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## Life-Cycle Management of Ammunition: Safety, Security, and Sustainability

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## FEATURE

# LIFE-CYCLE MANAGEMENT OF AMMUNITION: SAFETY, SECURITY, AND SUSTAINABILITY OF CONVENTIONAL AMMUNITION STOCKPILES

by Jovana Carapic, Eric J. Deschambault, Paul Holtom, and Benjamin King [ Small Arms Survey ]

**A**mmunition is an essential resource for the implementation of a national defense and security policy. National ammunition stockpiles—regardless of their functional classification—can pose risks to national security and public safety.<sup>1</sup> Poor accounting and inadequate physical security of storage facilities can lead to the diversion of ammunition from the national stockpile to terrorists, criminals, and other armed groups, increasing insecurity and instability. Furthermore, the deterioration of munition components can contribute to unplanned explosions at munitions sites (UEMS), which can have significant negative socio-economic and political consequences for the public and national governments.<sup>2</sup> Comprehensive ammunition management ensures that the right types and quantities of ammunition are available, at the right time, to support national strategic and operational needs. It is also seen as the only long-term strategy for preventing the excessive accumulation of surplus and for mitigating the safety and security risks inherent to all ammunition stockpiles.<sup>3</sup> Such an approach takes into account the technical aspects of ammunition management that are often covered by stockpile management efforts, as well as the related structural and political dynamics. This results in planning challenges and has significant budgetary implications for governments. A systems-based approach to the life-cycle management of ammunition (LCMA), and a long-term strategy to execute it, can help a state to address these challenges by minimizing the probability of excessive surplus accumulation and mitigating diversion and UEMS risks while meeting national strategic and operational needs.

This article provides an overview of the LCMA approach. Drawing on previous Small Arms Survey work such as

*A Practical Guide to LCMA Handbook* and the case study, “LCMA: Lessons Learned from Bosnia and Herzegovina,” this article provides an abridged version of the LCMA model and the lessons learned from efforts to establish LCMA in Bosnia and Herzegovina (BiH).<sup>4-6</sup> Perhaps more importantly, it also invites policy-practitioners to think creatively about ammunition management and argues that national ownership creates an enabling environment that supports the effective functioning of LCMA. The political and structural aspects of ammunition management determine the efficiency of LCMA-related processes and activities: rather than being opposing concepts, the political dynamics and technical aspects of ammunition management are tightly intertwined.

## What Is LCMA?

Ensuring effective management of ammunition requires a comprehensive approach that allows states to meet their long-term strategic and operational requirements and ensure safe and secure ammunition stockpiles. LCMA is an example of such an approach and recognizes the importance of adequate technical capabilities but also emphasizes the political dimension of managing ammunition across its life cycle: planning, procurement, stockpile management, and disposal. This section provides an overview of the safety and security implications of improper stockpile management before introducing the concept of LCMA.

## UEMS, Diversion, and Surplus Accumulation

Despite growing awareness, in many states ineffective management of ammunition stockpiles continues to be the norm. All ammunition stockpiles pose a risk of UEMS and diversion

