

Unplanned Explosions at Munitions Sites

Considerable attention has been paid to the threats posed by small arms and light weapons proliferation and misuse, but far less is known about the dangers inherent in poorly stored or mishandled munitions.¹ A single unplanned explosion at a munitions site can claim dozens of lives, injure hundreds, and displace thousands of people.² The damage to infrastructure can be extensive, covering

many square kilometres. In addition, the loss of economic activity can exceed tens of millions of dollars and have long-term ramifications on livelihoods and the environment.³

Unplanned explosions at munitions sites (UEMS) are a global problem. Since 1998, incidents of this nature have been reported in more than one-third of UN member states and on every continent except Australia and Antarctica

Table 1 Number of reported UEMS by region, sub-region, and UN member state, January 1998–October 2011*

Geographical distribution		Number of reported UEMS		Number of events by reporting state
Region ^a	Sub-region (number of UN member states)	Number of UN member states reporting UEMS	Number of events	
Africa	Eastern Africa (17)	4	14	Mozambique (9); Tanzania (3); Kenya (1); Somalia (1)
	Middle Africa (9)	3	8	Republic of the Congo (4); Democratic Republic of the Congo (3); Angola (1)
	Northern Africa (7)	4	7	Libya (2); South Sudan ^b (2); Sudan (2); Egypt (1)
	Southern Africa (5)	0	0	No events recorded
	Western Africa (16)	5	9	Nigeria (3); Côte d'Ivoire (2); Guinea (2); Guinea-Bissau (1); Sierra Leone (1)
Americas	Caribbean (13)	1	1	Cuba (1)
	Central America (8)	4	6	Mexico (3); El Salvador (1); Guatemala (1); Nicaragua (1)
	Northern America (2)	1	10	United States (10)
	South America (12)	8	16	Ecuador (6); Colombia (3); Brazil (2); Chile (1); Guyana (1); Paraguay (1); Peru (1); Venezuela (1)
Asia	Central Asia (5)	4	10	Kazakhstan (6); Uzbekistan (2); Tajikistan (1); Turkmenistan (1)
	Eastern Asia (5)	3	14	China ^c (10); North Korea (3); South Korea (1)
	Southern Asia (9)	5	58	Afghanistan (18); India (18); Sri Lanka (9); Iran (8); Pakistan (5)
	South-Eastern Asia (11)	6	22	Thailand (6); Vietnam (5); Cambodia (4); Philippines (4); Indonesia (2); Laos (1)
	Western Asia (17)	9	35	Iraq (15); Yemen (6); Lebanon (4); Turkey (3); Georgia (2); Israel ^d (2); Cyprus (1); Kuwait (1); Syria (1)
Europe	Eastern Europe (10)	6	57	Russian Federation (40); Ukraine (10); Bulgaria (3); Romania (2); Poland (1); Slovakia (1)
	Northern Europe (10)	2	3	United Kingdom (2); Denmark (1)
	Southern Europe (14)	8	21	Serbia (8); Albania (5); Bosnia and Herzegovina (2); Montenegro (2); Croatia (1); Italy (1); Slovenia (1); Spain (1)
	Western Europe (9)	3	11	Germany (7); France (3); Belgium (1)
Total	193	76	302	

Notes:

* According to the United Nations Statistics Division (revised in July 2011).

a. There are no reported explosions in any of the 14 UN member states of Oceania.

b. The two incidents recorded in South Sudan occurred in Juba, in 2005 and 2007, before South Sudan became a UN member state (on 14 July 2011) and after the signing of the Comprehensive Peace Agreement (on 9 January 2005).

