



# **Worldwide Production and Export of Cluster Munitions**

**A Human Rights Watch Briefing Paper**

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## Summary

Cluster munitions stand out as the weapon category most in need of stronger national and international regulation in order to protect civilians during and following armed conflict. Cluster munitions have been used in at least twenty countries and while this number is still relatively limited, the harm to the civilian population is striking in nearly every case. Cluster munitions pose an immediate danger to civilians during attacks, especially in populated areas, because they are inaccurate and have a wide dispersal pattern. They also endanger civilians long after the conflict due to the high number of submunition duds that do not explode on impact and become *de facto* landmines.

The potential future dangers of widespread production and continued proliferation of cluster munitions demand urgent action to bring the humanitarian threat under control. At least seventy countries stockpile cluster munitions and the aggregate number of submunitions in these stockpiles is staggering. For example, the stockpile of the United States alone contains upwards of one billion submunitions. Most of the cluster munitions now in stockpiles are not sophisticated weapons, but rather are types known to be highly inaccurate and to have high submunition failure rates. Despite the demonstrated humanitarian harm, some countries continue to produce these unacceptably dangerous cluster munitions.

In recent years, more countries are producing or importing new cluster munitions with technologies such as self-destruct fuzes and guidance systems. While less harmful, most of these more advanced cluster munitions also pose great threats to civilian populations, due to their wide footprint (strike area) and still significant number of hazardous duds.

For the future, there is concern that the number of countries capable of producing cluster munitions will continue to grow as production know-how is licensed and technology transferred, and that countries will increasingly offer out-of-date, surplus cluster munitions to less advanced military allies.

This briefing paper identifies the countries known to produce and export cluster munitions. An appendix lists the companies that produce and offer cluster munitions for sale. The paper highlights some positive steps being taken by a number of countries, and recommends steps regarding production and transfer for governments committed to reducing the risk to civilians posed by cluster munitions.

## Production of Cluster Munitions

Globally, thirty-four countries are known to have produced over 210 different types of cluster munitions. These include artillery projectiles, aerially delivered bombs, and rockets or missiles that can be delivered by surface or aerial means. The countries listed below are known to have produced cluster munitions. A few have stopped production (the Netherlands and, presumably, Iraq), and in other cases, it is uncertain if production is still underway.

**Cluster Munition Producers**

Argentina	India	Romania
Belgium	Iran	Russia
Brazil	Iraq	Serbia & Montenegro
Bulgaria	Israel	Singapore
Canada	Italy	Slovakia
Chile	Japan	South Africa
China	North Korea	Spain
Egypt	South Korea	Sweden
France	Netherlands	Switzerland
Germany	Pakistan	Turkey
Greece	Poland	United Kingdom
		United States

Human Rights Watch has identified over eighty-five companies that have produced cluster munitions or their key components. Of these companies, at least fifty-nine are actively producing or marketing cluster munitions or submunitions. Nearly half of these active companies are based in Europe and another eight are located in the United States. Companies that produce cluster munitions are listed in the attached appendix.

There is no standard industrial model for the production of cluster munitions. Some are the product of multinational cooperative research and production programs. These partnerships can involve individual companies, teams of companies, or industrial consortiums. The production of cluster munitions involves the fabrication and integration of a large number of components like metal parts, explosives, fuzes, and packaging materials. It is rare that all components are produced at one location by one entity. The culmination of the production process occurs at a facility that loads, assembles, and packs the submunitions into a complete warhead assembly, which is often hermetically sealed. This warhead can then be mated with other components in

the weapon system such as rocket motors and guidance systems. Once the complete weapon is assembled, it enters service with the armed forces.

One recent innovation in cluster munition production is the advent of a back-up self-destruct fuze as a measure to reduce the initial failure rate of the submunitions. At least fourteen countries have developed or deployed cluster munitions with this capability: Argentina, Denmark, Finland, France, Germany, Israel, Italy, Romania, Russia, Singapore, Slovakia, Switzerland, United Kingdom, and United States. While the most common forms of self-destruct technology can reduce the failure rate substantially, the threat is not eliminated: the danger during strikes remains and the large number of submunitions typically employed can result in a significant number of hazardous duds, even if the failure rate is low.