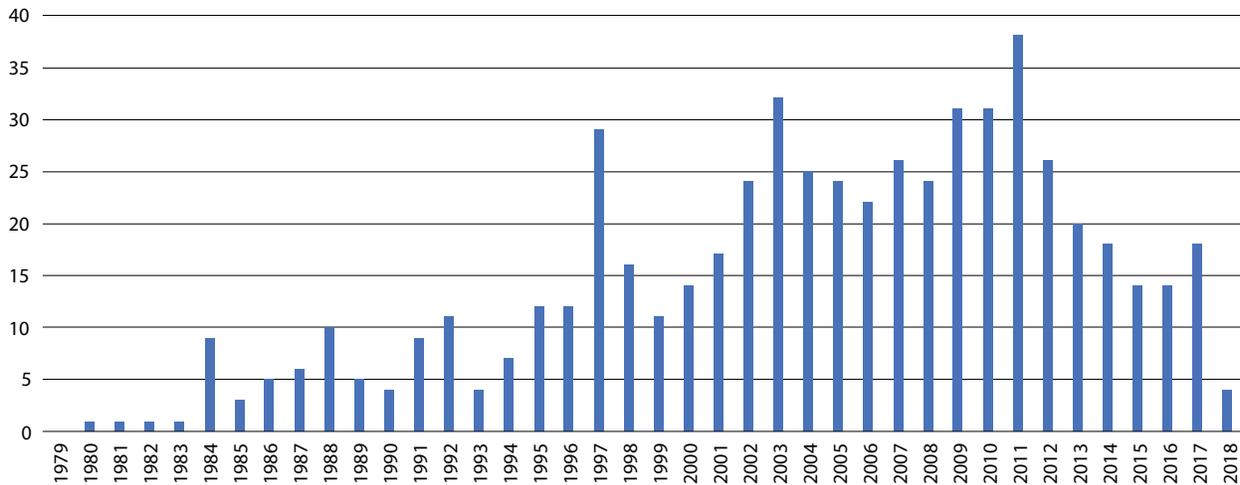


Figure 1. Number of UEMS incidents per year, 1979-2018. (Data available until end of February 2018.)  
Figure courtesy of Small Arms Survey (n.d.).

along all points of the national stockpile chain: manufacture, storage, employment, and disposal. According to the Small Arms Survey's UEMS Database, about 580 UEMS occurred in more than 100 countries between 1979 and February 2018, often with grave social, economic, and political consequences (see Figure 1).<sup>7</sup> In addition to fueling crime and terrorism, ammunition that is diverted from state stockpiles can affect the duration and intensity of armed conflicts.<sup>8</sup>

States view conventional ammunition stockpiles as assets rather than liabilities and thus have a tendency to retain ammunition stockpiles in excess of strategic and operational requirements. In some contexts, together with ineffective stockpile management practices, this leads to the accumulation of unsafe, unserviceable, and obsolete surpluses in the national stockpile. The result is a build-up of ammunition and an increase in safety and security risks.<sup>9</sup> Surplus accumulation also leads to a considerable financial burden for states in terms of operational, maintenance, and destruction costs.<sup>10</sup>

Historically, national authorities, international donors, and practitioners have adopted technical approaches for dealing with surplus accumulation and mitigating the risk of UEMS and diversion. Often under the heading of physical security and stockpile management (PSSM), the aim is to improve stockpile management practices by bringing them in line with international best practices, such as the measures elaborated in the International Ammunition Technical Guidelines (IATG).<sup>11</sup> Technical approaches have a number of benefits: they can be cost-effective and help to mitigate the risk of UEMS, diversion, and surplus accumulation at storage locations.

One of the main shortcomings of the technical approach is its lack of sustainability. Despite the increase in safety and security, most technical programs and initiatives to reduce

ammunition-related risks are not usually designed or implemented in a way that would address the systematic failures in stockpile management that lead to UEMS, diversion, and excessive surplus accumulation. A key challenge faced by national authorities, donors, and implementing organizations is to deliver appropriate technical programs to respond to incidents of UEMS and diversion, as well as to address the underlying, higher-level causes of these events. The effectiveness of technical initiatives cannot be guaranteed without addressing systemic shortcomings. International guidelines emphasize that states take a proactive, rather than reactive, stance in ensuring the safety and security of stockpiles to the highest possible standards.<sup>12</sup> Effectively addressing both is contingent on adopting a comprehensive approach to ammunition management, as outlined by the Small Arms Survey's LCMA model.

### LCMA: A Comprehensive Means of Ammunition Management

LCMA comprises a comprehensive set of integrated processes and activities that ensure sustainable and cost-effective management of ammunition, delivering a safe and secure stockpile that meets national strategic and operational needs. The LCMA approach recognizes the importance of adequate technical capabilities but also emphasizes the political dimension of managing ammunition across its life cycle. It requires that state actors at the strategic, operational, and tactical levels work together on multiple ammunition-related aspects to ensure cost-effective management of the entire national stockpile.

The LCMA model draws on current practices among a number of states that participate in NATO's Partnership for Peace (PfP) program as well as other NATO partners that



Figure 2. The Small Arms Survey's LCMA Model.  
Figure courtesy of Carapic, et al.<sup>15</sup>

implement comprehensive ammunition management systems.<sup>13</sup> These states have well-established militaries and a long history of ammunition management. While national approaches may differ, one feature is central to all: the effectiveness of LCMA systems in these states is ensured by a high degree of national ownership. This feature guarantees an enabling environment, a prerequisite for sustainable ammunition management.

### LCMA Model

By analyzing the various LCMA systems observed in the NATO and PfP states, the Small Arms Survey developed a general LCMA model (Figure 2). It is composed of one structural element and four functional elements. To be effective, all elements must work together as an integrated and efficient whole.

