14/02/2007

ART- 1035.07

To: Australian Senate Standing Committee Inquiry into Cluster Munitions (Prohibition Bill)

Dear sirs,

IMI is serious about limiting harm to children and non-combatants caused by unexploded cluster munitions.

We have deployed the M85 cluster device specifically to deal with the high dud rate experienced when using US cluster munitions.

Our testing suggests that the M85 cluster device has hazardous dud rate of 0.06%, compared with rates reported by the UN from American M42, M46 and M77 devices of 20 – 40 percent.

IMI appreciates that war is an activity which can have significant effect on the target society and economy, long after conflict has ended. For this reason IMI has also thought of the long term environmental consequences.

Our M85 devices are the most environmental friendly device in the world because they leave no environmental hazardous behind and only minute of hazardous duds – in fact, much less then conventional munitions (High Explosive).

IMI safe M85 cluster device is possessed by many international countries, few of them are NATO members.

The IMI cluster device is also currently being tested by the US army as a replacement to the American devices.

Please accept IMI submission on the cluster munitions issue.

Sincerely,

Ilan Glickman

Program Manager

IMI, Heavy Ammunition Division

Artillery Directorate

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Cluster Munitions – Un-Exploded-Ordnance Issue

Executive Summary

MLRS, M26 artillery rockets carrying M77 bomblets were used extensively during the 1991, "Desert Storm" operation in Iraq and the 2006, conflict in south Lebanon.

Consequently, huge quantities of unexploded M77 bomblets were later found on the battlefield. Those duds caused deaths and injuries to friendly troops and local population.

The US official dud rate was stated as 2% - 23%, UN official reports estimations are close to 40%.

The above operations inaccurately labeled all "Cluster Munitions" as "immoral ammunition".

Israel Military Industries (IMI) would like to emphasize:

- IMI utilizes its self-developed M85 self-destruct bomblet as payload in DPICM artillery projectiles.
- The proven hazardous dud rate of the M85 bomblet is **0.06%**.
- The accepted dud rate for artillery ammunition such as the 155mm, M107 HE projectile, (in service with the Australian Army), is 98% (2% dud rate)
- IMI is known for its expertise in the field of DPICM cargo ammunition, DP bomblets and especially self-destruct fuzes for bomblets.
- Presently IMI supports two DPICM US programs, fuzes with Self-destruct for the 155mm M864 Recapitalization program, and the M77 bomblet for artillery rockets, (this program is to overcome the unacceptably high current US M77 dud rate).
- IMI is proud of its M85 bomblet which for many years and up to these days is the only Self-Destruct bomblet in production for artillery use.
- The battle proven M85 Bomblet serves as payload in a verity of Cargo Projectiles all over the world to the outmost satisfaction of its users, including the UK, Sweden, Switzerland, Germany, Turkey, Israel, etc.
- We respectfully suggest that the Senate Standing Committee of Foreign Affairs and Trade differentiate between the different types of Cluster Ammunition

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available, and recommend that Australia only consider introduction into service of cluster ammunition using a bomblet with a dud rate equal to or less than 0.06%.

This will therefore allow the Australian war-fighters to have the best possible ammunition available in order to provide a clear tactical advantage, without endangering friendly troops and the local population.

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IMI – Company Profile and Organization

Israel Military Industries (IMI) was established in 1933. In 1990 it became a government-owned corporation. IMI is renowned as a leader in the design, development and production of innovative high-performance ordnance.

IMI is the Israel's largest manufacturer of arms, ammunition and related products, and is a major force in the nation's defense capability. IMI has successfully supported Israel's armed forces in their battles to maintain the security of the nation often faced by overwhelming odds. IMI of the 3rd millennium continues to play a vital role in supplying of the IDF operational requirements and in the export of advanced, battle-proven equipment to a large number of allied and friendly nations throughout the world.

IMI is organized into 5 major divisions:

- **Ammunition Group** – Artillery, Tank, Infantry - Medium and large caliber ammunition; Air-to-Ground ammunition.
- **Land Systems Division** – Tanks & APCs upgrades, armor protection systems.
- **Rocket Systems Division** – Artillery rockets, guidance systems, space missiles engines.
- **Advanced Systems Division** – Aerial decoys, air-launched missiles.
- **Small Caliber Ammunition Division** – All types and small caliber ammunition.

Above all, IMI is committed to ensure customer satisfaction with the most advanced, proven and cost-effective weapons and ordnance available.

