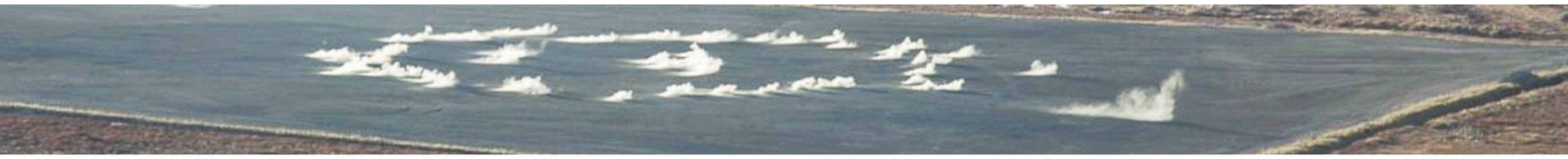
Land Release



and Cluster Munitions

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The Geneva International Centre for Humanitarian Demining (GICHD) works for the elimination of anti-personnel mines, cluster munitions and explosive remnants of war. The Centre contributes to the social and economic well-being of people and communities in affected countries. The Centre respects the lead of the national mine action programmes and works closely with them, it cooperates with other mine action organisations, and follows the humanitarian principles of humanity, impartiality, neutrality and independence.

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The GICHD is an international expert organisation, registered as a non-profit foundation in Switzerland.

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LAND RELEASE AND CLUSTER MUNITIONS

APRIL 2011

SURVEY AND CLEARANCE OF UNEXPLODED SUBMUNITIONS VS. LANDMINES AND OTHER ERW

This publication aims to explain how and why survey and clearance methods in areas contaminated by unexploded submunitions (from cluster munitions) are different to those in areas contaminated by mines and other explosive remnants of war (ERW). A proposed land release (LR) methodology for dealing with unexploded submunitions is also described.

Convention on Cluster Munitions Article 2 Definitions, as used in this chapter

Explosive Submunition means a conventional munition that in order to perform its task is dispersed or released by a cluster munition and is designed to function by detonating an explosive charge prior to, on, or after impact.

Unexploded Submunition means an explosive submunition that has been dispersed or released by, or otherwise separated from, a cluster munition and has failed to explode as intended.

Cluster Munition means a conventional munition that is designed to disperse or release explosive submunitions, each weighing less than 20 kilograms, and includes those explosive submunitions.

Traditionally, the systematic clearance of explosive hazards is grouped into two main categories:

- Mine clearance; and
- Battle Area Clearance (BAC). This is a broad term used for the clearance of ERW

When conducting mine clearance and BAC, a specific area is searched in a systematic manner, with the aim of locating all hazardous items within the identified boundaries. While the land release principles are similar, the operational methodologies that are applied to each category are different.

BAC includes activities such as a surface search of an area, which is when people walk shoulder to shoulder across the land, visually inspecting the ground for evidence of a hazard. It can also involve using procedures similar to those used in mine clearance, such as sub-surface searching (locating items on and below the surface) in marked lanes.

If both mines and ERW are present in the same area, the situation should first be treated as a mine hazard problem, and then the ERW hazard should be addressed.

Addressing areas contaminated by unexploded submunitions is a BAC activity, but the operational procedures used are, in many ways, similar to the clearance of mines. Therefore, to ensure the efficient release of land through survey and clearance, a separate operational approach is required.

CHARACTERISTICS OF CLUSTER MUNITIONS AND EXPLOSIVE SUBMUNITIONS

PATTERN

Cluster Munitions/Submunitions

Cluster munitions are distinct from other munitions, in that when fired, launched or dropped, the explosive submunitions are dispersed or released, and create a strike pattern or 'footprint' on the ground. There will undoubtedly be unexploded submunitions within the area of this footprint, because of the high failure rate of explosive submunitions, as discussed later in this chapter. By identifying the shape of the footprint, the centre and outer edge of the strike can be better determined, which facilitates a more precise systematic search of the hazardous area.

Identifying a footprint generally becomes more difficult over time, as natural changes affect the environment. Multiple strikes in the same area, or other factors, such as heavy vegetation or urban terrain, can also make identifying the extent of an individual footprint difficult.

An example footprint/pattern of 155 mm delivered explosive submunitions. The impact marks in this photo show the extent of the footprint.

In general, ERW such as aircraft bombs, mortars and artillery shells, do not create a predictable pattern after being fired or delivered. Therefore, they generally do not produce a regular pattern or footprint, but may be concentrated in certain areas.

Mines

Mines are often laid in rows and in set patterns, so methodologies can be developed in order to assist clearing patterned minefields. Even when mines have been laid randomly, and not in a set pattern (generally known as 'nuisance minefields'), it may still be possible to identify and analyse the laying tactics that were employed.

Therefore, it can still be possible to determine areas that are likely to be mined, and release areas that have no evidence of mines.

METAL CONTENT

Normally, explosive submunitions contain significantly more metal than regular anti-personnel (AP) mines, or non-metal cased anti-vehicle (AV) mines. This means that detectors/locators that are otherwise not suitable for mine clearance operations, such as magnetometers, can be used.

FAILURE RATE

Research indicates that explosive submunitions have a typical failure rate of between five and 20 per cent[1], which is high, when compared to other types of ERW. This high failure rate is a result of several factors. The most dominant cause is linked to the arming process and fuse design.