The **structural element**, which involves national ownership and its associated enabling conditions, supports the effective and efficient management of ammunition across the life cycle to ensure the integrity and sustainability of the LCMA system. Often recognized as a key aspect of LCMA, the structural aspects of ammunition management are rarely elaborated in detail by international guidelines. The LCMA model also consists of **four functional elements**: planning, procurement, stockpile management, and disposal, which ensure the safety, security, and cost-effectiveness of ammunition stockpiles. The four functional elements draw and, where necessary, elaborate on the best practices for stockpile management according to the IATG.

Representations of LCMA models tend to be linear depictions that mask the degree of interaction and sequencing among the functional elements of the system. Such depictions also tend to omit the key role of national ownership, which complements and supports the functional elements and is critical to the overall integrity of an LCMA system. In contrast, Figure 2 highlights the interrelationships among the elements. It also stresses the importance of the two crucial aspects of ammunition management: the **political**, which is the structural element necessary for effectiveness of the functional elements; and the **technical**, which is the functional elements necessary for the management of ammunition across its life cycle.

### Milestones

Throughout an LCMA system, decisions are made in order to manage the national stockpile and mitigate the risk of UEMS and diversion. Milestones are points in the life cycle where the most critical decisions are made regarding transition across the functional elements of LCMA and their related processes and activities.<sup>14</sup> There are a number of milestones within any LCMA system. Examples include:

- » **Planning to procurement:** involves the development and approval of strategic plans and budgets for the acquisition and management of types and quantities of ammunition necessary for achieving defense goals and operational requirements.
- » **Procurement to stockpile management:** involves the procurement of ammunition based on confirmation that the items being acquired are safe and suitable for service (also known as an S3 process).
- » **Stockpile management to disposal:** involves the approval of disposal of ammunition following a national disposal review.
- » **Disposal to planning:** involves the certification or confirmation of disposal activities.

### Prerequisites for Implementing LCMA Systems

An enabling environment is a prerequisite for sustainable ammunition management. It allows for long-term policies and plans to become targeted, integrated, and coordinated programs aimed at effectively managing the national stockpile

and mitigating the risks posed by the ammunition. There is agreement, both within and outside the U.N. system, that a high degree of national ownership is necessary for sustainable ammunition management.<sup>16</sup> Despite the recognition that national ownership matters, there is little guidance on what it means in practice. This section provides an overview of the concept of national ownership before discussing the enabling conditions that foster it and support effective implementation of LCMA.

### National Ownership for Ammunition Management

At its core, national ownership is grounded in the premise that states need to take responsibility for ammunition management and be actively engaged in ensuring the safety and security of their stockpiles. A state demonstrates national ownership when national actors—including relevant political decision-makers, armed forces planning and logistics staff, and procurement authorities—have defined and active roles in designing, implementing, and monitoring all processes and activities across the ammunition life cycle, such as planning, procurement, stockpile management, and disposal.

The IATG state that “the primary responsibility for conventional ammunition stockpile management shall rest with the Government of the state holding the ammunition.”<sup>17</sup> It follows that national ownership is not simply about **political buy-in** for ammunition management but also about taking responsibility for setting up and maintaining an LCMA system by:

- » **Establishing a set of effective life-cycle and enabling processes** that allow them to make milestone-relevant decisions and to plan and implement programs for each functional element of LCMA.<sup>18,19</sup>
- » **Providing national financial resources** for the system to cover the cost of procurement and post-acquisition costs, such as those associated with storage, surveillance, transportation, maintenance, security, and disposal.
- » **Facilitating the establishment of the enabling conditions** necessary for supporting the effective management of ammunition over its life cycle.

### Enabling Conditions for LCMA

There is a dynamic relationship between national ownership and the enabling conditions that make LCMA possible. In turn, these conditions foster national ownership for ammunition management and ensure the sustainability of the LCMA system as a whole. They include a normative framework, an organizational framework, infrastructure and equipment, and human resources.

The concept of enabling conditions is inherent in U.N. General Assembly Resolution 72/55 “Problems arising from the accumulation of conventional ammunition stockpiles in surplus” (2017), which recognizes “the importance of appropriate national ammunition management structures and procedures, including laws and regulations, training and doctrine, equipment and maintenance, personnel management and finances, and infrastructure in order to ensure sustainability in ammunition management.”<sup>20</sup> The rest of this section presents the four enabling conditions in more detail.