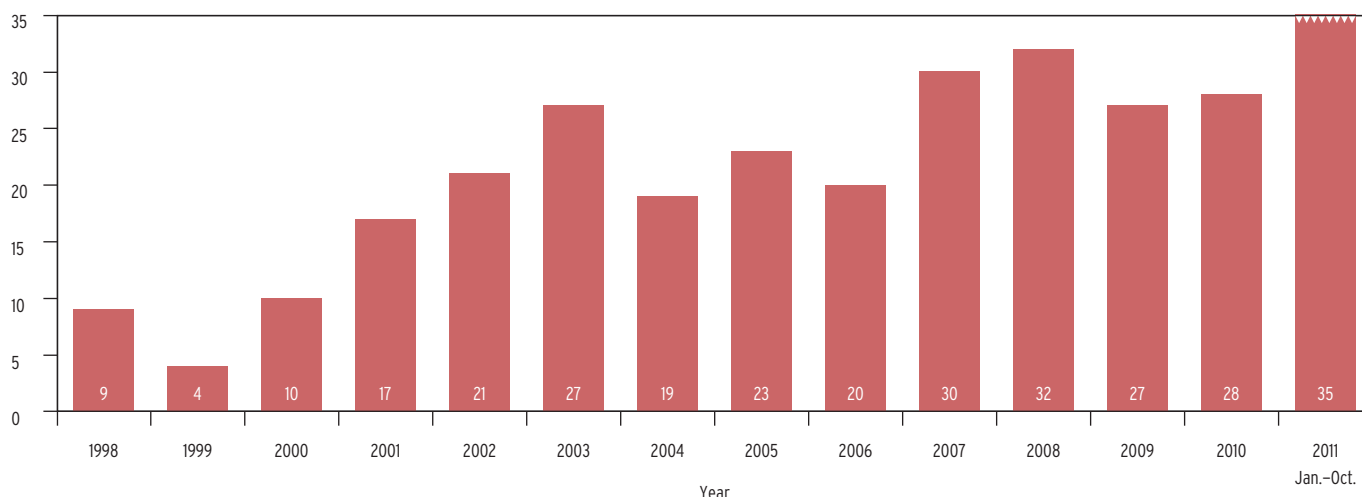
c. The figure for China includes eight incidents recorded in Taiwan, which the UN has recognized as a province of China since 1971.

d. The two incidents in question took place in the Palestinian Territories.

Sources: UNSD (2011); Wilkinson (2011); Zahaczewsky (2011); Small Arms Survey UEMS database

Figure 1 **Number of recorded UEMS by year, January 1998–October 2011**

Number of UEMS



Sources: Wilkinson (2011); Zahaczewsky (2011); Small Arms Survey UEMS database

(see Table 1). They have occurred regularly, with an average of three every two months for the ten-year period from 1998 to 2007 (see Figure 1). The Small Arms Survey UEMS database⁴ reveals that the rate has increased in recent years to more than one every two weeks. It is unclear whether the problem is getting worse or reporting of incidents is improving. What is clear is that the rate of explosions is not decreasing despite efforts to address their causes.⁵

There are numerous causes for unplanned explosions at munitions

sites. Most concern a lack of technical knowledge and inadequate attention to safety standards.⁶ Poor storage practices and inferior infrastructure are also major causes of UEMS and contribute to related security challenges.⁷ Other frequent causes include negligence during handling and during transport of ordnance. That said, for almost one-third of reported explosions, no cause is yet recorded (see Table 2).

States that exhibit strong political will to tackle UEMS—often with international assistance—can prevent unplanned explosions or mitigate their

ramifications. Several regional organizations have developed best practice guidelines regarding physical security and stockpile management (PSSM).⁸ Ad hoc coalitions of the willing—such as the nine countries in South-east Europe that comprise the Regional Approach to Stockpile Reduction (RASR) Initiative—underscore the importance states attribute to PSSM.⁹ International donors working bilaterally and through regional organizations have assisted dozens of governments in the safe destruction of surplus stocks of munitions and in

Table 2 **Reported causes of UEMS, January 1998–October 2011***

Category	Causes	Number of events	% of all causes	% of known causes
1. Deterioration of the physical or chemical condition of the ammunition and explosives	Auto-ignition of propellant	18	6.0%	8.4%
2. Unsafe storage practices and infrastructure	Electrical fault	12	4.0%	5.6%
	Fire**	46	15.2%	21.4%
	High temperature	11	3.6%	5.1%
	Lightning	15	5.0%	7.0%
	Other	3	1.0%	1.4%
3. Unsafe handling and transport practices	During demilitarization or explosive ordnance disposal	36	11.9%	16.7%
	Handling/negligence	52	17.2%	24.2%
4. Poor security conditions	Security/sabotage	22	7.3%	10.2%
5. Unknown causes	Not known	87	28.8%	
Total		302	100.0%	100.0%

Notes:

* The categories and causes in this table are in the process of being revised and updated.

