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.

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 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