufacturing, transportation, and stockpile records (United States, 1998, paras. 4.1, 5.3, 5.4, 5.5, and 6.1). This requirement mirrors stipulations contained in defence standards in other NATO member states.[30]

At the same time, it should be acknowledged that record-keeping practices may be less specific in relation to ammunition that is not produced under contract or that is retransferred. For example, ammunition for non-state actor markets is usually produced in response to perceived market demands rather than under a contract with a particular client. This is because end-users in non-state actor markets, such as sport shooters or hunters, will only purchase a small quantity of ammunition at a time.[31] This ammunition, while pertaining to a particular lot number, will be sold to various end-users in various non-state actor markets without manufacturers necessarily keeping records that would identify the initial individual purchasers of ammunition from this lot. In addition, trading companies and others who retransfer ammunition may keep records that identify quantities, types, and destinations of transferred ammunition, but not necessarily their lot numbers.[32]

Implications for tracing illicit ammunition

Existing marking and record-keeping standards, as well as the differences between them, can have important implications for the traceability of recovered illicit ammunition. Weaknesses that exist in relation to the traceability of small arms ammunition are of particular concern in this context. Small arms ammunition cartridges are generally marked not with a lot number but with basic identifying information engraved in a 'headstamp', such as the manufacturer's code and the year of production and calibre. This means that, if taken out of its original packaging, manufacturers may no longer be able to identify reliably the first recipient of ammunition marked in this way.

For example, recovered cartridge cases used in an attack in August 2004 on unarmed civilians sheltering in the refugee camp of Gatumba, Burundi, were marked with a manufacturer's code (identifying producers in south-eastern Europe and China) and identification of the year of production, but no further information (Control Arms, 2004, p. 7). This means that the manufacturers were not able to relate the cases to a particular lot produced in that year. As ammu-

Mourners gather around the coffins of 163 Congolese Tutsi massacred at Gatumba, a UN-run refugee camp in Burundi, in August 2004. © AP Photo/Aloys Niyoyita

nition produced during that year is likely to have been sold to more than one client, the manufacturers were also not able to identify reliably the customer who received the ammunition when it was initially transferred (Control Arms, 2004, p. 7).

In sum, tracing ammunition is severely impeded in situations where transfers are not recorded in a way that links lot numbers to specific transfers and recipients, or where a manufacturer or other actor transfers identically marked ammunition to multiple recipients. As suggested above, this occurs especially in relation to small arms ammunition sold in non-state actor markets.

For instance, a typical lot of small arms ammunition contains 500,000 rounds. These rounds will, depending on calibre size, be packaged in quantities of, for example, 20, 30, or 50 individual rounds.[33] A single lot of small arms ammunition may therefore be packaged in 10,000 or more identically marked packages. With individual sport shooters buying only a few of the packages at a time there may consequently be thousands of individual recipients of ammunition from a particular lot.[34] Because the packaging of this ammunition will bear exactly the same markings it is not possible to trace reliably the legal supply chain and identify the last legal holder of a package that is recovered from the illicit sphere.

Requirements for reliable tracing

If it is rarely acknowledged that there are existing standards and practices that could assist with tracing illicit ammunition in certain situations, it is also rarely acknowledged that requirements of tracing may differ according to the reason for tracing. For example, a basic reason for tracing illicit ammunition is to identify and combat diversions of ammunition from state actor stockpiles and markets—particularly illicit ammunition that is recovered in the context of armed conflict. Such ammunition is often assumed to have been produced for, transferred to, or held by state actors (see Chapter 5).[35] It can be safely assumed that ammunition that is not small arms ammunition recovered in the context of armed conflict originated from military markets because these calibres are not produced for non-military clients.[36] Diverted small arms ammunition made for use in 'military' small arms such as assault rifles and machine guns is also likely to have originated from state actor markets. This is because the legal ownership and use of 'military' small arms and their ammunition is restricted in many countries to state actors.[37]

When small arms ammunition is diverted to an armed conflict it is likely to be diverted in large quantities.[38] Those seeking to engage in sustained armed conflict will often require the supply of many thousands or hundreds of thousands of rounds. This is especially the case for irregular forces with poor firing discipline (Germany, 2005, p. 1). These quantities may be found more easily in state actor stockpiles and on state actor markets than in the stores of non-state actors. This is because, as mentioned above, end-users such as sport shooters will hold only limited stocks—often only a few packages of small arms ammunition at a time.

A more comprehensive focus on tracing illicit ammunition would cover not only ammunition on state actor markets, but also ammunition on non-state actor markets. This would include the ability to trace a cartridge case recovered in the context of a criminal act. Such comprehensive tracing would require all ammunition to be reliably traceable throughout its legal supply chain. Specifically, it would require even the smallest quantity of ammunition transferred to an individual recipient to be marked with a unique code. In relation to sports shooting markets, this would imply that each of the 10,000 or more individual packages described above would receive a unique code. Such marking would then need to be complemented by appropriate record keeping on transfers to allow for reliable tracing of the supply chain of each individual package should any one of them be recovered from the illicit sphere.