In one recent example of this type of production, the United Kingdom purchased 59,364 L20A1 cluster munitions between 1996 and 2004. These artillery delivered projectiles contain 2.9 million M-85 Dual Purpose Improved Conventional Munitions (DPICM) submunitions with self-destruct fuzes. The L20A1 projectiles, 2,100 of which were used in the 2003 invasion of Iraq, were manufactured by BAE Systems Royal Ordnance under license from Israel Military Industries (IMI). U.K. forces caused dozens of civilian casualties when they used these cluster munitions in and around Basra, and Human Rights Watch found duds in civilian neighborhoods more than one month later.

In another licensing agreement, the United Kingdom purchased 29,574 M26 rockets for its Multiple Launch Rocket System (MLRS) between 1992 and 1995 for an estimated value of £186 million. The weapons were produced under license in Germany and contain 19 million DPICM submunitions.

It was reported in 2002 that Israel Military Industries has produced over 60 million M-85 DPICM submunitions. IMI concluded licensing agreements in 2004 with companies in India (Indian Ordnance Factories) and the United States (Alliant Techsystems) to produce DPICMs. Companies in Argentina (CITEFA), Germany (Rheinmetall), Romania (Romtecnica), and Switzerland (Armasuisse) have also assembled or produced these submunitions under license.

The United States has also concluded a number of licensing agreements, including with South Korea in 2001 for production of DPICM submunitions for MLRS rockets, as well as with the Netherlands, Pakistan and Turkey in the past. Also in 2001, the U.S.

provided assistance and technical data to support Japan's production of CBU-87 Combined Effects Munitions (CEM).

### **Global Trade in Cluster Munitions**

According to available information, at least twelve countries have transferred over fifty different types of cluster munitions to at least fifty-eight other countries. However, the true scope of the global trade in cluster munitions is difficult to ascertain. International arms exhibitions and marketing publications regularly include projectiles, bombs, and rockets that are cluster munitions. Notifications of arms transfers as required by domestic law in some countries provide some knowledge of the trade patterns.

Examples of transfers of cluster munitions are contained in the following table. However, this is by no means a comprehensive accounting of the global trade in cluster munitions.

#### ***Examples of Known Exports of Cluster Munitions***

Producer	Munition Type	Recipient(s)
Brazil	ASTROS Rocket	Iran, Iraq, Saudi Arabia
Chile	CB-500 Bomb	Ethiopia, Eritrea, Iraq, Sudan
Egypt	SAKR-36 Rocket	Iraq
France*	Belouga Bomb	Argentina, Greece, India
Germany	DPICM Projectile	Austria, Denmark, Finland, Greece, Italy, Norway
	SMArt-155 Projectile	Greece, Switzerland, United States
Israel	DPICM Projectile	Argentina, Germany, India, Romania, Switzerland, United Kingdom, United States
	TAL Bomb	Argentina
Russia (including ex-USSR)	RBK Bomb	Bulgaria, Croatia, Cuba, Czech Republic, Hungary, India, Iraq, North Korea, Libya, Poland, Romania, Slovakia, Syria

	KMG-U Dispenser	Algeria, Angola, Cuba, Czech Republic, Hungary, India, Iran, Iraq, Korea (North), Libya, Mongolia, Poland, Romania, Slovakia, Sudan, Syria, Yemen
	Smerch/Urgan Rocket	Algeria, Egypt, India, Kazakhstan, North Korea, Kuwait
Serbia & Montenegro (ex-Yugoslavia)	Orkan Rocket	Iraq
South Africa	CB-470 Bomb	Iraq, Zimbabwe
Sweden/France	BONUS Projectile	United States
United Kingdom*	BL-755 Bomb	Belgium*, Eritrea, Germany*, India, Iran, Italy, Netherlands, Nigeria, Oman, Pakistan, Saudi Arabia, Switzerland*, Thailand, United Arab Emirates, Yugoslavia
United States	DPICM Projectile	Bahrain, Belgium, Canada, Greece, Jordan, South Korea, Netherlands, Pakistan, Turkey, United Kingdom
	CBU-87 CEM Bomb	Egypt, Greece, Italy, Japan, South Korea, Netherlands, Norway, Oman, Poland, Saudi Arabia, Turkey, United Arab Emirates
	Rockeye Bomb	Argentina, Australia*, Canada*, Denmark*, Egypt, France*, Greece, Indonesia, Israel, Japan, South Korea, Norway*, Oman, Sweden*, Turkey
	M26 MLRS Rocket	Bahrain, France*, Germany*, Greece, Israel, Italy, Japan, South Korea, Netherlands*, Turkey, United Kingdom
	ATACMS Missile	Bahrain, Greece, South Korea, Turkey