### Normative Framework

An LCMA system needs to be anchored in and informed by a normative framework that provides guidance on ammunition management at different operational levels. The development of an appropriate framework is a national responsibility and is based on national needs and priorities. For states without a normative framework in place, the IATG offer concrete guidance and tools for ammunition safety and security, as well as a model for effective stockpile management. They also provide advice on developing technical directives for ammunition management and on the roles and competencies of ammunition specialists.<sup>21</sup>

### Organizational Framework

National ownership for ammunition management calls for context-specific organizational frameworks (i.e., relevant institutional and organizational structures that are led and staffed by national personnel) and allows for coordination and oversight of ammunition management processes and activities, and ensures efficient implementation. Establishing a framework involves meeting a number of preconditions, including:

- » **A high level of institutional and organizational development.** An LCMA system demands a high level of institutional and organizational development, with clearly defined tasks, competencies, and responsibilities.
- » **A high level of flexibility.** The organizational structure must also be flexible enough to ensure that there is information exchange, coordination, and oversight among relevant stakeholders, both international and national.

### Infrastructure and Equipment

Infrastructure and equipment are essential to support the implementation of LCMA. A state cannot claim to have the capacity to ensure the safety and security of its stockpiles or the disposal of surplus without them. For this reason, the last decade has seen a considerable increase in the number and scale of international assistance programs related to capacity

development.<sup>22</sup> Since 2012, the international community has coordinated its efforts to provide infrastructure upgrades to strategic ammunition (and weapon) storage. Similar efforts have also been seen in Mali, where the international community has focused on improving physical security infrastructure in order to prevent weapons and ammunition from getting into the hands of insurgent groups.<sup>23</sup>

### Human Resources

The implementation and sustainability of an LCMA system depends on the availability of adequately trained personnel at all levels (strategic, operational, and tactical) and the existence of effective personnel management systems. Training on basic stockpile management activities—such as cleaning, storehouse maintenance and organization, inspection and surveillance of ammunition, inventory management, and accounting—can help to reduce the probability of UEMS and diversion. In addition, training is key in fostering national ownership and is most effective when it is transferred and integrated into a recipient state's institutions.

### Functional Elements of an LCMA System

There are four functional elements of the LCMA model that relate to the different stages of the ammunition life cycle: planning, procurement, stockpile management, and disposal. The elements must be managed in order to ensure that they operate in a coordinated manner and that the risk of UEMS and diversion is kept to a minimum. Each functional element is summarized below.

### Planning

Planning is essential to the overall management of ammunition. An LCMA system must be thoroughly planned from the outset, with dedicated resources and procedures put in place in advance of any new acquisitions or other alterations to the system. Direction is provided by a state's national defense policy, which is translated into a comprehensive, long-term defense strategy that defines the scope of LCMA planning (Figure 3). Consequently, a primary milestone of the planning element is the development of a cohesive national ammunition stockpile plan that meets the long-term defense planning goals.

The LCMA planning begins by defining the nation's ammunition requirements and continues through the development of integrated programs. It is incumbent on planners to understand all of the downstream ramifications of their stockpile-related decisions. For this to take place, an information management system must be in place to ensure oversight

is maintained over the entire system. An information management system also allows planners to gather essential information for the development of element-specific programs, which turn identified needs into achievable outputs given financial and human resource constraints.<sup>24</sup>

### Procurement

An effective procurement process delivers ammunition that is suitable for the implementation of the national defense policy in a safe and secure manner.<sup>25</sup> While the planning element of the LCMA model determines the general parameters for the quantity and type of ammunition to be procured, the procurement element begins with the approval of ammunition for acquisition and concludes with its entry into service.

Even before an order is placed, a limited amount of ammunition is usually acquired for testing (i.e., demonstration and evaluation) purposes to determine the safety and suitability for service of the ammunition.<sup>26</sup> Once ammunition is deemed suitable for service, it can be acquired either from producers located within their national territory or, more commonly, from commercial suppliers in other states. States import new and surplus ammunition via commercial sales, government-to-government sales, or gifts. The import of surplus ammunition is cost-effective if it is in good condition.<sup>27</sup> However, purchasing from old stockpiles can lead to “controversial quality control, dubious traceability issues, and procurement fraud.”<sup>28</sup>

Procurement systems are expected to adhere to good governance principles and include robust anti-corruption provisions. Regardless of the mode of acquisition, states manage the safety and security of ammunition during the acquisition process, with a focus on ensuring state control and oversight, comprehensive registration and record-keeping, and safe and secure transportation.<sup>29</sup> States also develop laws, regulations, and administrative procedures to control and regulate the import, export, transit or transshipment, and brokering of military items and technologies, including ammunition. Recording each stage of the acquisition process and of the ammunition's entry into service is essential to ensuring the safety and security of the ammunition.<sup>30</sup> This is particularly true at moments when the ammunition is susceptible to theft, loss, or an unplanned explosion.