The company operates 15 plants in Israel, the Company has about 3000 employees. 2004 turnover was $500M, with 65% being exported. IMI invests some $50 million annually in research and development, thus ensuring that the company retains its leading edge in technology and capabilities in a very competitive market.

IMI is a major supplier to the Israel Defense Forces (IDF), with which there is very

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close co-operation, as well as to foreign customers around the world. IMI has a worldwide reputation for on-schedule delivery of a wide range of quality products, within cost and at high production rates.

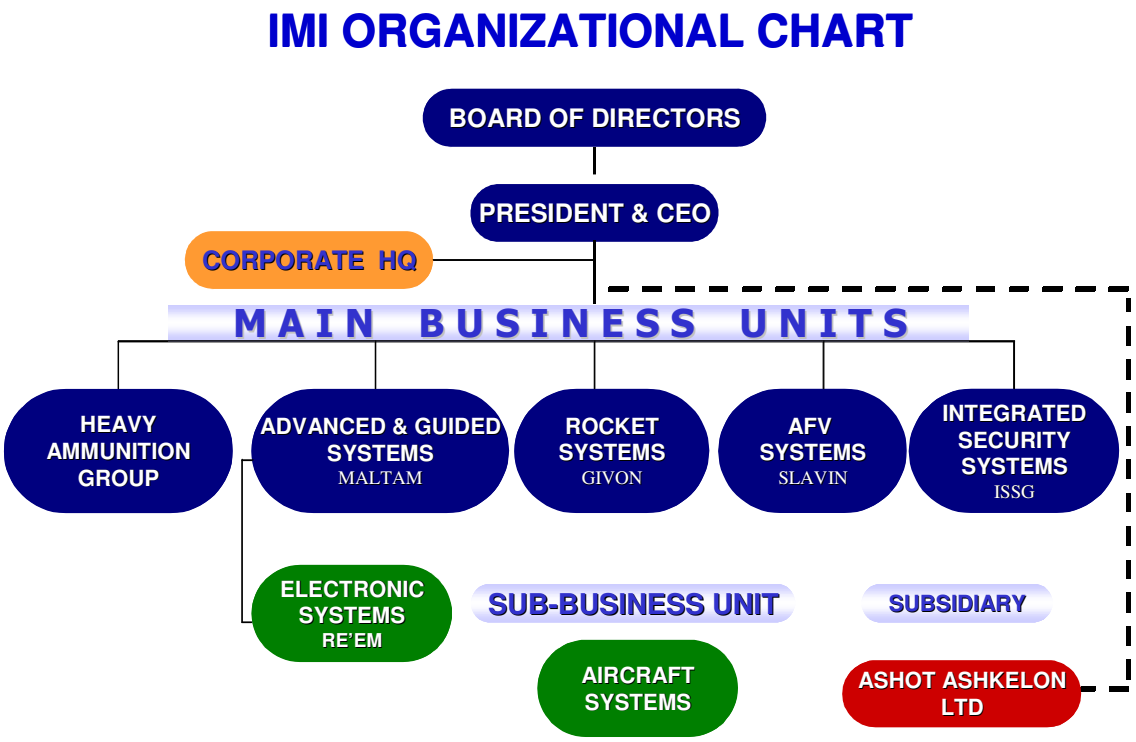

Figure 1. The IMI Organizational Chart

IMI Ammunition Group Profile and Organization

Founded in 1933, IMI is a diversified high-tech company specializing in the design, development and manufacture of leading-edge solutions for complex defense needs of customers around the world. With a catalog of products ranging from small arms to space-based systems, IMI is committed to providing its clients with a lasting competitive edge.