There are a large number of explosive submunitions in each cluster munition (up to several hundred in each container). This, coupled with the high percentage that fail to detonate, can create a grouped pattern of unexploded submunitions.

RISK OF ACCIDENTAL FUNCTIONING

The fusing of explosive submunitions varies, depending on the make and model. Most types are designed to detonate on impact with the ground or the target. This is different to mines, which are generally designed to be victim-activated.

The risk of activating an unexploded submunition below the surface, by stepping on the ground above it, is considered very low. Therefore, the area can usually be accessed to conduct any survey activity. Unexploded submunitions should not be compared to anti-personnel (AP) mines, which in most cases, are designed to detonate when a person steps on them.

Because of the characteristics outlined above (pattern, metal content, failure rate, and risk of accidental functioning), the land release methodology for submunitions can, and should be, distinct from mine clearance and clearance of other ERW.

It should be emphasised that accessing areas contaminated by unexploded submunitions, in order to conduct a survey activity, is a procedure used by trained technicians, who are capable of conducting a proper risk assessment before entering a contaminated area. It should not be confused with the risk that unexploded submunitions pose to a local population.

Summary table | Different characteristics of mines, ERW and submunitions

	Pattern	**Metal Content**	**Failure Rate**	**Risk of accidental activation** (accessibility during survey)
MINES	Laid in a pattern or placed for tactical reasons	Low/ Medium/ High	Not applicable	Victim activated. **No access to the area during survey**
SUBMUNITIONS	Create a pattern or footprint as a result of the launching system	High	5 – 20 %	Designed to detonate on impact. **Access to the area during survey in most cases**
OTHER ERW	Generally no pattern	High	Depends on type, but in general lower than for submunitions	Generally designed to detonate on impact **Access to the area during survey**

LAND RELEASE METHODOLOGY

Submunitions create a footprint, or a certain pattern on the ground, when they have been dispersed, released, or otherwise separated from the cluster munition. Because of the high failure rate, the discovery of one unexploded submuniton may be an indication of the presence of more unexploded submunitions in the same area.

Even if the conflict occurred several years earlier, or if a large number of the unexploded submunitions have been moved and/or destroyed, this will still be the case. It is still likely that one unexploded submunition is indicative of others in the immediate surroundings. In the case of overlapping strikes, it is necessary to find out where the footprints end. It is therefore important to have clear and agreed working procedures on how to plan and conduct survey and clearance.

Similar drills and equipment are used during clearance of submunitions and, in some situations, mines, eg, a systematic search below ground, using detectors. Because of the cost and logistical challenges involved when purchasing new equipment, an organisation may not have a choice, other than to use detectors that have been designed to detect minimum metal mines, and procedures developed for mine clearance.

Using mine clearance procedures and equipment during survey and clearance of submunitions is highly inefficient, and should be avoided whenever possible. The reason for this statement is that the metal content (medium/ high) is significantly higher, and the fact that submunitions are not designed to detonate by appling pressure, eg, when stepped on.

The survey and clearance of submunitions therefore can generally be conducted using more rapid and more effective procedures than for mine clearance. For example:

- **Quicker Search Procedures**

  High metal content of the target and not pressure/victim-activated. In most cases it is considered safe to conduct a surface-search by walking through the suspected area and cutting of vegetation (if needed) to allow a more thorough search of the ground.

- **Quicker Marking**

  Depending on what working procedures are being used, a less comprehensive marking system may be justified.

- **Quicker Site Set up/Take Down**

  As a result of the less comprehensive marking system, the site set up and take down will be less time-consuming.

Even though a land release methodology for unexploded submunitions may not be as straightforward as for a patterned minefield, similar land release principles should be applied. It is also acknowledged that sometimes, a certain area must be subjected to clearance, because of heavy contamination, intended land use, or other factors.

EVIDENCE-BASED APPROACH

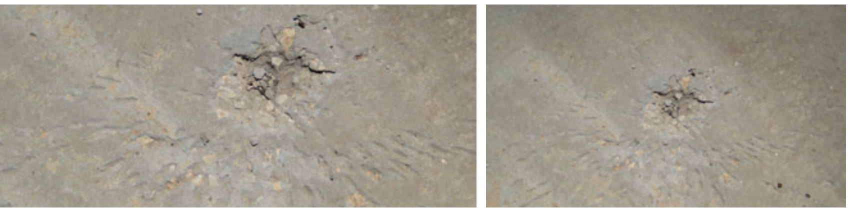
A proposed methodology for the survey and clearance of unexploded submunitions is an 'evidence-based approach'. This is when:

- Evidence of a strike is confirmed by either physical evidence or a strong claim (by an informant) of the presence of cluster munition remnants
- An evidence point[2] is then created, and from this point, further survey/clearance commences

Criteria for the required level of evidence needed to create an evidence point should be developed and agreed by the National Mine Action Authority (NMAA) and operators.

Example criteria for the creation of an 'Evidence Point':

- Unexploded submunitions
- Fragmentation of submunitions
- Parts of the delivery systems
- Strikemarks
- Fragmentation marks
- Burned areas
- A strong claim by an informant stating that unexploded submunitions have been located in the area. In most cases, the informant should be able to take the non-technical survey (NTS) team to the location so that they can search for physical evidence to support the claim.



