NMAS 09.32

Guide for Large Scale Demolitions and Burning Operations

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Foreword

The National Mine Action Standards (NMAS) of Lebanon were first developed in the form of Technical Standards and Guidelines (TSG). These TSG were edited into the first edition of the NMAS in 2010 and were written to comply with the first edition of the International Mine Action Standards (IMAS). Since then, the scope of the IMAS has been expanded to include more components of mine action and amended to mirror the most recent changes to standards as required in today's operations. These changes, as well as changes in the local context of Lebanon, have necessitated a review and update of the NMAS.

As detailed in the National Mine Action Policy of 2007, the Lebanon Mine Action Center (LMAC) has the responsibility to execute and coordinate the Lebanon Mine Action Program (LMAP) on behalf of the Lebanon Mine Action Authority (LMAA), including the development and amendment of standards. Such standards shall be developed in a participatory approach that shall involve international, governmental, and nongovernmental organizations.

The NMAS are reviewed as needed to reflect amendments in the IMAS as well as incorporate changes to international obligations and local requirements. Such revisions are made available on the LMAC's website www.lebmac.org or can be obtained through contacting the LMAC via the email info@lebmac.org.

Acronyms

AXO	Abandoned Explosive Ordnance
CASEVAC	Casualty Evacuation (also MEDEVAC)
CDS	Central Demolitions Site (authorized demolition sites)
EMF	Electro-Magnetic Force
EO	Explosive Ordnance (of all kinds)
EOD	Explosive Ordnance Disposal
ERW	Explosive Remnants of War
HMA	Humanitarian Mine Action
IA	Implementing Agency
IMAS	International Mine Action Standards
LMAA	Lebanon Mine Action Authority
LMAC	Lebanon Mine Action Center
LMAP	Lebanon Mine Action Program
NEQ	Net Explosive Quantity
NMAS	National Mine Action Standards
OBOD	Open Burning and Open Detonation
RC	Radio Control
TSG	Technical Standards and Guidelines

Introduction

Together with NMAS 09.30 and 09.33, this NMAS provides guidelines for the large scale demolition of EO by explosive demolition or by open burning. It focuses on ensuring that all large scale demolitions are conducted safely, effectively, and with minimum impact on the surrounding population and environment.

Large scale demolitions should take place in designated demolition areas that have been formally approved for that use by the LMAC.

Generally, large scale demolitions will only be necessary when large stores or caches of abandoned EO are found. All munitions and weapons caches discovered by implementing agencies (IAs) during demining work shall be reported to the LMAC immediately. The LMAC shall arrange for them to be secured, transported when necessary, and ultimately destroyed.

Although the government of Lebanon neither possesses nor maintains a stockpile of anti-personnel mines it is possible that while conducting demining operations implementing agencies (IAs) may come across abandoned anti-personnel mine caches or stockpiles placed by previous militias. These shall be recorded and formally demolished under the direction of the LMAC as with all other abandoned explosive ordnance (AXO).

Guide for Large Scale Demolitions and Burning Operations

1. Scope

This NMAS provides standards and guidelines for the conduct of large-scale demolition and burning operations at authorized demolition sites that may be called Central Demolition Sites (CDS). It includes recommendations for the layout of demolition grounds and the content of SOPs that require the IA's to use inherently safe procedures.

This NMAS should be read in conjunction with NMAS 09.33, *Guide for the Demolition of Mines and EO*, and NMAS 09.30 *Explosive Ordnance Disposal* (EOD).

2. References

A list of normative and informative references is provided in Annex A.

Normative references provide cross-referencing to other standards referred to in this NMAS, and which form an integral part of the provisions of this standard.

Informative references provide a list of documents that may be consulted for a clearer understanding of this standard.