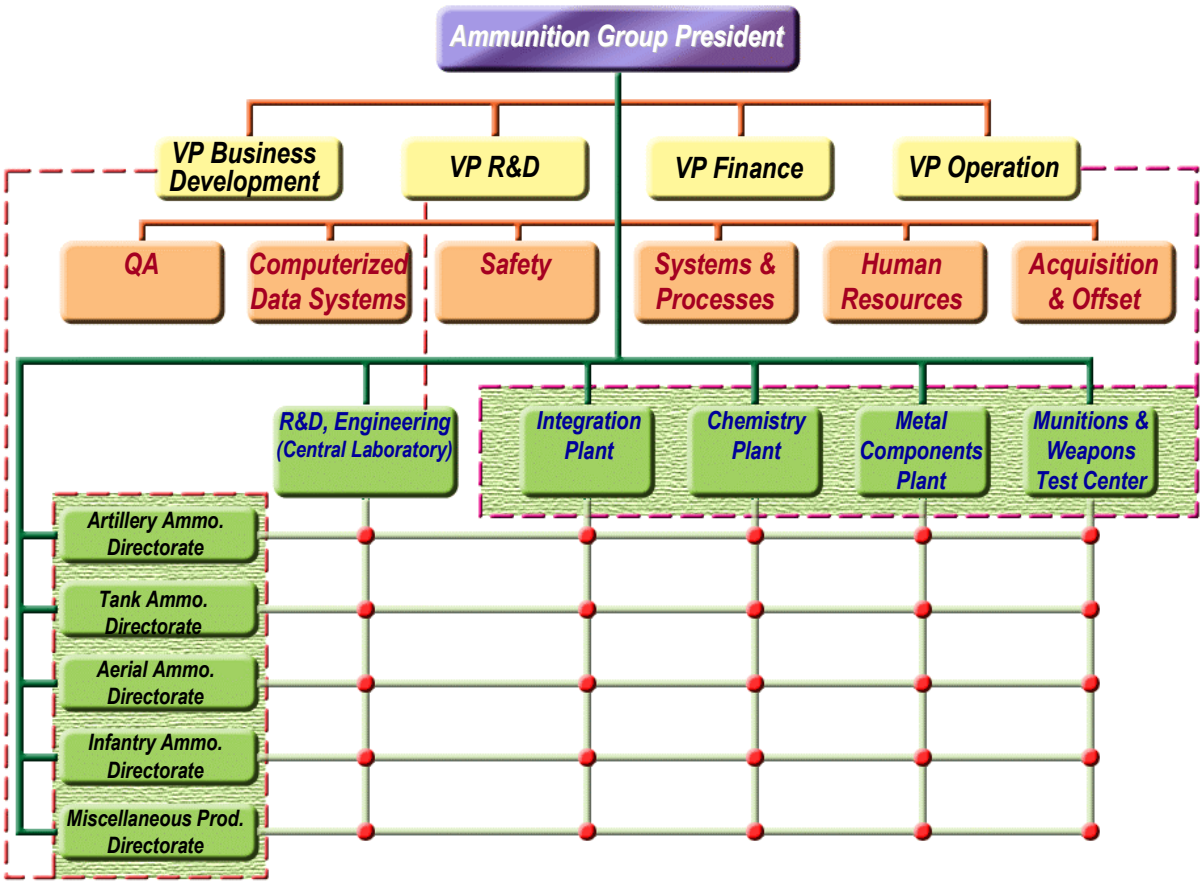

Figure 2: IMI Ammunition Group Organization

By far the largest of the Groups, the Ammunition Group's culture is perhaps best summed up as "**Technology fired by vision and fine-tuned by experience**". This approach has earned the IMI Ammunition Group the respect of the international

defense community and success in an increasingly competitive market place.

The IMI Ammunition Group is world-renown for its innovations in advanced tank, artillery, mortar and aerial ammunition, as well as rifle grenades and non-lethal ordnance.
Emphasizing quality and accountability, The IMI Ammunition Group products meet the most stringent international standards. Like all IMI production facilities, the Group's plants are ISO 9001 certified and comply with U.S. and NATO standards.

The Ammunition Group's success is the product of hard-won experience, remarkable strategic foresight, and first-hand military experience of the IMI team. The Group has repeatedly anticipated important trends in military doctrine and weaponry, translating these foresights into novel systems that have transformed military technology.

Based on decades of field experience, IMI's munitions experts put a premium on combining state-of-the-art approaches in order to create advanced weapons that work, are easily integrated into existing battle plans, and provide the most cost-effective solutions.

2.1 From Specs to Products

Advanced production facilities allow the Ammunition Group to transform the most demanding specifications into operational products. Treated steels, aluminum, magnesium and heavy tungsten alloys are processed in a modern, high capacity production. The plant supports cold forming and deep drawing. It also produces high strength metal sheets for high-tech applications.

The Ammunition Group produces a full range of high quality propellants and explosives, which it supplies to major armed forces and leading defense manufacturers worldwide.

2.2 Envisioning tomorrow's Battlefield

The IMI Ammunition Group designs are based on sophisticated computer models. The IMI Central Laboratory Division can create simulations of all imaginable conditions and final operational effects, giving a realistic assessment of product effectiveness, thus providing our customers with the critical edge necessary on the battlefield of tomorrow.