Strikemark DPICM
(Dual-Purpose Improved Conventional Munitions) M-77

DPICM M-77

In some countries, suspected hazardous areas (SHA) can be linked to boundaries that have been determined by the affected community. However, as these areas tend to be defined by people with no mine/ERW experience, they can be thought to be larger than they actually are. The result can often be that assets are used to work in non-contaminated areas, and where there is no real evidence of contamination, instead of in actual hazardous areas that have been confirmed by evidence.

For effective use of resources, estimated areas may be attributed to each 'evidence point'. The community should be closely involved in the process of identifying 'evidence points'. However, this 'area' should not be seen as an actual hazardous area, nor the boundaries as the extent of any contamination.

The extent of the survey/clearance should be mainly determined by the trail of evidence, as the technical survey (eg fade-out process) is conducted. A hazardous area may, in some cases, need to be created at the NTS stage, due to land use or other community/development requirements. This should not be the default course of action. The only exception to this is when a confirmed hazardous area (CHA) can be clearly defined at the NTS stage; ie, when there is enough evidence to accurately define the boundaries.

Well-defined criteria will ensure that only land qualifying for further technical survey/clearance will be recorded and tasked for further activity. As stated previously, the local population should be involved in the process, but the final decision should be evidence-based and made by technically-qualified staff, following defined criteria.

INITIAL RESPONSE

In the initial post-conflict phase, the rapid removal and destruction of surface-located unexploded submunitions is necessary, in order to remove the immediate threat to the people.

During this process, there is often not enough time to gather and record all available information. It is nonetheless very important that a minimum record is kept and entered into a database, such as the GPS location of each individual item, the type of munitions and the number of items destroyed. This will facilitate the analysis of the data at a later stage. Also, sufficient and accurate recording of the location of each item enables the footprint of the strike to be identified later, and technical survey/clearance assets to be deployed in contaminated areas.

Mine action programmes often have ‘roving’ explosive ordnance disposal (EOD) or ‘rapid response’ teams that carry out spot tasks on an as-needed basis. As with the above example, it is very important that a detailed record is kept, for all tasks to be incorporated into the later planning and tasking of technical survey/clearance teams.

NON-TECHNICAL SURVEY

Before conducting a non-technical survey (NTS), a desk assessment should take place where old survey records, EOD spot task records, and bombing data (if available) is analysed. Then, the NTS teams should deploy to the field, in order to investigate any previously recorded SHA/‘evidence points’, and to identify any new ones.

If credible evidence corresponding with the correct level outlined in national standards and SOP’s is not found, the survey team should not record an ‘evidence point’ or a hazardous area. This is essential for an ‘evidence-based’ methodology to be valid. It also avoids inflating the problem by populating the database with hazardous areas based on vague information or weak claims.

Conversely, if sound evidence is available and it is possible for the NTS team to clearly identify evidence of cluster munition remnants, an ‘evidence point’ should be recorded. If there is enough clear evidence to determine which specific area is contaminated, then the survey team should document the boundaries of the contamination. This can provide better planning information for further technical survey and clearance. However, this should only be done if the boundaries of the area of contamination can be clearly identified.

TECHNICAL SURVEY AND CLEARANCE

Once a survey has been conducted by a NTS team, a hazardous area or an area identified by an ‘evidence point’ is then subjected to technical survey (TS) and/or clearance. The two activities are generally conducted concurrently, even though some organisations have specialised technical survey and clear-ance teams.

With an 'evidence-based' approach, the task is carried out in the same manner, whether the area only requires a surface search, or if items are assessed to be below the surface. The team commences the TS/clearance at the location of the 'evidence point', and then work their way outwards, to the agreed 'fade-out' point (see below for explanation of 'fade-out').

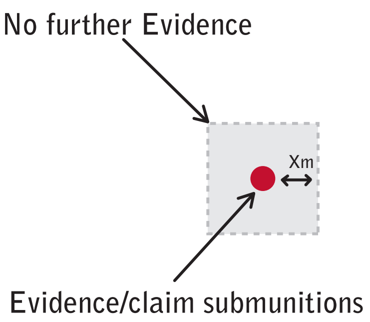
Fade-out

A fade-out is the agreed distance from a specific 'evidence point' where the TS/clearance is carried out. The fade-out distance is determined by the conditions specific to the area (eg geographical conditions, hazard type, delivery methods, etc). It should be based on operational experience, and is described in National Mine Action Standards (NMAS) and Standing Operating Procedures (SOPs).

If no other unexploded submunitions have been found once the fade-out distance has been applied and searched, then it is reasonable to determine that there are no further unexploded submunitions remaining from that strike/footprint. To give an example, if the fade-out is 50 m, the ground will be processed for a distance of 50 m in all directions from where the evidence point is located. If no further evidence is found, the survey/clearance will stop. A total of 10,000 m² will have been technically surveyed/cleared.