Levels of traceability

Other important distinctions can be made between the levels of traceability that are required in order to achieve different aims. For instance, a primary requirement when tracing illicit ammunition is the ability to identify reliably the initial transfer by the manufacturer. An international standard to improve the ability of states to trace the initial transfer of ammunition produced under contract with a state actor could make a considerable contribution to combating illicit ammunition flows. This is because much of the ammunition for state actors is produced under contract and is transferred by manufacturers to clients who are also the end user of the ammunition.[39] This means that ammunition diverted from the stockpiles of these actors could be reliably traced through its complete legal supply chain because this chain is limited to only the manufacturer and the client who ordered the ammunition.

A standard that identifies the initial recipient of ammunition produced under contract would, by itself, not enable ammunition that was retransferred by the first or subsequent recipients to be traced. Nor would it allow identically marked ammunition transferred to multiple state actor recipients to be traced. A more comprehensive approach would require not only lot-marking and adequate record keeping by the manufacturer but also each quantity of transferred ammunition to be marked and recorded in a way that links the ammunition to a particular (re)transfer and recipient.

In addition, a distinction between requirements could be made between standards on tracing illicit ammunition that seek to enhance the traceability of packaged ammunition, and those that apply to ammunition that has been removed from its packaging. A standard on adequate marking of ammunition packaging could make an important contribution to combating diversions because ammunition recovered during illicit transfers or from ammunition caches is frequently still in its original packaging.[40] A standard on adequate marking of packaging will not be of assistance, however, if the aim is to trace small arms ammunition cartridges that have been left behind at the scene of an armed attack or crime. To allow for tracing of individual cartridges, it would be necessary for (in relation to, for instance, small arms ammunition sold in non-state actor markets) every quantity of 50 cartridges or fewer to be marked with a unique code on the cartridges themselves. Again, this would need to be linked to record-keeping practices that allow for the reliable linking of the code marked on the cartridges to their individual recipient.[41]

In short, a fully comprehensive approach to tracing illicit ammunition would require that every single ammunition package and round of ammunition be reliably traceable through its chain of transfer. It should not be forgotten, however, that there is significant scope for more limited standards that, while not necessarily allowing for the reliable tracing of all ammunition in every situation, would make a substantial contribution to combating illicit ammunition trafficking by limiting the leakage of ammunition from state actor markets.

Concerns about ammunition tracing

Critics of proposals to strengthen the ability of states to trace illicit ammunition argue that ammunition marking for the purposes of tracing may pose technical difficulties, require expensive redesigns of production equipment, slow production, and increase the cost of ammunition. Furthermore, because of the large quantity of ammunition produced annually, establishing and maintaining the required record-keeping protocols would be highly resource intensive. It is also argued that loopholes and weaknesses in traceability would inevitably remain and these would allow controls to be easily circumvented.[42] In short, the measures would be costly without being effective.

Critics such as the pro-gun US National Rifle Association, however, do not make a distinction between small arms ammunition for non-state actor markets and small arms and other ammunition produced for state actor markets (see Mason, 2004; Rowe, 2005). Their criticisms and cost-assessments are rarely made on the basis of a differentiated understanding of the specific aims and requirements of reliable tracing. There are however major differences between the practical requirements for tracing tons of illicit ammunition recovered in the context of armed conflict, violations of arms embargoes, or post-conflict situations, and those for tracing a single ammunition cartridge stolen from a sport shooter and used in an armed robbery in the United States. It might be easier and cheaper to develop international standards that allow large quantities of illicit ammunition recovered in the context of armed conflict to be traced than standards for tracing a cartridge produced and traded on non-state actor markets and recovered in the context of armed crime. Ignoring such a differentiation blurs the fact that targeted measures to enhance the traceability of ammunition in *some* situations will be more cost-efficient than measures required to enhance ammunition traceability in *all* situations.

General concerns about ammunition tracing

An often heard argument is that the volume of small arms ammunition produced annually is too large to make record keeping on transfers a practical undertaking.[43] For example, annual global production of military-calibre small arms ammunition in 2005 was estimated by one source to amount to roughly 13 billion rounds (Forecast International, 2005).[44] However, it should not be forgotten that basic traceability of military-calibre small arms ammunition in state actor markets would focus on tracing transferred *lots* of ammunition. This means that record keeping would focus on recording the (initial) transfer of around 26,000 lots each year, rather than billions of individual rounds.[45] Record-keeping requirements for tracing transfers of ammunition lots in state actor markets would therefore require significantly fewer resources than is sometimes suggested by critics of ammunition tracing.