The Central Laboratory is uniquely positioned to enter into joint R&D and other co-operative ventures with defense manufacturers of international stature, as well as Government research organizations.

2.3 A Test of Strength

The IMI Munitions and Weapons Test Center (M&WTC) guarantees the top-quality performance of ammunition, warheads, grenades, mines, airborne armaments and weapon systems. Its methods include advanced ballistics measurement, high-speed photography, X-ray, arena tests, and proving ground firing tests.

2.4 A World of Business Alliances

The Ammunition Group's marketing and support network is committed to reliable product delivery and complete technical support. The Group's goal is to provide a total solution for its customers' economic and security objectives. The Group welcomes the opportunity to cooperate with customers through joint ventures, strategic alliances and other forms of cooperation.

2.5 Artillery Ammunition

The Ammunition Group provides its customers with high-performance artillery products in the largest possible selection of Western and Eastern calibers. With a

comprehensive range of ammunition for artillery and mortar systems, the Ammunition Group offers **HE, cargo (ICM), WP and HC smoke, and illuminating projectiles in 155 and 105mm calibers.**

IMI's DP-ICM family of artillery projectiles has proven battlefield record. The projectiles incorporate dual-purpose bomblets (submunitions) equipped with IMI's unique **self-destruct and self-neutralization mechanism**. This self-destruct feature ensures that the number of hazardous duds left in the path of advancing friendly forces is kept to the absolute minimum.

IMI's quest to continuously produce superior products has resulted in the development of a new **155-mm Multi-Spectral Smoke Shell (MSSS).** This innovative smoke shell is capable of defeating all visual and thermal observation and weapon-aiming devices. It replaces current smoke shells and improves upon their performance by extending their effective obscuration into the far infrared region of the spectrum.

IMI also continues to improve its standard shelf products in order to increase their cost-effectiveness. An example of such activity is the 155-mm HE **M107-A3 and its family** in which, by making a small improvement in the driving band, the maximum charge for firing was increased, **thus extending its range**.

IMI invests in artillery R&D in the fields of accuracy and effectiveness. Nowadays several R&D programs are in various stages of maturity: 1D and 2D trajectory-correction fuzes, part are based on GPS; proximity initiated fuzes for submunitions; B-Modular charge systems, and more.

2.6 Other areas of activity

Besides artillery ammunition, the ammunition group deal also with:

- **Tank Ammunition, Eastern and Western calibers – 100, 105, 120 and 125 mm** and various types such as: **kinetic-energy (KE) ammunition, APFSDS-T rounds**, **HEAT ammunition**, the unique and innovative **APAM (Anti-Personnel Anti-Materiel) multi-purpose round**, as well as training ammunition.
- **Mortar Ammunition**, of the calibers **52, 60, 81, and 120-mm mortar ammunition families** for the world's most advanced mortar systems. Each family contains **HE, Smoke and illuminating bombs.** The Ammunition Group also produces its unique **120-mm cargo mortar bomb**, equipped with its highly acclaimed Self-Destruct bomblets.
- **Infantry Ammunition,** which includes **Bullet-Trap Rifle Grenades, Non-Lethal Products** (rubber bullets, rubber-bullet launchers and flash grenades), **POMINS II Minefield Clearing System, Thermal Instantaneous Smoke System for Tanks.**
- **Airborne Munitions** which includes wide range (by weight) of **general-purpose cluster, hard-target penetration, anti-runway and training bombs.** The Ammunition Group also produces low-cost **dummy bombs for use in pilot training.** Having ballistic-properties similar to those of live bombs, they also include flash and smoke effects for life-like practice runs. These bombs have been proven to be environmentally safe.

2.7 Summery of the Ammunition Group Product Range

Tank Ammunition

APFSDS-T, HESH-T, HEAT-T, TP-T, TPCSDS-T.

Artillery Ammunition

HE, WP/PWP, Screening Smoke, DP-ICM.

Mortar Ammunition

Illumination, Colored Screening Smoke, HE-ICM, IWP/PWP.

Air-Released Ammunition

Cluster Bombs, Practice Bombs.

Infantry Ammunition

Stun and Flash Hand Grenades, Fragmentation Hand Grenades, Smoke Hand Grenades of various colors, Fuzes for various types of Hand Grenades, such as M215, M213, M201A1 and M210, Rifle Grenades, Minefield Clearing Systems, Demolition Charges.