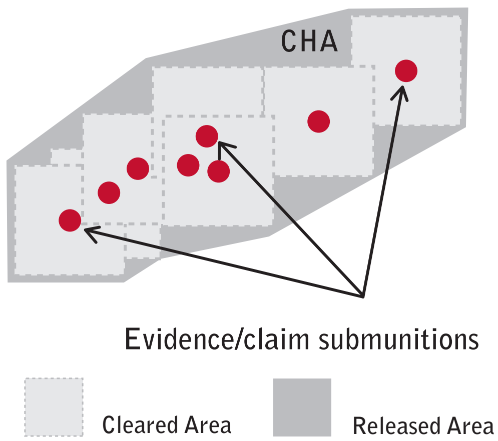
However, the fade-out distance applied to surface and sub-surface searches may differ, depending on the operational experience of a specific country or region.

FIGURE A



1. Identify evidence of submunitions
   > Unexploded bomblet
   > Fragmentation
   > Strikemark
   > Strong claim
2. Start clearance at the location of the evidence

FIGURE B



3. Clear X metres in all directions according to the agreed distance for fade-out from the evidence (eg 50 m)
4. If no further evidence is found, stop clearance
5. If no further evidence has been found/reported in the area, the CHA is released.

Fig A One piece of evidence was found in an area. Clearance starts at the location of the evidence (red dot). If no further evidence is encountered within the fade-out (x metres in all directions from the evidence operationally conducted as a box search), no additional survey/clearance is required.

Fig B Three separate locations with evidence were identified during the initial NTS. The survey team identified a hazardous area polygon, based on the evidence. During the survey/clearance operation, all evidence was dealt with individually. When applying the fade-out, and if additional evidence is found, the survey/clearance is extended. If no further evidence is found, the remaining area is released.

SURFACE AND SUB-SURFACE

Depending on the ground conditions (hard/soft, dense/sparse vegetation, slope) and the speed, direction and angle of impact, unexploded submunitions can either be on top or below the ground, or both, in the same strike area. A surface search is aimed at locating items on top of the surface. A sub-surface search aims at locating both surface and sub-surface items to an agreed depth.

SURFACE (locating items on the surface)

> **Visual Search:** Locating items on the surface, using visual search

> **Instrumented Aided Visual Search:** Locating items on the surface, using visual search and a detector

SUB-SURFACE (locating items on and below the surface)

Surface Search – locating items on the surface

Visual Search

Explosive submunitions are designed to detonate on impact, above the ground, or on a time delay, and are not victim-activated. After a risk assessment, it may be considered safe to conduct a visual search, by walking through the area. This will enable the quick removal of any immediate threats, and for information to be gathered, in order to establish the footprint. Then, sub-surface clearance, based on ground conditions and the intended future use of the land, may be carried out.

In some cases there may be a need for sub-surface clearance, without a prior visual search, due to the risk assessment (eg, sensitive unexploded submunitions and soft ground).

Conduct of a visual search

Instrument-aided Visual Search

During an instrument-aided visual search, the searcher uses a detector to assist the eye. This approach is recommended in areas with vegetation and/or when the unexploded submunitions have been on the ground for a long period of time, and which have become difficult to see.

Detectors not only assist when searching under vegetation and scrap, but also increase the safety of searchers when they are cutting back vegetation. The use of the detector considerably reduces the risk of accidentally cutting into an unexploded submunition, and subsequently detonating it.

If a signal is detected during a surface search, the searcher will carefully investigate the area. If no unexploded submunitions are found on the surface, the searcher will ignore the signal (as it must be indicating something below surface level) and continue the surface search. These signals may be marked for later follow-up. They should not however be excavated at this stage, as the purpose of the surface search is to find out the extent of the strike/footprint. Depending on the ground conditions (ie, the likelihood on finding items below surface), and operational assessment, the clearance may be conducted through visual search only and then the area released.

Sub-surface Search

The procedures used for locating unexploded submunitions below the surface are similar to those used in mine clearance. Firstly, a comprehensive marking system is set out to separate searched and unsearched areas, and the clearance operators are deployed into lanes. As unexploded submunitions contain considerably more metal content than most AP mines, detection is easier if the correct detector equipment is used, as procedures can be carried out at a significantly higher speed.

Reduced Clearance Depth

Depending on the ground conditions in an area (soft/hard etc), it may, after a thorough assessment, be suitable to make adjustments to the standard clearance depth. If the ground is hard, and operational experience/trials indicate that unexploded submunitions do not normally penetrate very deeply, then the overall clearance depth for that specific site may be reduced.

The test item for calibrating the detectors will be placed in accordance with the new clearance depth, and the detectors will be recalibrated, which means sensitivity will be reduced. In doing this, less metal scrap will be located and the overall clearance speed should improve.

Examples of technical survey and clearance methodologies

Fade-out	A set distance investigated from the last evidence identified.
Visual Search **Instrumented-aided Visual Search**	A surface search may be conducted in order to rapidly remove the submunitions located on the surface and to establish the footprint. Depending on the situation, sub-surface clearance may only be required where surface located evidence is found.
Sub-surface Search	The procedures used for locating items below the surface are similar to those in mine clearance. Items on top of and below the surface will be removed in the process.
Reduced Clearance Depth	Site specific amendments may be applied where the clearance depth is reduced. Based on the new clearance requirements, the sensitivity of the detector can be reduced, which will increase the overall clearance rate.
Systematic Search	A certain percentage of the area is surveyed/cleared, using standard procedures. If nothing is found, the area is released. If evidence is found, the fade-out methodology is then applied.
Cut lanes or Exploratory lanes	Lanes are cleared into the area to gather information and evidence.