Furthermore, it is sometimes claimed that marking small arms ammunition cartridges with lot numbers and other information necessary for reliable tracing is not feasible because of the limited space available on the base of a cartridge case. That this is factually incorrect is proved by the annual production of millions of rounds of lot-marked small arms ammunition for military forces and law enforcement agencies in, for example, Europe and South America (see Box 1). Even small calibre sizes such as 5.56 mm can be marked with comprehensive information by traditional stamping methods. For example, cartridges of this calibre produced for the German Army are stamped with a 17-character alphanumeric code that identifies the manufacturer, year and month of production, lot number, and calibre size.[46] Consequently, there would be sufficient space for lot-marking cartridges of small arms ammunition with larger calibres such as 7.62 mm and 9 mm.

Another argument made by critics of international standards on ammunition tracing is that they would not prevent those intent on circumventing controls from using illicit ammunition that cannot be adequately traced. One issue often mentioned in this context is that of hand-loaded ammunition (Mason, 2004, p. 2). A person may go to a sport-shooting range and pick up empty cartridge cases which can then be reloaded by hand (see Chapter 2). If recovered later, the markings on the cartridge cases would identify the manufacturer of the cartridge but not the identity of the person who reloaded and then misused the ammunition.

Nevertheless, while the issue of reloaded small arms ammunition may sometimes pose a challenge to traceability with respect to individual crimes,[47] it does not follow that this would make it a bad idea to develop standards to facilitate the tracing of industrially produced small arms ammunition for state actor markets. It seems unlikely that those seeking illicit ammunition in the context of an armed conflict would, ignoring the possible difficulties in obtaining the required components in sufficiently large quantities, spend days and weeks reloading the tens or even hundreds of thousands of rounds of small arms ammunition required to sustain a conflict.

Concerns about lot marking small arms ammunition cartridges

One of the most contested measures in policy debates on enhancing the traceability of ammunition is the marking of cartridges of small arms ammunition with information that would allow manufacturers to reliably identify the first recipient of the ammunition.[48] This is mainly because of the implications of lot marking for the production process. Cartridge cases are traditionally stamped at the case production stage, that is, before the empty case is put together with the bullet, primer, and powder (see Chapter 2).[49]

Procedural steps and costs of lot marking by stamping

Lot marking cartridge cases at the case production stage requires certain procedural steps. Before the production run for the cartridge cases begins, a stamp is inserted in the production line that carries not only the basic identifying information, but also the lot number.[50] After each production run, case production and ammunition assembly lines have to be stopped and cleared. This step is necessary because some cases may remain in the production machines and could become mixed with cases bearing a different marking during the assembly of a subsequent lot.[51] In contrast, production lines do not need to be stopped after individual production runs if the cartridge cases do not bear a lot marking. This is because cases that are only marked with a manufacturer's code and year of production/calibre can be used for various production runs during a given year without posing the problem of mixing cases with different markings. A manufacturer may produce several million empty cartridge cases at the beginning of a year, and these may be used to assemble different lots during that year. The use of such 'pre-produced' cartridge cases in the assembly of different lots by the same manufacturer is a typical aspect of ammunition production for non-state actor markets since it provides greater cost-efficiency and flexibility in relation to the use of the cases during assembly.[52]

The implications for the production process of stamping cartridge cases with lot codes for non-state actor markets would be significant. This is because, as indicated above, comprehensive traceability of such ammunition would require that the rounds in every box of 50 rounds or less receive a unique code. This implies not only that pre-production of cartridge cases for use in different lots would no longer be possible but, more importantly, also that production and assembly processes would have to be repeatedly interrupted. In turn, this would unquestionably increase the purchase price of ammunition.[53]

Lot marking cartridges for state actor markets

At the same time, it has to be stressed that these concerns relate mainly to ammunition for non-state actor markets and are less relevant to ammunition produced for state actor markets. Small arms ammunition for state actors is predominantly produced under contract.[54] This means that, for every lot, the manufacturer will adjust the production lines in such a way as to produce ammunition that conforms to the particular technical specifications of the customer. This implies that manufacturers of ammunition for state actors generally stop and clear production lines after the completion of a lot in any case.[55]

Manufacturers that use traditional stamping and annually produce millions of rounds with lot markings, when contacted for the purpose of this study, confirmed that marking need not slow production down or increase the unit price of the ammunition as long as the quantity ordered is sufficiently large; that is, 200,000 to 300,000 rounds or more.[56] This is because for smaller quantities, as is also suggested above in relation to production for non-state actor markets, the procedural steps required would unduly interfere with the production process.[57]