\* Countries that have reported subsequently disposing of or are in the process of disposing of the weapons

Most of these types of cluster munitions are known to be inaccurate and have high failure rates. For example, Human Rights Watch has documented that four types of cluster munitions exported by the United States have a history of producing especially high numbers of hazardous submunition duds in combat operations in Iraq, Kuwait, Yugoslavia, and Afghanistan: surface-launched M26 MLRS rockets and DPICM artillery projectiles, and Rockeye and CBU-87 CEM air-dropped cluster bombs. The proliferation of these weapons to over two dozen other countries underscores the concerns of global proliferation of cluster munitions.

More recently, the United States announced in October 2004 its intent to transfer to Turkey a small number of CBU-103 Combined Effects Munitions and AGM-154 Joint Stand-Off Weapons; as noted above, these more advanced cluster munitions are still problematic from a humanitarian perspective.

Some transfers of cluster munitions have occurred as surplus munitions are phased out of active service and provided to allies at little or no cost. As an example, the United States transferred over 61,000 artillery projectiles containing 8.1 million submunitions to Bahrain and Jordan between 1995 and 2001 as this type of ammunition was being phased out of the U.S. inventory. These transfers are detailed in the following table:

***Transfers of Excess U.S. Cluster Munitions to Bahrain and Jordan, 1995-2001***

Recipient	Year of Transfer	Munition Type	Quantity of Projectiles	Total Number of Submunitions
Bahrain	1995	M509A1 DPICM	6,000	1,080,000
	1996	M509A1 DPICM	3,000	540,000
	1998	M509A1 DPICM	12,000	2,160,000
	1999	M509A1 DPICM	6,000	1,080,000
	2001	M449A1 ICM	2,000	120,000
	2001	M483 DPICM	1,000	88,000
Jordan	1995	M509A1 DPICM	3,000	540,000

	1995	M483A1 DPICM	28,704	2,525,952
			61,704	8,133,952

This information displayed above is contained in public records maintained by the U.S. Defense Security Cooperation Agency. According to the results of life-cycle testing compiled by the U.S. Army Technical Center for Explosives Safety, the dud rates for the submunitions contained in the types of artillery projectiles range from 4.8 percent (M509A1) to 14.27 percent (M449, M483). Thus, the potential exists to create over 600,000 hazardous dud submunitions if these projectiles are ever used.

### **Examples of Positive Policy and Practice**

There have been a number of positive steps taken at the national level to mitigate the negative humanitarian impact of cluster munitions. Such “best practices” should be encouraged and promoted until an international agreement addressing cluster munitions is negotiated.

Norway has called for a legally binding instrument covering cluster munitions within the 1980 Convention on Certain Conventional Weapons (CCW). It has also foresworn the use of air-dropped cluster munitions in international conflicts and prohibited their use in Afghanistan. Australia said in April 2003 that it does not use cluster munitions and in October 2003, the Australian Senate passed a motion calling for a moratorium on use.

In October 2004, the European Parliament adopted a resolution calling for an immediate moratorium on the use, stockpiling, production, and transfer or export of cluster munitions until an international agreement has been negotiated on their regulation, restriction, or prohibition. Initiatives to ban cluster munitions have been introduced recently in the parliaments of Germany and Italy.

Denmark, Germany, Norway, Poland, South Africa, Switzerland, United Kingdom, and the United States have announced national policies for the future procurement of cluster munitions that establish a minimum submunition reliability rate. Germany has taken this a step further by announcing in March 2005 that it will not use cluster munitions that have a dud rate of greater than one percent and will not use those without the capacity to self-destruct or self-neutralize. The United Kingdom recently announced that it would implement a similar policy by 2015.