TOOLS FOR TECHNICAL SURVEY AND CLEARANCE

In many cases, clearance operators use the same metal detectors for clearing both submunitions and mines. These detectors were originally designed to find minimal metal AP mines in humanitarian or military clearance operations.

Some clearance operators are equipped with detectors designed for unexploded ordnance (UXO) clearance, or with magnetic locators suitable for finding larger metal objects. As explosive submunitions contain significantly more metal content than AP mines, but less than most UXO, detectors with magnetic locators are a more appropriate tool for detecting unexploded submunitions.

Cluster munition survey/clearance operations can greatly benefit from more appropriate detector systems, such as magnetometers, other magnetic detectors, and electromagnetic pulse induction detectors. These are designed to find larger metal targets such as mortar and artillery rounds. Such detectors can also be equipped with data-loggers and GPS interfaces. The type of search, ie, surface or sub-surface, also influences the choice of detector.

Consideration should also be given to the sensitivity settings used during operations. These can, in most cases, be manipulated to focus more efficiently on the unexploded submunition hazard. If it can be proved that the equipment is able to detect the applicable target to the agreed depth, then detectors capable of adjustable sensitivity (eg, lower sensitivity levels), such as wide area detectors and magnetometers, can be used. If traditional mine clearance detectors are used, they should be calibrated against the applicable target (eg, half a BLU 26 at 20 cm), and not to a minimum metal mine or standard test piece.

METAL DETECTORS

The highly sensitive metal detectors normally used for mine clearance operations are generally not suitable for efficient ERW and unexploded submunitions survey/clearance. The detectors are designed to enable the detection of minimum metal mines, and will slow down operations consider-ably, by picking up all small pieces of metal (scrap and fragments). The metal mass of an unexploded submunition is significantly larger than most fragments or scrap. Using these detectors can make the search procedures much less efficient.

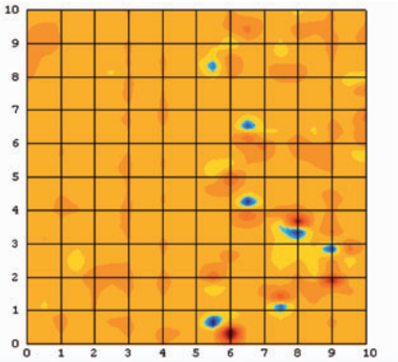
UNEXPLODED ORDNANCE (UXO) DETECTORS

There are a number of UXO detectors on the market with technical applications that enable a more efficient detection of unexploded submunitions. Generally, the same basic principles are used as for metal detectors. However, UXO detectors come with additional features, such as metal discrimination mode, larger search heads, and software designed to ensure fewer false alarms from metallic waste and fragments. UXO detectors can be further divided into:

1. Electromagnetic Induction Detectors
2. Magnetic Locators
3. Magnetometers
4. Wide Area Detectors

DATA-LOGGER

A data-logger is used in conjunction with a UXO detector. After searching an area with the detector, the information is downloaded onto a computer, and analysed by software. Areas containing ferromagnetic objects can then be separated from areas which don't, for further survey/clearance.



An example of information displayed by a data-logger

DUAL SENSORS

Dual sensors generally combine ground penetrating radar (GPR) technology, highly sensitive metal detector technology, and advanced data fusion algorithms.

This combination:

- results in reduced false-alarm rates
- enables the operator to distinguish between the target items and scrap metal
- allows the detector to automatically adapt to varying soil conditions

SIGNATURE DETECTOR

The GICHD initiated a study surveying the availability of affordable metal detectors from the civilian market, which are capable of profiling the signature of generic sub-munition types. These detectors should have a relatively easy user-interface and a design rugged enough for field use. Ergonomic factors, as well as battery consumption, are also relevant.

The GICHD found that the signature metal detector technology could, under the right conditions (known target and competent user), be a more cost-effective, safe, and faster detector system for projects involved in survey/ clearance of unexploded submunitions than the detectors that are used in such operations today.

The signature metal detector can be used to measure the target's conducive and ferromagnetic properties, in order to "profile" each type of explosive submunition. Each can then be identified by its distinctive digital footprint or "signature". The detector can be programmed to only sound an alarm when an object with this signature is encountered. When set up correctly, the signature metal detector can reduce the false alarm rate (FAR), while still obtaining the same accuracy or 'probability of detection' (PoD) as a standard metal detector used in UXO clearance. As of publishing date, the GICHD is, together with its partners, undertaking field trials of the Signature Metal Detector system.

For more information on all detector types please refer to the GICHD publications *"Guidebook on Detection Technologies and Systems for Humanitarian Demining 2005"* and *"Detectors and Personal Protective Equipment Catalogue 2009"* www.gichd.org

ARMOURED EXCAVATORS AND FRONT-END LOADERS

Under certain circumstances, armoured machines such as excavators and front-end loaders may be suitable tools to assist survey/clearance operations. Machines can provide access when working with rubble removal in built-up areas, or assist with tasks where the required clearance depths are deeper then normal. Consideration should, however, be given to the risk associated with operating in areas contaminated by unexploded submunitions with shaped charges[3].

MSB Front-end loader moving rubble (Photo by Magnus Bengtsson)

EXPLOSIVE DETECTION DOGS

Explosive detection dogs (EDD) are a viable option when it comes to survey of unexploded submunitions. EDD can be very effective in areas that have high levels of scrap and fragmented metal, and in areas with highly mineral-ised soils, where detector performance may be limited. As for any survey asset, a comprehensive accreditation process would need to be in place.