### Stockpile Management

In order to meet operational and strategic requirements, as well as to ensure the safety and security of stored items, it is important to emplace effective stockpile management policies and practices. Stockpile management begins when ammunition enters the stockpile and ends when it leaves, be it



Figure 3. Long-term defense planning and LCMA.  
Figure courtesy of Carapic, et al.<sup>6</sup>

through issuance (for training or operations), consumption (ammunition spent), or disposal (through exports or demilitarization). With many complex and interrelated processes and activities, stockpile management requires continuous review and assessment to ensure the adequacy of resources, infrastructure, equipment, and personnel. These review processes form the key milestones of the stockpile management element.

The stockpile management element of the Survey's LCMA model is based on the IATG—more specifically, the IATG **core groups** of activities around which all stockpile management processes and activities are structured.<sup>31</sup> To ensure effective stockpile management and reduce the risk of unplanned explosions and diversion, the core groups interact very closely, with individual activities depending on or influencing each other across group boundaries. The six core groups of ammunition-based activities are accounting, destruction, maintenance, stockpile security, storage, and transport.

Management of the risks inherent to ammunition storage is a fundamental component of stockpile management. Adherence to the IATG fulfills many of the requirements of an integrated risk management system.<sup>32</sup> Figure 4 outlines the overarching risk management approach of the IATG, in particular the relationship between the different components of risk management.<sup>33</sup> The IATG also offer detailed explanations of each component of risk management and techniques for stockpile management.<sup>34</sup>

## Disposal

Disposal is the removal of unsafe, unserviceable, obsolete, or excess ammunition from the national stockpile. Until it has been physically removed from the stockpile, disposal-designated ammunition is treated as part of the national stockpile.<sup>35</sup> A state's decision to dispose of ammunition as part of a national disposal review is the first step in the process, and a number of factors can influence that decision. The

process ends with the physical removal of disposal-designated ammunition from the stockpile as a result of a disposal action.

A number of milestones are related to disposal and include

- >> The decision to dispose of ammunition.
- >> The selection of a disposal method and process in the case of demilitarization.
- >> The completion of disposal activities.
- >> The confirmation that ammunition has been disposed of properly and in accordance with a disposal decision.

While historically various disposal methods were available to a state, there currently are only two internationally-accepted disposal methods: exports (sales or donations) and demilitarization. Of these two, states tend to prefer export; however, international arms and ammunition control efforts emphasize demilitarization.<sup>36</sup> The Arms Trade Treaty (ATT) establishes legally binding commitments governing the export, import, transit, transshipment, and brokering of conventional arms and ammunition. A number of technologies are potentially available for demilitarization, each one with advantages and disadvantages. Although commonly used, open burning (OB) and open detonation (OD) are modes of disposal that are increasingly discouraged by states due to health and environmental concerns.<sup>37a</sup>

Age, unclear history, or the existence of internal damage, corrosion, and other dangerous conditions (such as exudation or crystallization) can mean demilitarization causes significantly greater risks than those associated with new ammunition. Advanced planning is key to fully addressing ammunition disposal methodologies and risks, and can reduce costs and ensure appropriate equipment and training for individuals assigned to accomplish safe and efficient disposal and decommissioning tasks. Managing risk for demilitarization also requires developing effective munitions emergency response processes and procedures for the decommissioning of contaminated sites, both of which require the participation of specially trained individuals.



Figure 4. IATG risk management matrix.  
 Figure courtesy of Carapic, et al.<sup>6,11, 37b</sup>

### LCMA in Context: Lessons Learned from Bosnia and Herzegovina

Recognizing that a comprehensive approach is best suited to address complex ammunition management challenges, this section uses the LCMA model presented as a framework for analyzing the emergence of an LCMA system in BiH during the period 2012–2016. The section stresses the importance of focusing on ammunition management as a distinct area of concern when considering ammunition, weapons, and explosives (AWE) challenges in post-conflict settings. It highlights ten lessons learned from implementing four of the five main elements of an effective LCMA system: national ownership, planning, stockpile management, and disposal. The fifth element has not been implemented, as BiH has not yet made provisions for the procurement of ammunition.