3. Key Terms and Definitions

The following are key terms and definitions used in this NMAS:

- *Abandoned Explosive Ordnance (AXO):* explosive ordnance that has been abandoned by combatants without being used. Often the ordnance has not been fuzed or assembled. AXO may be found in large numbers in abandoned munition stores that may have been concealed.
- *Demolition (of EO)*: the process of converting EO or explosive material into a state that no longer presents an explosive hazard.
- *Demolition ancillaries:* ancillary items used by IAs during demolitions such as wires and exploders and parts which may be hazardous, such as detonators and primers.
- *Demolition Site:* an area authorized for the destruction of ammunition and explosives by any approved means. Also known as a *Demolition Ground* or a *Central Demolition Site (CDS)*.
- *Explosive Ordnance (EO):* all munitions or parts of munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms ammunition; all mines, torpedoes and depth charges; pyrotechnics; cluster

munitions and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components that are explosive in nature (adapted from IMAS, 2nd ed., 2014).

- *Explosive Ordnance Disposal (EOD):* the identification, evaluation, render safe, recovery and disposal of EO. EOD may be undertaken as a routine part of demining operations; upon discovery of ERW; to dispose of ERW discovered outside hazardous areas (this may be a single item of ERW, or a larger number inside a specific area); or to dispose of explosive ordnance which has become hazardous by deterioration, damage, or attempted destruction.
- *Explosives:* a substance or mixture of substances, which, under external influences, is capable of rapidly releasing energy in the form of gases and heat in a detonation.
- *Unexploded Ordnance (UXO):* explosive ordnance that has been primed, fused, armed or otherwise prepared for use or used. It may have been fired, dropped, launched or projected yet remains unexploded due to malfunction, design, or any other reason.

In addition to the above terms, NMAS 04.10 provides a glossary of terms and definitions used across all standards.

As in the IMAS, the terms 'shall', 'should' and 'may' are used across all standards to indicate the required degree of compliance. For any organization working in Lebanon, the use of 'shall' indicates a compulsory requirement. The term 'should' indicates the national preference which may be varied with LMAC approval. The term 'may' indicates a suggestion that is not obligatory.

4. General Guidelines

It is the responsibility of the Implementing Agency (IA) to ensure that its staff conduct all large scale demolition and burning activities in accordance with *all* NMAS using equipment and procedures that are included in the IA's detailed SOPs that have been approved by the LMAC for use.

Large scale demolitions are a part of explosive ordnance disposal that may be preceded by authorized render safe or neutralization procedures. All demolitions and EOD work shall be conducted by appropriately trained and experienced staff who have the appropriate individual accreditation from the LMAC.

Some common hazards present a specific or additional threat, such as sub-munitions, IEDs, munitions containing white phosphorous or missiles containing propellant. Persons tasked to destroy these items shall be specifically trained and experienced to conduct demolition of the munition types and shall conduct their work in accordance with the IA's LMAC approved SOPs.

5. Priorities and Main Principles

The destruction of ammunition and explosives is potentially hazardous whatever procedures are used. Nevertheless, risks can be managed and minimized by using appropriate procedures and equipment.

The following general priorities shall be observed at all times.

- *Safety:* the safety of staff is paramount. Methods deemed not to be safe shall not be used.
- *Security:* the security of munitions awaiting disposal and the demolition explosives and ancillaries used in their demolition shall be assured at all times.
- *Accounting:* an accurate record shall be kept of all munitions and all demolition materials at all times: any loss of munitions or hazardous materials shall be promptly identified, reported to the LMAC, and investigated.
- *Speed of Work:* demolitions shall never be conducted at a speed which compromises safety, security or accurate accounting.

Although there are many different detailed disposal procedures, the following principles and approaches should be reflected in the IA's LMAC approved bulk demolition SOPs and applied during all large scale demolition tasks.

- Plan the task carefully. Planning should not be left until arrival at the disposal site; the program and procedures shall be worked out in detail well in advance.
- Give and obey directions precisely. The disposal site is no place for ambiguity or misunderstanding. Directives should be designed to be easily understood and by all staff, then obeyed with discipline.
- Know the ammunition. Whenever possible, know in detail both the item being destroyed and the explosives used to destroy it. Unless the design characteristics of both are known, it may not be possible to determine a safe, effective, and efficient means of disposal.
- Create a safe working environment. A safe working environment is one that is safe for any members of the public who may be in the vicinity. It is also an environment that is safe for the demolition team, other staff, property, vehicles, and equipment.
- Observe all the safety precautions and use only approved methods.
- Never hurry or take shortcuts.
- When the bulk demolition has been completed, tidy the entire site so that is ready for the next user. No disposal task shall be considered complete until all hazards, contamination, remnants of hazards and other rubbish have been removed from the demolition area.