Due to the increased public attention to the humanitarian impact of cluster munitions, progress has been made in recent years on eliminating specific types of cluster weapons, particularly air-dropped cluster bombs. Belgium, Germany, and Switzerland have withdrawn from service BL-755 bombs, a type used by the United Kingdom in Iraq (in 1991 and 2003) and Yugoslavia. The United Kingdom acknowledged in March 2005 that the BL-755 has an unacceptably high submunition failure rate and will go out-of-service by 2010.

Denmark, Norway, and Sweden have removed from service Rockeye bombs, a type used by the United States in Iraq (1991 and 2003), Kuwait, and Saudi Arabia. In 2002, more than a decade after the fighting stopped, 2,400 dud submunitions were detected and destroyed in Kuwait; one in five of these dud submunitions were from Rockeye bombs. Canada has retired 80 percent of its stockpile of Rockeye bombs.

France announced in March 2005 that it destroyed its entire stock of BL-66 Belouga bombs between 1996 and 2002. The Belouga bomb was used by France in Iraq and Kuwait in the 1991 Persian Gulf War. Poland reported that its residual stockpile of unspecified types of cluster bombs is no longer in service.

Progress on retiring ground-launched cluster munitions has been more circumspect. Only one country, the United Kingdom, has announced the retirement of its stockpile of aging 155mm DPICM projectiles; it will replace them with the L20A1 projectile with self-destruct submunitions. A number of other NATO countries (Denmark, Germany, Greece, Italy, and Norway) have told Human Rights Watch that they have recently procured similar replacement cluster munition projectiles. As an alternative to new production, the United States is choosing to retrofit 5,000 existing projectiles with self-destruct submunitions at a cost of \$10.1 million.

Germany and France stated in March 2005 their intent not to use M26 MLRS rockets with DPICM submunitions until they are modernized. The dud rate for this submunition is 16 percent according to reliability test data from the U.S. military. The Netherlands has withdrawn from service its MLRS launchers and M26 rockets citing concerns about the potential to create disproportionate collateral damage. Denmark and Norway decided not to purchase M26 rockets for their MLRS rockets, and instead have deferred the procurement of high-explosive ammunition. A five-nation research and develop program with participation by France, Germany, Italy, United Kingdom, and the United States is currently underway to develop a guided MLRS rocket whose submunitions have self-destruct fuzes.

The United Kingdom posited in March 2005 that in the long term there may be a general trend away from ground-launched cluster munitions, but emphasized that this change is not imminent. Artillery-delivered cluster munitions constitute a large proportion of active stockpiles for many countries.

## **Recommendations**

The immediate effect and long-term impact of the use of cluster munitions over the past forty years have demonstrated that cluster munitions pose unacceptable risks to civilians. Yet little has been done to reduce the supply of and demand for the weapon, or to regulate its production, trade or use. There is no transparency requirement in any conventional arms control regime that requires states to declare or notify other states of sales or transfers of cluster munitions.

Human Rights Watch first issued a call in 1999 for a moratorium on the use of cluster munitions until the humanitarian problems associated with their use are resolved. In conjunction with subscribing to this call, states should adopt national policies to curb the unrestricted production and export of these weapons. Human Rights Watch recommends that governments committed to reducing the risk to civilians posed by cluster munitions enact the following steps related to their production and export:

- Disclose prior exports of cluster munitions to include recipient states and weapon types.
- Prohibit the export of cluster munitions known to be inaccurate or to have high submunition failure rates (including the BL-755, Rockeye, and Belouga bombs, M26 MLRS rockets, and M509, M483, and M864 DPICM projectiles) and provide assistance to buy-back or destroy previously exported types.
- Remove decommissioned cluster munitions from the types of weapons eligible for transfer as excess defense articles to allies.
- Make public the technical characteristics of cluster munitions produced or exported; at a minimum, disclose the number of submunitions, fuze type, estimated foot-print, known failure rate for each munition type.
- Establish a national procurement requirement specifying a high rate of submunition reliability (i.e., greater than 99%) if cluster munitions are ever produced or exported in the future.