LIABILITY

The issue of liability regarding the clearance of unexploded submunitions, is no different to that of mine clearance. As long as the operational procedures have been agreed to, and are documented in national standards and accredited SOPs, and these procedures have been followed correctly, the operator should not be liable for any post land release incidents. This is the same for land released through survey, and through clearance.

The NMAA (or equivalent) is responsible for ensuring that the required procedures have been followed, and that 'all reasonable effort' has been applied.

CONCLUSION

This chapter explains how and why land release procedures for areas contaminated by unexploded submunitions differ to areas contaminated by mines and other ERW. It is clear that unexploded submunitions are different to both mines and other ERW in a number of ways.

Because of these unique characteristics, it is an advantage to develop a specific land release methodology for the survey and clearance of unexploded submunitions so that the most efficient approach is used.

This methodology may include an agreed 'fade-out'. This gives clear guidance on when to stop survey/clearance, and avoids continuing work into areas where there is no evidence of contamination. It can also include the decision to not create a hazardous area, but instead an 'evidence point', when conducting a NTS. This limits the probability of over-inflating recorded hazardous areas through a lack of evidence.

While some procedures used in mine clearance are also suitable for unexploded submunitions survey/clearance, it is important that more efficient procedures, which, because of the unique characteristics of submunitions are doable, are used wherever possible. Key findings from this chapter include:

> Unexploded submunitions differ from mines and other ERW in their characteristics, and therefore they require different land release methodologies and operational systems to gain the most efficient outcome.

> Recording of 'evidence points' (or similar), as opposed to recording polygons (hazardous areas), should be considered when there is no clear evidence indicating the boundaries of the unexploded submunition contamination.

> While some procedures and equipment used in mine clearance are suitable for unexploded submunition surveys/clearance, the unique characteristics of submunitions enable more efficient procedures and more suitable detection equipment to be used.

TASK EXAMPLES

LAO PDR

Example taken from NPA *"Enhanced Technical Survey"* Study by Technical Advisor Leonard Kaminski August 2005" Lao PDR

Background

The *Enhanced Technical Survey* project was a joint venture between Norwegian People's Aid (NPA) and the national operator UXO Lao, and was aimed at increasing efficiency and effectiveness through the development of technical survey procedures.

The tasking system used in Lao PDR is based mainly on a bottom-up approach, whereby requests to have an area cleared are submitted by the community.

Often, the quality of these requests can be poor, which is reflected in the clearance results, which demonstrate that a high percentage of sites are cleared without locating any unexploded submunitions. The project was seen as a step in changing from a basic request driven system to an evidence- based approach, where sufficient evidence of a hazard is required for a task to be recorded and to justify TS/clearance.

Suggested Land Release Methodology

Step 1. Office research (Desk Assessment)
Checking bomb data by analysing the contamination map, historical reports, and ERW impact information, to assess the likelihood of whether or not an area contains ERW.

Step 2. Field research (NTS)
Interviewing villagers who have requested their land be cleared, and focusing on gathering evidence that supports the claim that the land is contaminated by unexploded submunitions.

Step 3. Site research (TS)
Visual surface search of the site, and sampling of contamination levels.

Step 4. Decision
The survey team will then make a decision, based on the evidence found during the survey, on what the next step will be by using a five step discretion model (see below).

Step 5. Dissemination of information
A detailed record is kept of the work conducted, and any decisions made are to ensure a clear audit trail. This will assist when any future findings in the area occur, or new requests for clearance are made.

Five step discretion model

GREEN	Cancellation of clearance request	Land is/has been cultivated, **no** evidence of ERW and/or unexploded submunitions
YELLOW	Assign a Roving EOD team to the request and not a clearance team	Land is/has been cultivated, evidence of ERW, **no** evidence of unexploded submunitions
ORANGE	TS of the area, for example a magnetometer with a data-logger	Land has not been cultivated; little or no evidence of ERW, **no** evidence of unexploded submunitions
RED	Land is cleared using normal methods and standards	Land has not been cultivated, evidence found of unexploded submunitions
COLOURED	A combination of the above responses if necessary	The requested land represents a mixture of the above situations

Task - Houaxe Village

During the desk assessment, the task was initially identified as a possible "yellow" scenario, as the landowner stated that "the land was in use but some ERW was still there". The majority of land in the area was being used for agriculture, and it seemed likely that the farmers would have sound knowledge of the areas that were contaminated and those which were not.

Step 1. Office research
The village had been subjected to Community Awareness, roving teams (EOD teams), survey and clearance operations in the past. The following conclusions were made by the survey team:

- UXO LAO had cleared three tasks in the area. Unexploded submunitions were found on two of the tasks
- Community Awareness team had reported suspected mines in the area
- Unexploded submunitions had been reported by the Survey team
- Roving teams had destroyed ERW, including unexploded submunitions in the area
- Six people were involved in an accident, reported to be caused by a BLU 26 submunition

The conclusion by the survey team was that the village contained unexploded submunitions, and since the area was cultivated, it seemed possible through local knowledge, to separate contaminated areas from non-contaminated areas.