The disintegration of Yugoslavia had serious repercussions for ammunition management in BiH. The onset of conflict, in June 1991, combined with a U.N. arms embargo on Yugoslavia's successor states in January 1992, had serious negative consequences for ammunition management capacities and practices.<sup>38</sup> The immediate post-conflict period was characterized by efforts to exercise basic control of ammunition and weapon stockpiles in BiH instead of developing life-cycle management systems for ammunition and weapons.<sup>39</sup>

By 2000, the focus had switched toward defense reform, military downsizing, and the identification and disposal of surplus weapons and ammunition. Despite the urgency to deal with the surplus ammunition, and the establishment of a normative framework to do so, competing political interests

undermined the disposal process (Figure 5). Consequently, international pressure for addressing the safety and security concerns of the national ammunition stockpile increased by the end of the 2000s, paving the way for the development of a plan to establish an LCMA system in the country. The priority for BiH to date has been to identify and dispose of excessive, unstable, and unsafe ammunition and to put in place the planning and management processes that will ensure the safety and security of the ammunition that the country needs to implement its national defense and security strategy.

**Lesson 1: National ownership is fundamental for effective LCMA.** The international community substituted for a lack of national capacity to manage and dispose of surplus ammunition in post-conflict BiH. Since 2012, however, the international community has focused on building national capacity to ensure ownership of the LCMA system. As a result of these efforts, high-ranking BiH Ministry of Defence (MoD) and Armed Forces of Bosnia and Herzegovina (AFBiH) personnel, including the minister of defense and chief of defense, are now taking the lead in related decision-making and planning on ammunition as well as ensuring that armed forces personnel are sufficiently trained.

**Lesson 2: The coordinated, long-term commitment of international partners is essential for the establishment of LCMA in a post-conflict setting.** Prior to 2013, there was a lack of coordination, communication, and information sharing between international and regional organizations, states, and NGOs working to address BiH's ammunition stockpile

challenges.<sup>40</sup> To address these issues, all key international stakeholders committed to providing expertise and resources in a complementary and coordinated way to help the BiH MoD and the AFBiH address the challenges posed by the AWE stockpile.<sup>41</sup> By the end of 2012, thanks to the non-paper, the international community had streamlined its efforts on how to address BiH's ammunition stockpile challenges.<sup>40</sup>

**Lesson 3: Implementing effective LCMA in a post-conflict setting requires early agreement on overall objectives, specific priorities, and resource requirements.** During the first quarter of 2013, the international community convened a task force consisting of key international and BiH stakeholders to develop an AWE Master Plan that defined the desired outcome for addressing AWE challenges as “the transparent disposal of surplus ammunition and weapons and the introduction of a sustainable ammunition and weapons life-cycle management system in BiH.”<sup>42</sup> The AWE Master Plan provided clarity on the international community's capacities, resources, and potential contributions in addressing BiH's AWE challenges. It also defined the roles and responsibilities of the different international actors, the BiH MoD, and the AFBiH.<sup>43</sup> The AWE Master Plan was endorsed by all relevant national and international stakeholders.

**Lesson 4: Sustainable LCMA requires robust organizational structures and appropriate personnel.**

The AWE Master Plan defined the organizational structure required to support the programs and activities for the transparent disposal of surplus ammunition and the implementation of sustainable LCMA.<sup>44</sup> This organizational structure ensured effective and efficient coordination of national and international activities, confidence among all key stakeholders, and empowered BiH authorities and senior leaders within international organizations.

Moreover, appropriately experienced, skilled, and motivated personnel should be placed in key positions to ensure that the organizational structure delivers the desired changes. A critical factor in the case of BiH was the European Union Force (EUFOR) commander's decision to create the position of senior advisor for weapons and ammunition disposal (SAWAD) in April 2013. SAWAD can influence decision-making, oversees implementation, and ensures the overall coordination of Master Plan activities.

**Lesson 5: Successful LCMA rests on a comprehensive inventory of the ammunition stockpile.**

It was not until 2012 that a decision was made for BiH to conduct a comprehensive inventory—locally referred to as the 100 per cent inventory—of its ammunition stockpile, create a

single national ammunition list, and establish a national inventory management system.<sup>45</sup> BiH's limited capacity made it difficult to conduct the 100 percent inventory in an effective and timely manner.<sup>46</sup> Therefore, from 2012 to 2013, AFBiH personnel received training in basic ammunition handling, testing, storage, LCMA regulations and standard operating procedures (SOP), and inventory management.<sup>42</sup> The AFBiH began the ‘100 percent inventory’ in 2013 MoD, and it is expected to be finished by the end of 2018.