- Restrict exports of cluster munitions to states that have joined or provisionally applied the 2003 Protocol V on Explosive Remnants of War of the 1980 Convention on Certain Conventional Weapons.
- Voluntarily apply at the national level the generic preventive measures and best practices referred to in part 3 of the technical annex of CCW Protocol V related to the production and export of cluster munitions. States should report on its implementation measures at CCW meetings.

## Appendix: Companies that Produce Cluster Munitions

	Current Producers	Past Producers, Current Status Not Known
Europe	Aerotech SA (Romania) Armasuisse (Switzerland) BAE Systems Royal Ordnance (UK) DaimlerChrysler Aerospace (Germany) Dezamet SA (Poland) Diehl Munitions Systeme (Germany) European Aeronautic Defence and Space NV (Netherlands) Expal Explosivos SA (Spain) Forges de Zeebrugge (Belgium) Giat Industries (France) Gesellschaft für Intelligente Wirksysteme (Germany) Hellenic Arms Industry (Greece) Konstrukta Defense (Slovakia) LFK-Lenkflugkörpersysteme GmbH (Germany) Makina ve Kimya Endustrisi Kurumu (Turkey) MBDA Missile Systems (France) Pyrkal Greek Powder and Cartridge Company (Greece) Rheinmetall GmbH (Germany) Romtecnica (Romania) RTG Euromunition (Germany) RUAG (Switzerland) Saab Bofors (Sweden) Santa Barbara SA (Spain) Simmel Difesa SpA (Italy)	Aerospatiale (France) BPD Difesa (Italy) Buck (Germany) Dynamit Nobel (Germany) Esperanza y Cia (Spain) Insys (UK) Instalaza SA (Spain) International Technology SA (Spain) Krauss Maffei (Germany) Krupp Atlas Elektronik (Germany) KUKA Wehrtechnik GmbH (Germany) MECAR SA (Belgium) R. Alkan et Cie (France) SNIA BPD (Italy) Thyssen Henschel (Germany) Yugoimport SDPR (Serbia & Montenegro)

	SPRE Bazalt (Russia) SPRE Splav (Russia) TDW (Germany) Thomson Brandt Armements (France) Tlocznia Metali Pressta Spolka Akcynjna (Poland) Vazov Engineering Plants (Bulgaria)	
Africa	Denel (South Africa) Naschem (South Africa)	Reunert Technology Systems (South Africa)
Americas	Aerojet (USA) Alliant TechSystems (USA) Avibras Aeroespacial SA (Brazil) Bristol Aerospace Ltd (Canada) Britainite Industrias Quimicas (Brazil) FAMAE (Chile) General Dynamics (USA) Industrias Cardeon SA (Chile) Instituto de Investigaciones Cientificas y Technicas de las Fuerzas Armadas (Argentina) L-3 Communications (USA) Lockheed Martin (USA) Los Conquistadores 1700 (Chile) Northrop Grumman (USA) Raytheon (USA) Sistemas Tecnológicos Aeronauticos SA (Argentina) Target Engenharia et Comércio Ltda (Brazil) Textron Defense Systems (USA)	American Ordnance (USA) Day and Zimmermann (USA) Direccion General de Fabricaciones Militares (Argentina) Ferranti International (USA) Ferrimar (Chile) Olin Ordnance (USA) Primex Technologies (USA)

Asia-Pacific	Chartered Ammunition Industries Ltd (Singapore) China Northern Industries (China) Indian Ordnance Factories (India) Pakistan Ordnance Factories (Pakistan) Poongsan (South Korea) Singapore Technologies Kinetics (Singapore) Unicorn International Pte Ltd (Singapore)	
Middle East -North Africa	Ammunition Industries Group (Iran) Helipolis Company for Chemical Industries (Egypt) Israel Military Industries Ltd (Israel) Parchin Missile Industries (Iran)	Rafael (Israel) SAKR Factory for Developed Industries (Egypt)

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Additionally, a significant amount of information was obtained in discussions with military and diplomatic officials from numerous countries at meetings of CCW Groups of Government Experts held in Geneva, Switzerland between May 2002 and March 2005. Online resources also contributed greatly to the information presented herein, particularly the websites of the UK Parliamentary Stationary Office (<http://www.hmsc.gov.uk/>) and the U.S. Defense Security Cooperation Agency (<http://www.dsca.osd.mil/>).