6. Guidelines for large scale demolitions

6.1 Authority for Large Scale demolitions

Formal LMAC pre-authorization shall be required before any large scale (bulk) demolitions are conducted.

6.2 Approved Large Scale Demolition Methods

The following three methods have been approved by the LMAC for use during large scale demolitions in Lebanon.

- *Detonation:* demolition by detonation should be used to destroy munitions with a high explosive (HE) content. Munitions with other contents such as pyrotechnics and lachrymatory munitions may be disposed of by their appropriate inclusion in stacks of HE munitions during large-scale demolitions. The non-HE items included in a mixed stack should not be more than a small percentage of the overall stack.
- *Burning:* burning is an approach generally used with propellant (bagged or loose), smoke, pyrotechnic and lachrymatory munitions. It may also be appropriate to burn plastic-bodied mines. Burning may also be used as an alternative to detonation for some types of explosive, such as CE, TNT, NG based explosives and GP. However, detonation is generally the cleaner, so preferred, method.
- *Incineration:* incineration is a specialized way of burning in a confined space that may be authorized for use during the destruction of specified munitions with a small explosive content.

Other procedures and equipment may be described in detail in the IA's SOPs that are submitted for LMAC assessment. When appropriate, the LMAC may ask for the proposed variations to be demonstrated before deciding whether or not to approve their use.

6.3 Location of Large Scale Demolition Sites

The LMAC shall formally approve and license all large scale demolition sites in Lebanon.

Any IA wishing to use a large scale demolition site shall seek pre-approval from the LMAC. Each large scale demolition site should be a secure area authorized for the destruction of ammunition and explosives by detonation and/or burning. These may be referred to as demolition grounds or burning grounds and both explosive demolition and burning may be conducted in designated parts of the same site.

Large scale demolition sites may also be approved by the LMAC for the temporary storage of munitions prior to large demolitions subject to security guarantees. Permission to use these areas for the temporary storage of any EO shall be requested and must be granted before they are used.

6.4 Approval of Large Scale Demolition Sites and SOPs

Formal approval for the use of a large scale demolition site and the IA's bulk demolition SOPs must be granted by the LMAC before any IA can use a site.

When an IA has identified a site that it wants to use for one or more large scale demolitions, it shall request LMAC approval for the site to become either a temporary or a permanent bulk demolition site (or Central Demolition Site, CDS).

The LMAC shall consider the following factors when deciding whether to permit the use of the site.

- The IA's large scale (bulk) demolition SOPs shall include details of how the procedures documented will be applied in local conditions.
- A detailed map of the area on which the grid reference, name, and area of the site are marked shall be submitted. This should be accompanied by an explanation of why the site is suitable for large scale demolitions.
- The site shall not be in productive use or intolerably close to roads or habitations. Its use shall not raise security concerns with the LAs, LAF or UNIFIL.
- A large scale sketch map of the site showing the proposed layout when in use should be submitted. The sketch map should show the proposed locations of sentries and observation posts, the location of the firing point or points, and any associated protective works.
- Details of the proposed marking of the site should be provided. All large scale demolition sites should be marked with LMAC approved notice boards that are positioned so that they are visible on all possible approaches.
- The IA shall demonstrate that effective communication between all parties involved in a large scale demolition shall be ensured at all times.

The LMAC may refuse approval of an IA's request to use an area as a large scale demolition site without providing any explanation, at its discretion. Generally, if refusal is not for security reasons, the LMAC should provide explanations and try to help the IA to access a more appropriate site

7. Guiding Principles for Large Scale Demolitions

The Large scale (bulk) demolition SOPs submitted by the IA to the LMAC for assessment shall take note of the general observations and requirements listed in this section.