Laser marking at the post-assembly stage

Importantly, with the development of laser-marking technologies, there now exist alternatives to stamping small arms ammunition cartridge cases at the stage of cartridge case production. A pioneer in this area is the Brazilian manufacturer CBC, which has developed and integrated a laser marking stage into its automated packaging machinery. This means that, rather than lot marking empty cartridge cases before their assembly, CBC can apply lot marks to the cartridges after their assembly and just before the rounds are packaged for transfer to the customer. The information marked on the cartridges at this post-assembly stage allows CBC to identify the state actor recipient of quantities of 10,000 rounds or less (Box 1). As indicated above, marking of such small quantities with unique codes would not be possible in a cost-efficient manner with traditional stamping at the cartridge case production stage. According to the technical director of CBC, laser marking fully assembled rounds does not slow production down, pose a risk of explosion, or increase production costs.[58] Instead, computer-based laser marking at the packaging stage, and the automated recording of this marking and the customer for the ammunition, has led to a rationalization of marking and record-keeping practices at CBC.[59] An added advantage to CBC is that it can use pre-produced cartridge cases to produce different lots and still apply markings at a later stage that will relate the cartridges to a single recipient.[60]

Conclusion

This chapter provides an overview of the requirements and complexities in relation to the marking and record keeping of ammunition for small arms and light weapons as a means of combating the illicit trade in such ammunition. It argues that a useful measure would be the development of common minimum standards allowing for the reliable identification of the first recipient of ammunition produced by manufacturers under contract with state actors. Even such a limited measure would provide an important tool for state actors to ensure that, should ammunition be diverted from their stockpiles, they can be made aware of the fact if the ammunition is later recovered from the illicit sphere. This standard could build on regulations and practices already in place in those states with modern procurement practices and manufacturers with modern production processes.

A more comprehensive approach would complement this standard with record-keeping measures that enable the reliable identification of subsequent recipients of ammunition in a legal transfer chain in state actor markets. Such record keeping is important because non-state groups engaged in armed conflict are able to obtain illicit ammunition through diversion from state actor stockpiles and, importantly, from ammunition traded in state actor markets as surplus to the requirements of the state actor that originally ordered this ammunition.[61]

In addition, while adequate marking of and record-keeping standards on ammunition would contribute to the traceability of ammunition that is diverted and recovered inside the national territory of the producing state, there is also a need for greater international cooperation in tracing. This means that states need to agree on common minimum standards for the timely and reliable exchange of information in the context of bilateral tracing operations. This is especially important in the light of the assumption that armed groups seeking illicit ammunition will not necessarily obtain all of this ammunition from domestic sources. This is indicated by, for example, the ammunition that was recovered at the location of the 2004 Gatumba massacre in Burundi, which was produced in south-eastern Europe and China.

Finally, it must be emphasized that tracing illicit ammunition for small arms and light weapons, although providing a potentially substantial contribution to combating the illicit ammunition trade, would not suffice. This is because such tracing focuses on ammunition that is recovered from the illicit sphere, and therefore on ammunition that has already been diverted and possibly used in illicit activity. States must also combat such diversion by seeking strengthened norms, measures, and principles in the areas of ammunition stockpile security and the destruction of ammunition surpluses. Only a comprehensive approach to combating illicit transfers of ammunition for small arms and light weapons that adequately prioritizes available resources is capable of effectively countering the continuing proliferation of such ammunition.

List of abbreviations

CBC	Companhia Brasileira de Cartuchos (Brazil)
CIP	Permanent International Commission for the Proof of Small Arms
GRIP	Groupe de Recherche et d'Information sur la Paix et la Sécurité (Belgium)
MG	Marinha de Guerra (Brazilian Navy)
NICC	National Institute on Crime and Criminology (Belgium)

OPR	Office of the President of the Republic (Brazil)
STANAG	Standardization Agreement
UNGA	United Nations General Assembly

Endnotes

1 This chapter largely relies on interviews undertaken by the author in 2005 with manufacturers and other actors in the ammunition industry. The interviews were held over the telephone and by email as well as at meetings during international trade fairs in France and the UK and visits to manufacturing sites in Belgium and Germany. The interviewees included representatives from 11 companies that produce ammunition for small arms and light weapons for state and non-state actor markets, including four companies which regularly supply customers that require lot markings on their small arms ammunition cartridges. Three companies are global providers of ammunition production machinery, including marking technologies based on stamping and laser-marking. Other companies are commercial or state-owned trading companies. The companies are located in Austria, Belgium, Brazil, China, Finland, France, Germany, Italy, Pakistan, Russia, South Africa, and Switzerland.

2 See 'Draft Instrument' (Annex to UNGA, 2005, section II, para. 5) for a similar definition of tracing that was adopted by states in 2005 in relation to tracing illicit small arms and light weapons.