** Many of these fires may have originated as auto-ignitions of propellant.

Sources: Wilkinson (2011); Zahaczewsky (2011); Small Arms Survey UEMS database



A fire reportedly caused an explosion of a Venezuelan Army's artillery munitions depot, killing one person and forcing the evacuation of 10,000 residents from surrounding areas. Maracay, Venezuela. January 2011. © Gerard Aponte/Reuters

securing remaining materiel in safe conditions.¹⁰

Some solutions are expensive to implement and may require external assistance, but many can be undertaken unilaterally and with modest investment. Some sites may need to be closed and their ordnance moved to another location at great cost. New sites, incorporating quantity–distance principles and security features, may need to be constructed from scratch. Nevertheless, without necessarily striving to achieve state-of-the-art storage standards, a number of pragmatic measures can address the immediate risk of unplanned explosions. As depicted in the RASR PSSM Best Practice cards (see below),¹¹ states can achieve posi-

tive results on their own through some inexpensive and effective first steps. These include installing proper doors and locks, using adequate fences and barriers, posting signs to warn and inform, organizing the stockpile into stacks, and ensuring that aisles are free of obstruction. ■





Notes

- 1 In this *Research Note*—as in common practice—the term ‘munitions’ refers to military weapons, ammunition, and equipment; however, the term can also be used to refer solely to complete rounds of ammunition.
- 2 The death toll has at times been much higher. In January 2002, for example, a series of explosions at a military depot

on the outskirts of Lagos, Nigeria—sub-Saharan Africa’s most populous city—resulted in more than 1,000 deaths, with many people drowning in nearby canals when fleeing the fires and explosions (MSIAC, 2002). See also USDoS (2010).

- 3 Following an explosion in Paracin, Serbia, in 2006, a main access road was reportedly blocked for 32 hours, and an estimated EUR 15 million (USD 19 million) worth of trade was lost (Parliamentary Forum, 2008). The Serbian Army subsequently removed more than 130,000 pieces of unexploded ordnance from an 8-km² perimeter around the contaminated area (Jovanović, 2011).
- 4 The UEMS database builds on the listing of incidents compiled by Adrian Wilkinson and George Zahaczewsky (Wilkinson, 2011; Zahaczewsky, 2011); it will be made available on the Small Arms Survey website in early 2012.

RASR PSSM Best Practice cards

<div>2 ♣ 2 ♣</div> <div>DOORS</div>  <ul style="list-style-type: none"> • Door made of steel (or 4.5 cm wood with 12 gauge steel plate) • Frame anchored to building at 8 places • Hinges welded to prevent pin removal • Marked with UN Fire Division symbol • Doors open OUTWARDS – cannot be rammed • Light gauge handles break off easily – cannot be used to pull off door • Door seam covered with metal strip – prevents lever from fitting inside <div>♣ 2 ♣ 2 ♣</div>	<div>4 ♣ 4 ♣</div> <div>SIGNS</div>  <ul style="list-style-type: none"> • List forbidden items (cell phones, flame-producing items, etc.) • Identify restricted areas <div>♣ 4 ♣ 4 ♣</div>	<div>5 ♣ 5 ♣</div> <div>FENCES AND BARRIERS</div>  <ul style="list-style-type: none"> • A barrier within a barrier • For Category I and II items barriers are WITHIN the installation boundaries • Clear zones with unimpeded visibility: <ul style="list-style-type: none"> • 4 m inside • 10 m outside <div>♣ 5 ♣ 5 ♣</div>	<div>6 ♣ 6 ♣</div> <div>LOCKS</div>  <ul style="list-style-type: none"> • Must protect against manual manipulation (hammers, bars, etc.) for at least 15 minutes • Must protect against powered tools (drills, saws, etc.) for at least 5 minutes <div>♣ 6 ♣ 6 ♣</div>
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- 5 Private facilities are also at risk. The UEMS database seeks to distinguish facilities that are wholly national or private enterprises from those that are state-owned but privately operated.
- 6 Only trained experts can conduct routine physical surveillance and chemical testing throughout the life cycle of propellants, primers, and explosive components.
- 7 Poorly managed state stockpiles also facilitate corruption due to deficient record-keeping and theft by criminals and non-state armed groups.
- 8 See, for example, NATO (2010), OSCE (2008), RECSA (2005), and SEESAC (2007). See also the UN International Small Arms Controls Standards (CASA, n.d.) and the UN Office for Disarmament Affairs' International Ammunition Technical Guidelines (UNODA, n.d.; King, 2011, p. 4).
- 9 For more information on the US-funded RASR Initiative of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Former Yugoslav Republic of Macedonia, Montenegro, Romania, Serbia, and Slovenia, see RASR (n.d.a).
- 10 Best practice often meets unexpected challenges when put into practice. See, for example, King (2011).
- 11 See RASR (n.d.b).

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For additional information about unplanned explosions at munitions sites, please visit:
 <www.smallarmssurvey.org/?uems> and
 <www.smallarmssurvey.org/?pssm>

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