Step 2. Field research (NTS)
During the subsequent field visit to the site, the following conclusions were made, based on interviews with local population (women and men):

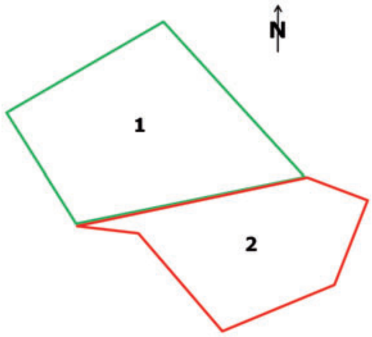
- No known accident on the site
- Unexploded submunitions were removed from a non-cultivated area
- The cultivated area had been worked on for four years without any ERW being found

Step 3. Site research (TS)
The area was mapped by the survey team and divided into two different sectors based on the collected evidence. Sector one was not cultivated and sector two was cultivated. A surface visual search was conducted on both areas, and the non-cultivated area was checked quickly with a detector. One BLU 3 was located during the detector search.

Step 4. Decision
The area was classified as a "coloured" scenario, since it could be divided into two sectors. The cultivated area was classified as "green" (no further action was required so the area was cancelled) and the non-cultivated area as "red" (clearance of the entire area). The local community was involved throughout the process, and had no objections to the final decision.

Step 5. Dissemination of information
A detailed record was kept, including mapping of the area, which was downloaded onto the database. The area classified as "green" was recorded, in order keep a detailed audit trail of the decisions made, and what had been done in order to cancel.

Cultivated area classified as "green" and subsequently cancelled.



The site map illustrating the two sectors one"green" (cancelled area) and two "red" (areas for clearance) - this sketch map is a replication of the original

Summary

When the survey was conducted, the standard approach to deal with such tasks was to conduct a clearance of the entire area, including the cultivated land. The methodology employed by UXO Lao on this task focused on the presence and/or absence of evidence. Gaining physical evidence from the ground and evidence from key informants allowed them to release (cancel) a large portion of the task during the survey stage. This is a key aspect of any land release methodology.

The decision-making framework that was employed gave the survey team the opportunity to use the evidence they had gathered, to make appropriate land release decisions, and save time and donor funding.

The fact that the border of the hazardous area was determined by local villagers and not trained survey teams is a major limitation of this current process, which could result in large areas of uncontaminated land being cleared. However, the decision framework developed does allow technical knowledge to be applied to what is cleared and what is released, (cancelled) without clearance.

LEBANON

The Swiss Foundation for Mine Action (FSD) conducted a clearance of unexploded submunitions in Lebanon between 2007 and 2009. Under the coordination of UNMACC SL, FSD successfully implemented an efficient land release methodology to ensure safe and timely survey and clearance of hazardous areas.

Land Release Methodology

The programme in Lebanon used an 'evidence-based approach' when dealing with areas contaminated by unexploded submunitions. Firstly, an area is identified through NTS, and then it is tasked to a clearance organisation.

The clearance organisation revises the survey data, and a detailed TS/clearance plan is generated and agreed to by the clearance organisation, the National Authority and the UN. This TS/clearance plan details those areas that were subjected to TS and clearance, and the type of assets deployed in each areas.

The Lebanon land release concept consists of three main components;

1. Target type
2. Fade-out
3. Surface or Sub-surface Clearance Requirements

Target type

Each clearance site is classified as Type 1 – 3, based on the information collected. Each type follows a set approach, and gives guidance to the clearance organisation on how to deploy their assets.

Type 1: Target Open Ground
This is in rural areas, where no emergency clearance has been conducted with a confirmed unexploded submunition hazard. A surface search is conducted through an instrument-assisted visual search of "usable land"[4] to the agreed fade-out. A sub-surface search is only conducted when a subsurface hazard is suspected, and/or after agreement between the clearance organisation and the NMAA.

Type 2: Village Target
This is when an explosive submunition strike of a village has occured and emergency clearance operations have been conducted. A surface search is to be conducted through an instrument-assisted visual search of the area to the agreed fade-out. A sub-surface search is only conducted when a sub-surface hazard is suspected and/or after agreement between the clearance organisation and the NMAA.

Type 3: Suspended Target Clearance
This is in areas, where previous clearance has been conducted, and where secondary clearance is required (ie sub-surface clearance of previously surface-cleared areas).

Fade-out

The agreed fade-out in Lebanon is a minimum distance of 50 m from the last unexploded submunition located, or evidence of, unless otherwise agreed.

Surface or Sub-surface Clearance Requirements

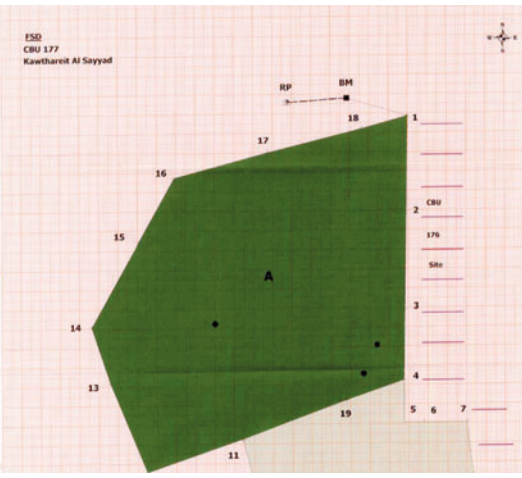
Generally, all areas are subjected to a visual search, prior to any sub-surface clearance, in order to establish the footprint for more effective targeting of any sub-surface clearance. Depending on the ground (hard/soft), and the intended land use, an area will be subjected to either surface only, or both surface and sub-surface clearance. If evidence of unexploded submunitions is located in an area which has been classified as hard ground, the item/s may be destroyed but no further sub-surface clearance will be conducted.