3 Relevant regulations in the 26 NATO member states are based on *inter alia* NATO Standardization Agreements (STANAG) such as STANAG 2316 *Marking of Ammunition and Its Packaging of a Calibre Below 20 mm*, 24 July 1995; and STANAG 2322 *Minimum Markings for the Identification of Ammunition (and Its Packaging)*, 10 March 1993. Additional information was provided by email or telephone in 2005 by ministries of foreign affairs or defence in Estonia (9 March), Lithuania (14 March), Latvia (16 March), Finland and Germany (17 March), the Czech Republic (29 April), Switzerland (10 May), Spain (23 August), and the UK (25 August). Information on national defence standards on marking in the other states listed above was provided by ammunition manufacturers and trading companies (note 1).

4 Interviews (note 1).

5 The convention establishing the CIP was drawn up in 1914 to guarantee the safety of arms users. A new convention was signed on 7 July 1969. The CIP member states are Austria, Belgium, Chile, the Czech Republic, Finland, France, Germany, Hungary, Italy, the Russian Federation, Slovakia, Spain, and the United Kingdom. CIP regulations stipulate minimum standards for identification markings on ammunition packaging sold in non-state actor markets. Source: interviews (note 1).

6 Interviews (note 1).

7 Interviews (note 1).

8 Interviews (note 1).

9 Interviews (note 1).

10 Interviews (note 1).

11 Interviews (note 1)

12 Interviews (notes 1 and 3).
13 Interviews (notes 1 and 3).
14 Interviews (note 1).
15 Interviews (notes 1 and 3).
16 Interviews (note 1).
17 Interviews (note 1).
18 Interviews (note 1).
19 Interviews (notes 1 and 3).
20 Interviews (note 1).
21 Information kindly provided by Pablo Dreyfus, September 2005.
22 These customers include public legal entities in Brazil as well as the armed forces in Colombia and Germany. Interviews (notes 1 and 3). Additional information kindly provided by Pablo Dreyfus, September 2005.
23 Telephone interview, German Federal Armed Forces, 17 May 2005.
24 Information provided by Pablo Dreyfus.
25 Information held at Viva Rio, Brazil.
26 Telephone interview by GRIP with representative of Companhia Brasileira de Cartuchos (CBC), the main Brazilian supplier of arms and ammunition to public legal entities, 2 May 2005.
27 Interview by Pablo Dreyfus with representative of CBC, September 2005.
28 Interviews (note 1).
29 Interviews (note 1).
30 Interviews (notes 1 and 3).
31 Interviews (note 1).
32 Interviews (note 1).
33 Interviews (note 1). For state actor markets the primary packaging containing 50 rounds or less is put in parent packs containing 1,000–2,000 or more individual rounds. The parent packs, which are designed to allow easy carriage by a single person, are marked with information that is identical to that on the primary packaging. Source: interviews (notes 1 and 3).
34 Interviews (note 1).
35 Interview, UN arms embargo investigators, Geneva, 2 July 2005.
36 Interviews (note 1).
37 Interview with policy researcher at the International Action Network on Small Arms, London, 13 September 2005.
38 Interview, UN arms embargo investigators, Geneva, 2 July 2005.
39 Interviews (note 1).
40 Interview, UN arms embargo investigators, Geneva, 2 July 2005. See also Small Arms Survey, 2005, p. 26, box 1.11.
41 Proposals for a system of marking and tracing of the smallest retail packages of small arms ammunition in non-state actor markets have been made recently in the Californian legislature. As of April 2006, the Californian legislature had neither adopted nor rejected the proposed tracing regime (California, 2005).
42 These criticisms of proposals for ammunition tracing standards were raised in informal interviews with government delegations in 2004 and 2005 in the framework of the negotia-

tions of the UN Draft International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons (UNGA, 2005). See also Mason, 2004; and Rowe, 2005.

43 Interviews (note 42).

44 The figure of 13 billion rounds was calculated by the author by the addition of the figures from Forecast International for production in Europe, the United States, and by non-US and non-European producers. Forecast International includes in its figures ammunition with calibres of 12.7 mm up to 15.5 mm. The global annual figure for small arms ammunition as defined in this chapter is therefore likely to be lower than 13 billion.

45 The figure of 26,000 lots was calculated on the basis of an average lot size of 500,000 rounds.

46 Visit to manufacturer's site, Germany, 20 May 2005.

47 In an interview with an official of the Belgian National Institute on Crime and Criminology (NICC), it was indicated that in Belgium, and probably in Europe more broadly, around 5–8% of recovered cartridge cases analysed in the context of law enforcement investigations are hand-loaded. This figure may be higher in the USA. Interview, NICC, Brussels, 10 November 2005.

48 Interviews (note 42).

49 Interviews (note 1).

50 The stamps required for this marking are made in standard metallurgical workshops and do not require any sophisticated knowledge or special investment. Interviews (note 1).