Medium Caliber Gun Ammunition

20-mm, 30-mm, 40-mm, 76-mm

Small Arms Munitions

Military & Civilian

Pyrotechnics and HE Accessories

Simulators, Markers, Booby Traps, Primers, Percussion Detonators, Percussion Primers, Delay Detonators, Booster charges, Blasting caps.

Explosives

RDX, HMX, Explosive Compounds based on RDX, HMX and TNT, Accurate Warhead Shaped Charges.

Propellants for:

Tank Ammunition, Artillery Ammunition, Mortar Cartridges, Rocket Motors for Missiles and Rockets, Combustible Products.

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2.8 Additional Information

IMI has been certified for the ISO 9001-2000 QA System by a number of world-renown institutions.

Certificates of Approval from The Standards Institution of Israel of the quality management system to ISO 9001;

Certificate of Conformance from IQNET of the quality system to ISO 9000;

Certificate of Registration from BSI of the quality management system to BS EN ISO 9001.

Cluster Munitions – Un-Exploded-Ordnance Issue

Foreword

The term "Cluster Munitions" defines a wide range of munitions having a common characteristic; the payload is sub-munitions packed in a canister. To get the desired effect the sub-munitions are dispersed over the target area.

"Cluster Munitions" are found in the form of aerial bombs, artillery projectiles, artillery rockets, mortar bombs and missiles.

We would like to focus the discussion on artillery projectiles and artillery rockets.

Representatives of those are the US made 155MM, M483A1 DPICM (Dual-Purpose-Improved-Conventional-Munitions) containing 88, M42 and M46 bomblets as payload and the MLRS, M26 artillery rocket containing 644, M77 bomblets as payload.

Efficiency of DPICM

Those two types of DPICM were developed and fielded at the middle of the "cold war" and were intended to give the NATO forces the ability to stop the flood of the "Warsaw pack" armored divisions.

The DPICM is considered to be 4-8 times more efficient than HE (High-Explosive) ammunition against a variety of targets, is considered as "force multiplier" and gives the maneuvering force commander the winning edge in defense and offence.

So, what is the problem?

Cluster Munitions were used extensively for the first time during the 1991, "Desert Storm" operation in Iraq.

MLRS, M26 artillery rockets were used extensively and with devastating results in the roll of counter battery fire missions. They were given the nickname "rain of steel" by the Iraqi troops.

Alas, huge quantities of unexploded M77 bomblets were found later on in the battlefield, those duds caused deaths and injuries to friendly troops and local population.

Attached is a report GAO/NSIAD-93-212 that was presented to the US senate on the issue. We took the liberty to highlight some paragraphs.

One of which is,

"The Army attributes the higher dud rates to design and deployment deficiencies. However, until 1989, these deficiencies were given little consideration because MLRS was developed to defend against the Soviet threat, which would not have required U.S. soldiers to occupy submunition-contaminated areas."

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The report estimates the dud rate for those munitions as,

"Based on lot acceptance test data, the Operation Desert Storm dud rate could have ranged from 2 percent to 2.8 percent for the 155-MM howitzer submunitions (M42 and M46)"

and,

"The lot acceptance test submunition dud rate of MLRS rockets, available for use during Operation Desert Storm, ranged from 2 percent to 23 percent-leaving from 154 to 1,777 unexploded submunitions from a full launcher load."

UN reports from the Gulf and South Lebanon conflicts estimate the dud rate for the MLRS system as 40%.

There is no system having no failures, in ammunition accepted reliability value is 97%-98% (2%-3% duds, actually the acceptance criteria for artillery fuzes is 95% reliability) dud values of 23%-40% are completely unacceptable and were the main cause of labeling all "Cluster Munitions" "immoral ammunition"

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The IMI M85 Hazardous dud rate is 0.06% versus the 5% to 40%, using M42, M46 and M77 US devices

What is the risk?

The probability that a person crossing an area previously struck by a clustered weapon will encounter an unexploded bomblet (PE) is:

$$P_E = 1 - \left(1 - \frac{L \times d}{A}\right)^B$$

Where:

L= the distance traversed into the area.
d= the diameter of the threat (Diameter of the bomblet).
A = the size of the impact area.
B = quantity of hazardous duds

Let's consider a typical impact area having a diameter of 200 M into which 10,000 bomblets were fired. A person who crosses the impact area will have a risk of PE to step on a hazardous bomblet according to.