7.1 Hazards of Detonation

Hazards involved in large scale demolitions include:

- *Flash and heat:* These effects are localized but still significant. Flash could injure the eyes. Heat will start fires if combustible materials are present, such as dry grass, undergrowth, trees or peaty soil.
- *Blast and noise:* large blast pressure waves can cause serious damage to persons impacted, including brain damage. Excessive noise accompanying pressure can cause ear damage that can be permanent. Excessive noise may also be a nuisance to the general public.
- *Ground shock:* the main effects of ground shock are usually felt relatively close to the detonation but rock strata may transmit the effect over a considerable distances.
- *Fragments:* fragments of metal thrown out during a demolition are potentially lethal over a wide area. The size of each large scale demolition's 'danger area' shall be calculated with reference to the bulk of explosives involved an the potential range of fragments.
- *Toxic smoke/fumes:* toxic smoke and fumes can be a hazard, especially when burning some munition types. Effective respirators shall be made available when appropriate.

7.2 Properties of Large Scale Demolition Sites

To overcome the hazards involved in large scale demolitions, the following approaches shall be applied in the selection and use of all large scale demolition sites in Lebanon:

- all large scale demolition sites shall be located as remotely as possible from local communities;
- all large scale demolition sites shall be well away from the flight paths of civil and military aircraft;
- the ground surface in the demolition area should be deep soil that is relatively free from stones and from which all surface stones larger than 10 cm diameter have been removed;
- the site should be free from secondary fire hazards so dry surface vegetation shall be removed before the area is used;
- demolition grounds shall never be located over pipelines, over power cables, or near fuel storage areas;
- all large scale demolition sites should be well away from radio/radar transmitters or high voltage power lines whenever electric cable or radio control (RC) initiation systems may be used during demolitions;

- when possible, the large scale demolition site should be located on high ground because this can reduce ground shock, avoid concentrating blast effects and high ground is usually relatively well drained (however, high ground is likely to increase the radius of fragmentation hazard, so a balance between advantages and disadvantages should be found).

8. Guiding Principles for Burning

The SOPS covering the large scale (bulk) demolition of EO by burning that are submitted by the IA to the LMAC for assessment shall take note of the general observations and requirements listed in this section.

8.1 Hazards of Burning

Hazards created by burning EO may include intense heat, intense light, and toxic fumes. However, there are no blast, ground shock, or fragmentation hazards unless the demolition burns to detonation. Generally, the same safety requirements apply to the large scale burning of EO as are applied to the large scale explosive demolition of munitions because the burning of high explosives in bulk or in a confined space inside a munition may accelerate to detonation without the presence of any detonator.

The controlled burning of plastic or wooden cased munitions (such as some mines) is a demolition procedure that has been widely used in some countries. Lebanon has no formal stockpiles of anti-personnel mines and so no decision over how best to destroy stockpiles of mines is necessary. The burning of mines that have been recovered from minefields during demining procedures may be authorized by the LMAC but shall not be conducted on a large scale so should not take place in a large scale demolition area.

8.2 Properties of Burning Grounds

When all or part of a large scale demolition area has been approved for use as a burning ground, the following approaches shall be applied in their selection and use:

- no secondary fire hazards shall be present;
- an adequate fire-fighting capacity to guarantee that fires cannot spread uncontrolled or breach the perimeter shall be ensured;
- the area shall be sufficiently isolated to guarantee prevention of heat or fume casualties; and
- areas with sandy soil shall be preferred.

Sites near steeply rising ground should be avoided because they encourage rising hot air currents that can carry burning soot a considerable distance.

9. Explosive Limits

The limit of total high explosive in any large scale demolition shall be constrained by the potential spread of fragmentation and the disturbance that a large demolition may cause.

The IA shall include details of how it proposes to calculate the potential fragmentation range (or danger area) in the SOPs that it submits for the LMAC's approval before being permitted to undertake any large scale demolitions.

The fragmentation range shall not exceed the perimeter of the large scale demolition range, so the size of the area will dictate the maximum permissible net explosive quantity (NEQ) of any one demolition.

At the discretion of the LMAC, the 'tolerance' of the public, the LA, the LAF, UNIFIL and others who may be affected may impose lower NEQ limitations than the fragmentation range.

10. Safety at Large Scale Demolition Sites

Accidents on large scale demolition ranges are very rare but can be catastrophic, defeating all PPE that is available, so must be avoided. All reasonable accident prevention measures shall be detailed in the IA's relevant SOPs and enforced by a suitably trained and experienced demolitions supervisor.