51 Interviews (note 1).

52 Interviews (note 1).

53 Interviews (note 1).

54 Interviews (note 1).

55 Interviews (note 1).

56 Interviews (note 1).

57 Interviews (note 1).

58 Telephone interview, CBC, 2 May 2005.

59 Telephone interview, CBC, 2 May 2005.

60 Telephone interview, CBC, 2 May 2005.

61 Interview (note 35).

Bibliography

Berkol, Ilhan. 2001. *Marking, Record-Keeping, and Tracing of Small Arms and Light Weapons.* Contribution to the Third Session of the Preparatory Committee to the United Nations Conference on the Illicit Trade in Small Arms and Light Weapons in All Its Aspects, New York, 19–30 March, Special Issue. Brussels: Groupe de Recherche et d'Information sur la Paix et la Sécurité, March. <http://www.grip.org/bdg/pdf/g1882.pdf>

Brazil. 2004. *Aprova a Norma Reguladora da Marcação de Embalagens e Cartuchos de Munição* [Approving the standards regulating the marking of ammunition packaging and cartridges]. Decree No. 16 D LOG. 28 December 2004. Brasilia: Ministry of Defence.

California. 2005. *Bill SB 357* (Serialization of handgun ammunition). <http://www.leginfo.ca.gov/cgi-bin/postquery?bill_number=sb_357&sess=CUR&house=B&author=dunn>

Control Arms. 2004. *Tracking Lethal Tools: Marking and Tracing Arms and Ammunition.* London: Control Arms (Amnesty International, Oxfam GB, and International Action Network on Small Arms, IANSA), December. <http://www.controlarms.org/documents/mtfinaljan05.pdf>

Dreyfus, Pablo. 2004. *Tracking Bullets in a Violent Place: The Statute of Disarmament and Ammunition Marking Regulations in Brazil.* Background paper, not published. Geneva: Small Arms Survey. November.

Forecast International. 2005. *Ordnance & Munitions Forecast 2005: Small Arms Ammunition, United States, Europe, International*. Newton, Conn.: Forecast International, October.

Germany. 2005. 'Marking of German SALW [small arms and light weapons] Ammunition'. Presentation to the UN Open-ended Working Group. New York, 28 January.

GRIP (Groupe de Recherche et d'Information sur la Paix et la Sécurité). 2005. *Scope for International Minimum Standards on Tracing Illicit SALW Ammunition*. Note d'Analyse. Brussels: GRIP. <http://www.grip.org/bdg/g4575.html>

Mason, Thomas. 2004. 'Statement to the UN Open-Ended Working Group on Tracing Illicit SALW'. New York, 17 June. <http://disarmament.un.org:8080/cab/oewg/First%20session/NGOs/WFSA.pdf>

Office of the President of the Republic (OPR, Brazil). 2003. *Dispõe sobre registro, posse e comercialização de armas de fogo e muniçao, sobre o Sistema Nacional de Armas-Sinarm, define crimes e dá outras providencias* [The Statute of Disarmament]. Law No. 10,826/03 of 22 December 2003. Brasilia: OPR.

Rowe, Edward. 2005. 'Statement to the UN Second Biennial Meeting of States to Consider the Implementation of the UN Programme of Action'. New York, 13 July. Accessed March 2006. <http://www.un.org/events/smallarms2005/NGOs/Rowe%20-%20Manufacturers%20Advisory%20Group.pdf>

Small Arms Survey. 2005. *Small Arms Survey 2005: Weapons at War*. Oxford: Oxford University Press.

Stohl, Rachel. 1998. *Deadly Rounds: Ammunition and Armed Conflict*. Washington, DC: British American Security Information Council.

United Kingdom. 1994. *Defence Standard Lotting and Batching of Ammunition.* Doc. 3-96 of 29 April 1994. <http://www.dstan.mod.uk/data/13/096/01000300.pdf>

UNGA (United Nations General Assembly). 1999. *Report of the Group of Experts on the Problem of Ammunition and Explosives.* UN Document A/54/155 of 29 June. <http://disarmament.un.org/cab/salw-sggarep.htm>

—. 2005. *Report of the Open-ended Working Group to Negotiate an International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons*. UN Document A/60/88 of 27 June. <http://disarmament.un.org:8080/cab/oewg/Report.pdf>

United States. 1998. *Department of Defense Standard Practice: Ammunition Lot Numbering and Ammunition Data Card*. US Military Standard 1168B. 10 June. <http://www.osc.army.mil/ib/ibq/surv/gen/..%5Cmil%20std%201168b%5Cmil1168b.rtf>

Conclusion

A soldier inspects ammunition at the armoury of the Philippine military headquarters in Manila, August 2003.