Bomblet	Hazardous duds Rate (%)	Probability of hit (%)
M42 / M46 / M77	5%	2.4%
M42 / M46 / M77	20%	9.1%
M42 / M46 / M77	40%	17.4%
M85	0.06%	0.03%

IMI is proud of its M85 bomblet which for many years and up to these days is the only Self-Destruct bomblet in production for artillery uses.

The battle proven M85 Bomblet serves as payload in a verity of Cargo Projectiles all over the world to the outmost satisfaction of its users.

We hope that we succeeded to clarify the UXO issue and that the so called "bad

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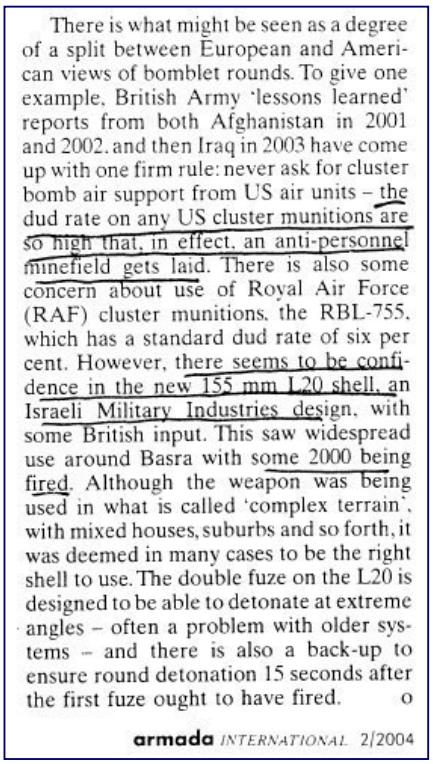
reputation" that was stuck to "Cluster Munitions" do not imply to the use of DPICM with the M85 bomblet.

We are aware and directly involved in US programs for upgrading the M42 / M46 and M77 to bomblets with self-destruct capability.

The M85 bomblet was used in the 2003, Second Gulf War by the Royal British Artillery.

And we attach two clippings.



There is what might be seen as a degree of a split between European and American views of bomblet rounds. To give one example, British Army 'lessons learned' reports from both Afghanistan in 2001 and 2002, and then Iraq in 2003 have come up with one firm rule: never ask for cluster bomb air support from US air units – the dud rate on any US cluster munitions are so high that, in effect, an anti-personnel minefield gets laid. There is also some concern about use of Royal Air Force (RAF) cluster munitions, the RBL-755, which has a standard dud rate of six per cent. However, there seems to be confidence in the new 155 mm L20 shell, an Israeli Military Industries design, with some British input. This saw widespread use around Basra with some 2000 being fired. Although the weapon was being used in what is called 'complex terrain', with mixed houses, suburbs and so forth, it was deemed in many cases to be the right shell to use. The double fuze on the L20 is designed to be able to detonate at extreme angles – often a problem with older systems – and there is also a back-up to ensure round detonation 15 seconds after the first fuze ought to have fired. o

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UK confirms use of cluster munitions

The UK Ministry of Defence (MoD) clarified its stance on the use of cluster munitions in Iraq on 3 April, revealing that "in the region of 50" of the weapons have been employed to date during the current conflict.

An MoD spokesperson confirmed that the British Army has used its L20 bomblet munition from the service's AS90 155mm self-propelled howitzer. "We have employed cluster munitions against dispersed Iraqi armoured units where their military utility has favoured their use over other weapons," the source told *Jane's Defence Weekly*. The weapons have not been used near major population centres, he said.

The L20 round leaves no unexploded submunitions, since these feature a secondary time-sensitive arming device, which detonates failed rounds within 15 seconds of hitting the ground, said the official.

Should any bomblets be left, however, the source noted: "We know where we are using these munitions, and we are committed to clearing any unexploded ordnance left by them as part of our post-conflict reconstruction activities."

JDW also believes that the Royal Air Force's Harrier GR7 ground-attack aircraft have deployed RBL755 cluster bombs against Iraqi targets, although MoD sources have yet to confirm the design's use.

This unguided glide bomb carries a payload of 147 submunitions, around 5% of which fail to detonate on average, according to MoD estimates.

This confirmation of the UK's use of cluster weapons resolves earlier confusion over their potential employment during Operation 'Iraqi Freedom' (referred to by the UK as Operation 'Telic').

This arose when a senior planning official noted: "I don't think there is any intention on our part to use such weapons" after they had already been pictured deployed to forward operating bases ahead of the Gulf conflict (*JDW* 26 March).

Craig Hoyle *JDW Aviation Editor*
London

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