**Lesson 6: Stockpile safety depends on an assessment of the condition of stored ammunition.** A key component of effective LCMA, more specifically of the 100 percent inventory referred to previously, is the ability to determine the physical condition, chemical stability, and hazard classification of ammunition in the national stockpile.<sup>47</sup> With the support of the international community and as part of the 100 percent inventory mentioned in Lesson 5, the BiH MoD decided to undertake

- > A stock-check of the entire ammunition stockpile.
- > A visual technical inspection of all the ammunition.
- > A chemical test of the propellant, using quick propellant analysis kits (QPAK) provided by the Austrian component of the mobile training team (MTT) Project.<sup>48</sup>

These additional assessments laid the foundations for the development of an ammunition surveillance system in BiH.

**Lesson 7: Adequate resources and capacities are needed for a safe and secure ammunition stockpile.** Effective stockpile management involves the safe and secure storage, transportation, and handling of ammunition.<sup>49</sup> In accordance with BiH's Law on Defence and the future operational requirements of the AFBiH, OSCE SECUP, and UNDP EXPLODE, assistance projects upgraded safety and security standards for two prospective ammunition storage sites in BiH: Kula 1 and 2, and Krupa. The Dobož demilitarization facility was also upgraded, because these sites have capacity to house BiH required ammunition and can be maintained by the AFBiH.<sup>50</sup> These infrastructure upgrades, as well as donations of equipment and training provided by the EUFOR MTT Project troop-contributing nations, reflect good coordination between BiH and its international partners.<sup>51</sup>

**Lesson 8: Effective and efficient surplus disposal requires adequate normative and institutional frameworks, as well as the necessary political will.** As noted previously, ammunition disposal was a politically sensitive issue during the late 2000s. While presidential approval was (and continues to be) required for any form of disposal, the process for authorization is now more efficient, and approval is granted more quickly than in the past.<sup>40</sup> The reduction in the time