Conclusion
Holger Anders and Stéphanie Pézard

This book reviews the information available on the characteristics of ammunition for small arms and light weapons, the processes underpinning authorized or illicit transfers of such ammunition, misuse of ammunition in specific contexts, and the challenges involved in developing common policies and approaches for controlling the proliferation of ammunition for small arms and light weapons. The book sets out a range of characteristics that set ammunition for small arms and light weapons apart from the weapons themselves. It is important, for instance, that small arms and light weapons can be used for many years, while each cartridge or round of ammunition can be used only once. This means that ammunition stockpiles are quickly depleted in contexts of sustained use, such as in criminal or conflict settings. Illicit ammunition flows sustaining armed conflicts and crime, which may thus be particularly interesting to researchers, also seem to be a prime area for targeted policy action. Legal flows of ammunition are also of interest. Reported annual authorized small arms ammunition exports average USD 700 million. This represents about one-third of the value of authorized transfers of small arms and light weapons. It is worth noting that the actual value of ammunition exports is almost certainly much higher than this because of underreporting from exporting and importing countries and the absence of reliable data on transfers of light weapons ammunition and related equipment such as hand grenades.

Production of guided ammunition for light weapons is not widespread because the technology involved is not easily accessible. While ammunition for small arms is produced widely around the world, large-scale production capacities and production capacities for high-quality products are much more difficult to obtain. Tanzania, for example, has been seeking external assistance in recent years in order to update its 30-year old Chinese-built ammunition factory. Responsible export regulations for transfers of ammunition production capacities are important because the establishment or refurbishment of production facilities has the potential to create future sources of destabilizing ammunition proliferation in states that do not have, or are still in the process of establishing, effective national systems for the control of domestic ammunition production, stockpiling, and transfers. The importance of these regulations is underscored by evidence from a review of the latest developments in ammunition for small arms and light weapons, which indicates that the accuracy and destructive capacity of ammunition—particularly for light weapons—are continuously increasing.

In conflict situations, the availability of ammunition can affect the level of intensity of conflict as well as patterns of use and misuse. The reliable resupply of the correct type of ammunition (i.e. corresponding to the calibre of weapons used by the fighting groups) is crucial during conflict. Instances where armed groups find themselves in possession of weapons they cannot use because of a lack of suitable ammunition are the best evidence of the interdependence of weapons and their ammunition. In addition, disrupting illicit flows of ammunition could make ammunition less available to embargoed actors and increase its price. This, in turn, could provide the incentive to find a negotiated settlement to armed conflicts.

The need to prevent leakages from national stockpiles and to identify the origins of illicit flows of ammunition highlight the importance of putting in place systematic and reliable systems for marking and tracing. The detailed study of how ammunition reaches armed groups, whether in conflict or criminal settings, underlines the importance of the ability to identify the provenance of ammunition that is misused. Even a limited measure, such as the reliable identification of state actors who order and then procure a given quantity of ammunition, would be an improvement on the present situation because it would allow ammunition holders to identify patterns of leakage from their own stockpiles should some of their ammunition be recovered from the illicit sphere. Measures such as the new Brazilian Statute of Disarmament and its provisions on the marking of ammunition are therefore encouraging steps and it is important to monitor its effects in order to assess the extent to which it will prevent ammunition diversion from state stockpiles, allow reliable identification, and discourage misuse by state forces.

In addition to strengthened national measures, regional and international cooperation should be improved. Trafficking networks, such as those that allow criminal gangs to procure their ammunition, take advantage of the lack of information exchange that still exists between countries. Insufficient consultation and coordination can also be found inside countries: between the different law enforcement bodies (e.g. the army, police, and customs officials) or between the different levels of administration (e.g. federal and local). International cooperation is crucial not least in order to identify patterns of trafficking and to track recovered ammunition back to its origin.

The proper management of ammunition stockpiles and the destruction of surplus ammunition are of paramount importance. Lax stockpile control poses serious risks of diversion of ammunition—sometimes in large quantities—to the illicit sphere. It may also prove dangerous to populations living in areas neighbouring ammunition storage facilities who may be victims of an accidental explosion. The issue of ammunition disposal is particularly crucial in post-conflict situations where explosive remnants of war pose serious threats to populations attempting to return to a normal life.

The management of ammunition stockpiles has not yet been accorded sufficient priority on the global political agenda, where it should rank as a serious security and proliferation issue. Many countries seem to lack a political awareness of the significant challenges posed in this area. Countries may also lack national capacities in this regard, and need to rely on the financial and technical assistance of donors. In some cases, when problems are too serious, radical changes to current management systems and the promotion of elementary principles of explosive safety are required to complement financial support and infrastructure development.