TASK ID: CBU- 177

In accordance with the clearance plan, an instrument-aided visual surface search was conducted over the entire area. After assessing the ground conditions and evaluating the information obtained during the visual search, the northern part of the area was subjected to additional sub-surface clearance, to a depth of 20 cm.

Task data

Historical information and type of area	Items previously found in the area Agricultural land near residential area
TS/Clearance Assets	Manual Searchers x 8
Method Used	Instrumented-aided Visual Search and Sub-surface Clearance
Category	Type 1 Target Open Ground
Total working days	13 days
Total m²	Surface 11,400 m² Sub-surface 16,939 m²
Total Items Found	3 x M-77



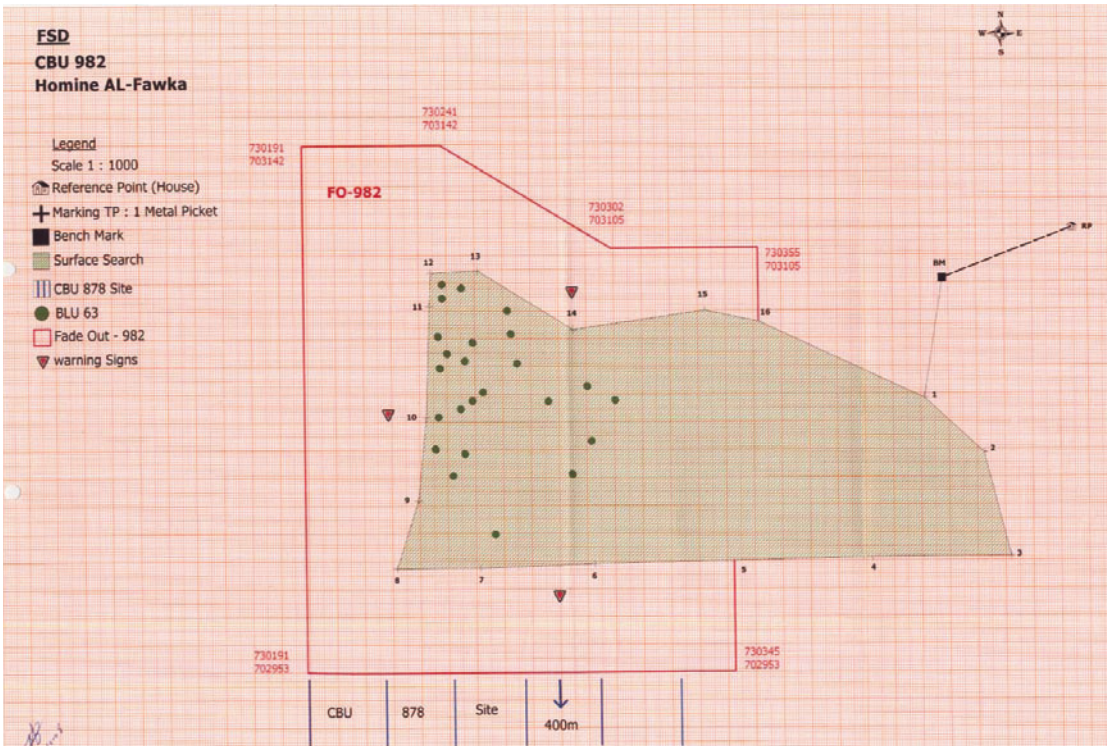
Completion map CBU-177

TASK ID: CBU-982

In accordance with the clearance plan, an instrument-aided visual surface search was conducted over the entire area. Due to hard and rocky terrain, it was agreed that the likelihood of items being located below the surface was low, and no sub-surface clearance was therefore required. Fade-out was not achieved to the west of the task, and warning signs were put up to inform the local population.

Task data

Type of area	Hard rocky ground
TS/Clearance Assets	Manual Searchers x 8
Method Used	Instrumented Aided Visual Search
Category	Type 1 Target Open Ground
Total working days	15 Days
Total m²	Surface 19 100 m²
Total Items Found	24 x BLU 63 and 31 BLU 63 Fuze M 219



Completion map CBU-982

SUMMARY

Through the development of a land release methodology, assets were focused on contaminated areas where evidence had been confirmed. This meant that unnecessary and time-consuming sub-surface clearance was kept to a minimum.

ENDNOTES

1 Human Rights Watch Report 2008 Flooding South Lebanon: Israel's Use of Cluster Munitions in Lebanon in July and August 2006, Volume 20 No. 2(E).

2 This 'point' can be termed as required. 'Evidence point' will be used throughout this chapter.

3 Unexploded submunitions with shaped charges can pose a hazard to armoured vehicles due to the directed explosive jet.

4 Note: "Usable Land" is land to be used for housing, movement of civilians or cultivation areas. If justified, sub-surface clearance can be applied directly, without a previous visual search.

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