The minimum PPE to be worn by all persons inside the large scale demolitions area as soon as any demolitions procedure starts should be eye protection as described in NMAS 10.30 PPE. This is because minor accidents have occurred during demolitions when a single fuze of detonator has exploded and persons involved have suffered severe eye damage. In addition, the wearing of body protection is preferred.

The large scale demolition team shall include at least one person trained and equipped to act as a paramedic. This person should be positioned outside the danger area or in a position that is suitably protected inside the area. A site casualty evacuation (CASEVAC) plan shall be documented before the site is used.

In the event of an accident, the requirements of NMAS 10.60 Reporting and Investigation of Demining Accidents shall be applied. In addition, the IA shall describe in the SOPs that it submits for LMAC approval how they would make the large scale demolitions area safe following an accident.

11. Records and Reports

A Demolitions Diary is kept for each large scale demolition area by the LMAC. IA's shall keep an accurate inventory of all munitions destroyed and all demolition explosives and ancillaries or other equipment consumed in the process. The IA conducting the demolition

shall complete the documentation required by the LMAC after each demolition and at the end of the IA's use of the range (or as otherwise required by the LMAC).

12. Roles and Responsibilities

12.1 Role of the LMAC

The LMAC shall:

- assess and, when appropriate, accredit demining organizations before assigning any tasks involving large scale demolitions to them, in accordance with NMAS 07.12 Guide for the Accreditation of Mine Action Organizations and Operations;
- assess the IA's large scale demolitions SOPs and, when appropriate, approve their use;
- maintain a list of dedicated large scale demolition sites to be shared with IAs, and approve and license proposed large scale demolition sites when appropriate;
- liaise with all relevant civil and government bodies and gain their approval before authoring a large scale demolition;
- ensure that the relevant air transport authorities are aware of authorized large scale demolitions that may be visible over great distances;
- monitor large scale demolitions conducted by IAs to assure quality operations; and
- collect, analyze and store all relevant data related to large scale demolitions.

12.2 Role of IAs

In their capacity as demining organizations conducting large scale demolitions, IAs shall:

- acquire LMAC accreditation to conduct large scale demolitions;
- submit detailed large scale demolitions plans for the LMAC's approval before conducting any large scale demolition;
- comply with the national standards related to large scale demolitions;
- submit appropriate and effective SOPs for large scale demolitions to the LMAC for assessment and, when appropriate, approval. These standards shall cover all large scale demolitions procedures that they will use in their work;
- when appropriate, identify potential large scale demolition sites and submit the required details to the LMAC
- ensure appropriate and timely data gathering, documentation, and reporting; and
- gain formal approval from the LMAC before preparing for or conducting any large scale demolition.

The documents listed below constitute normative references, which form an integral part of the provisions of this standard.

- Current LMAC and IMSMA reporting formats (request copies from the LMAC);
- NMAS 09.30 Explosive Ordnance Disposal;
- NMAS 09.33 Guide for the Demolition of Mines and EOD;
- NMAS 10.30 PPE;
- NMAS 10.60 Reporting and Investigation of Accidents/Incidents;
- NMAS 12.10 Mine/ ERW Risk Education; and
- NMAS 04.10 Glossary of Mine Action Terms, Definitions, & Abbreviations used in the Second Edition of the NMAS

In addition to the normative references listed above, the following informative references may be consulted:

- National Mine Action Policy 2007.

NMAS 09.32, Edition 2.1: Amendment Record

The NMAS are subject to a comprehensive or partial review by the Review Board periodically. Changes in the context as well as safety requirements and efficiency considerations may necessitate amendments to individual NMAS standards more frequently. If this occurs, such amendments shall be given a number, dated, and detailed in the table below. The amendment should also be indicated on the header under the NMAS edition number.

Whenever the formal review of the NMAS is completed, a new edition shall be issued. Amendments that have taken place before the review date shall be incorporated in the new edition and the amendment record table cleared. Consequently, the recording of amendments shall start again until the next review.

The most recent revisions of the NMAS shall be posted on the Lebanon Mine Action Center (LMAC) website on www.lebmac.org.

Number	Date	Amendment Details
1	March 2020	Minor revisions throughout.