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The reviews carried out in this book aim to serve as a first step—or 'primer'—for further efforts by the small arms and light weapons research community to tackle the issue of small arms and light weapons ammunition control. Additional research is required—particularly on such issues as national standards for state actors on stockpile management and for marking of and record-keeping on ammunition that is produced for state actors. Useful research could also be conducted on global small arms ammunition production and trade flows in order to better identify potential sources of concern and patterns of flows in relation to diversions of ammunition from the legal sphere. There is also scope for studies at the regional and sub-regional levels on measures for ammunition control with a view to developing harmonized national approaches at these levels to complement standards on small arms and light weapons control.

At the same time, the scope and depth of much of this research will be dependent on greater transparency by states, and a greater willingness by them to engage fully with the small arms and light weapons ammunition issue. There is currently a severe lack of transparency about domestic ammunition production, including the number of manufacturing facilities and their outputs in terms of volumes and types of ammunition produced. States should also be encouraged to be more open about authorized transfers and to report regularly—and in greater detail—on cross-border transfers of ammunition. Increased transparency is essential for the development of a more accurate picture of global production and transfers of ammunition for small arms and light weapons. This, in turn, is required in order to identify more accurately and to prevent destabilizing accumulations and proliferation of ammunition as well as illicit trade flows. It could also make an important contribution to combating the proliferation and trade in illicit small arms and light weapons. Finally, existing sources of information should be improved, and press agencies and the media generally should be more careful to distinguish between small arms, light weapons, and their respective ammunition when covering news items.

■■■

This book highlights avenues for future research and also areas for political action. While there is significant overlap between controls on small arms and light weapons and those suggested for their ammunition, there is also a need for controls that take account of ammunition-specific challenges. For example, controls on the export of ammunition could easily be integrated into controls on the export of small arms and light weapons. In contrast, ammunition-specific efforts are more relevant in the areas of stockpile management and ammunition destruction. Further efforts are needed to raise awareness and to promote a better understanding among states, donors, and other stakeholders about the challenges posed by insecure and unsafe stockpiles and the requirements for the safe destruction of ammunition. Ammunition collection and destruction should become an integral part of disarmament, demobilization, and reintegration programmes and other relevant post-conflict efforts aimed at reducing destabilizing accumulations of ammunition. Wherever possible, ammunition stockpile destruction must be coordinated with other small arms and light weapons control or security sector reform programmes and initiatives. There is significant synergy, and opportunities to rationalize administrative costs should be explored for each project. This will require better coordination between international organizations, donors, and other stakeholders.

Other areas for future political action are marking ammunition at its point of manufacture and improved record-keeping on ammunition transfers to allow the tracing of ammunition that is recovered from the illicit sphere. In the light of the fact that ammunition flows often take place across international borders, agreement between states would be required to cooperate in the tracing of illicit ammunition. A political debate on these issues would benefit from a more focused approach that distinguishes between the different levels of traceability for ammunition and the relevant requirements.

States should be encouraged to make greater efforts to exchange information on their national regulations, rules, and procedures relating to the control of ammunition for small arms and light weapons. This should include exchanging information on national systems for the management of ammunition stockpiles and on standards for the marking of ammunition procured by governments. Greater openness in these areas, where rules and procedures often remain classified, could increase the understanding of common approaches and the scope for developing relevant minimum standards.

Furthermore, states should ensure that national legislation and regulations covering production, domestic transfers, and ownership of ammunition for small arms and light weapons make the best possible contribution to preventing ammunition diversions. To some extent, this is already the case for small arms and light weapons. States should at least ensure they can identify ammunition diversion from stockpiles by domestic state actors such as the military or police forces. There is also a need to harmonize domestic controls with high common standards set at the regional and sub-regional levels. This is important in order to prevent states with weaker controls from becoming 'sources of choice' for those seeking illicit ammunition.

Strengthened controls should also be applied to ammunition exports. These should include a rigorous assessment at the licensing stage of: the risk that the ammunition being exported will be diverted or misused; the proper use of authenticated end-user certificates; as well as physical checks to verify that adequate records have been kept about the transferred ammunition and that it reaches the authorized recipient. This should be complemented by restraint in export policies and the development of common standards at regional and international levels on when a licence or authorization for an export should be denied by licensing officials. In addition, there is also a critical need to control the activities of those brokering or otherwise facilitating the transfer of ammunition. As indicated above, such controls on ammunition exports and brokering might best be addressed in the context of existing controls on transfers of small arms and light weapons.

In sum, this book highlights the desirability of taking a comprehensive approach to the control of ammunition for small arms and light weapons. Where possible, controls should be integrated into standards and systems for controlling the production, possession, use, transfers, and stockpiling of small arms and light weapons. Certain aspects of ammunition controls, however, are better addressed by efforts that are geared to the specific challenges posed by ammunition. In either case, a continued policy debate is essential in order to encourage greater national, regional, and international efforts to fully address the illicit trade in small arms and light weapons ammunition in all its aspects.