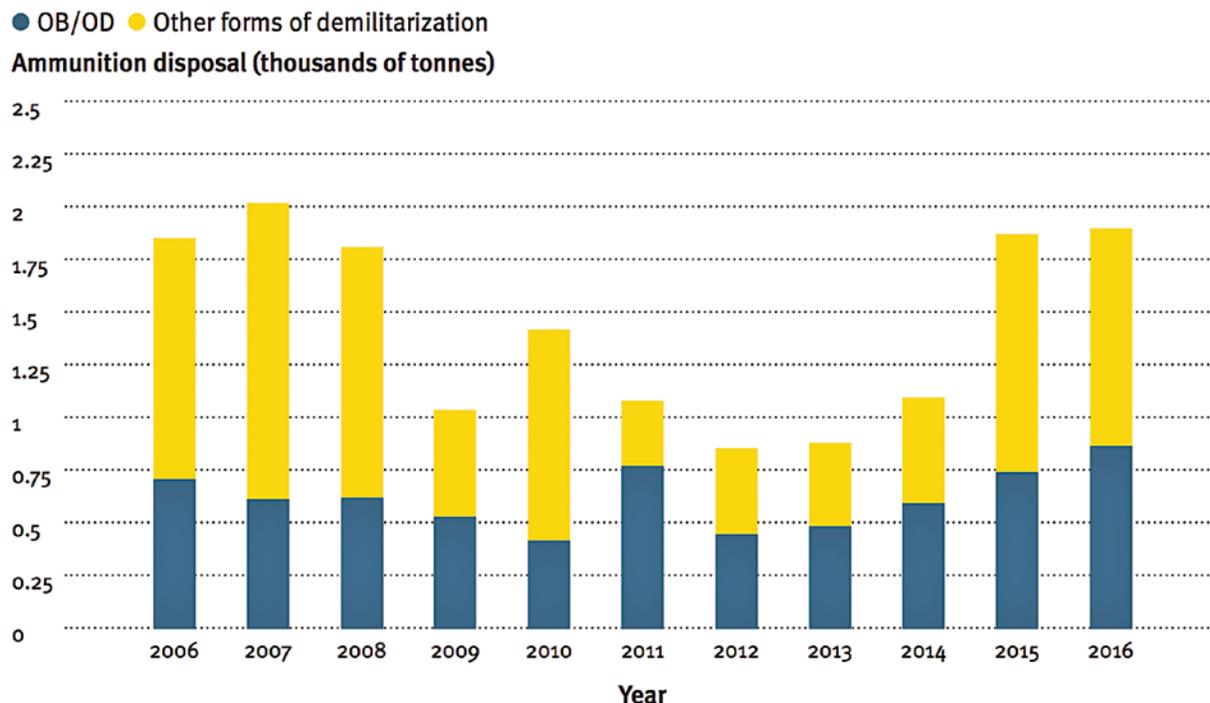


Figure 5. Disposal of ammunition in BiH using open burning/open detonation (OB/OD) and other forms of demilitarization, 2006–2016.

Figure courtesy of Carapic and Holtom, 2018.

taken for the presidential approval led to a significant increase in the ammunition disposal rate during the period 2015–2016 (see Figure 5).<sup>52</sup>

Despite BiH authorities preferring to export their surplus ammunition, demilitarization continues to be the primary mode of disposal in the country.<sup>52</sup> International stakeholders have facilitated the demilitarization and destruction process by increasing the capacity and skills of AFBiH personnel and employing independent contractors at the TROM Doboj demilitarization facility and the Glamoc range.<sup>51</sup>

**Lesson 9: Serviceable but surplus ammunition may be disposed of through export sales authorized in conformity with a country's international commitments.** Prior to 2013, international partners and key BiH stakeholders had divergent views regarding the export of surplus ammunition.<sup>40</sup> Stakeholders have come to accept export sales as a valid method for the disposal of surplus if carried out by national authorities in accordance with international standards, such as those of the ATT.<sup>54</sup> Several independent assessments have concluded that BiH's arms export control legislation and administrative procedures meet such standards.<sup>55</sup> The BiH MoD has developed administrative guidance for the disposal of surplus by export in the 2012 Plan for Resolving Surplus.<sup>56</sup>

**Lesson 10: Serviceable but surplus ammunition can also be disposed of through international donation to**

**demonstrate support for international partners.** The BiH president must approve the disposal of surplus through international donation after an assessment of political, strategic, and foreign policy considerations. MoD BiH and AFBiH representatives have raised two sets of concerns regarding such donations. The first is a concern over foregone profit. International stakeholders, however, have stressed that donations help to dispose of ammunition that, while still serviceable, needs to be used quickly.<sup>52</sup> Such ammunition is unlikely to meet the quality needs of commercial importers. The second concern relates to the perceived risk of donated material diverting.<sup>57</sup> This reflects recent media coverage of the possible diversion of BiH donations intended for Iraqi government forces to non-state armed groups in the Middle East and North Africa.<sup>58</sup> Yet diversion risks can be reduced via international cooperation and good practice.<sup>55</sup> At the same time, such donations can allow BiH to contribute to efforts to strengthen international peace and security.<sup>59</sup>

### Looking Forward

A comprehensive ammunition management approach is required to ensure that a state's national stockpile is safe, secure, and operational when needed in order to meet national and strategic objectives. The LCMA approach not only allows for the mitigation of the risk of UEMS and diversion, but also

ensures sustainability of international cooperation and assistance projects. The most recent General Assembly Resolution on the “Problems arising from the accumulation of conventional ammunition stockpiles in surplus” (A/RES/70/35) stresses the need to develop and implement cooperation and assistance programs that ensure sustainability—i.e., are able to mitigate the immediate risk of UEMS and diversion and have a lasting impact on ammunition management practices at the national level. To date, a limited number of international cooperation and assistance projects have been designed and implemented with the intention of ensuring sustainability by addressing ammunition management practices across the life cycle: from planning to procurement, stockpile management, and disposal. The case of BiH is an illustrative example.

From a practical perspective, this article provides an overview of the experience and lessons learned from efforts to establish and implement a sustainable LCMA system in BiH. The BiH experience is useful for other prolonged post-conflict environments or those states aiming to establish an LCMA system. Establishing and implementing better stockpile management processes and ultimately LCMA are long-term and challenging endeavors. These efforts do not need to be accomplished all at one time. Improvements can be incrementally structured and implemented based on national priorities, available resources, capacities, and capabilities, considering the potential efficiencies and benefits that will be derived along the way with regards to the national stockpile’s functionality, safety, security, and ability to meet national strategic and operational needs. ©

See endnotes page 59

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