Issue 11.2 of the Journal of Mine Action will focus on landmines in the Middle East and North Africa. Countries of particular interest include Algeria, Guinea-Bissau, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Senegal, Syria and Yemen. Articles are sought that deal with clearance, survivor assistance, community risk-reduction initiatives, socioeconomic impact and technology being produced or tested in any of these target countries. We will also accept nonpolitical historical pieces highlighting the conflicts that resulted in the mines being deployed and giving researchers and aid workers an understanding of the country and context in which they are working.

FOCUS
Middle East/North Africa

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FEATURE
Environmental Impact of Demining

The JMA is soliciting articles for issue 11.2 on the environmental impact of demining—articles about how to reduce the environmental impact, what to consider regarding the environment before commencing demining, methods and equipment that produce the least environmental impact, and related story angles will be considered.

SUBMISSION GUIDELINES:

Article length: 1,000–2,000 words and submitted in digital format (i.e., Microsoft Word). R&D articles can be up to 2,500 words.

Images/photos: Must be scanned at 300 dpi or better. Line art, graphics and charts should be scanned at 600 dpi or better. Submit all images/graphics by CD, Zip disk or e-mail (.zip files cannot be received via e-mail at JMU).

Important: Please do not include images in your documents. The quality is too poor for printing. Originals are encouraged and will be returned upon request.

Please note: We do not accept overly promotional articles. If you are promoting your business or product, be sure to give data and/or solid examples that demonstrate your accomplishments.

Contact information/bio: Articles must contain a title, author and full contact information at the end of the article (i.e., phone, e-mail and mailing address). Please include a head-and-shoulders photo and biography (no more than 60 words) of the author for inclusion at the end of the article. Consider including credentials, books authored and other biographical information.

For complete submission guidelines, please visit: http://maic.jmu.edu/journal/index/guidelines.htm

Submit all materials to:
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Dear Reader,

As we’re sure is the case with everyone reading the JMA, we at the MAIC were disappointed and troubled by the recent conflict between Israel and Hezbollah in Lebanon. The extent of the damage and danger left behind is still being determined, but we can be assured that there will be much work to be done to make this area of the world safe and livable again.

In light of recent events, we thought it appropriate to focus the attention of the Journal on the events in Lebanon and Israel and the issue of explosive remnants of war in general. Mine-action practitioners on the ground have realized that their work goes far beyond finding and disposing of landmines, as other explosives are difficult to separate from the equation. Thus, we wanted to give the opportunity to those in the community to discuss how the overarching issue of ERW affects their work.

As the voice of the mine-action community, the JMA strives to capture the realities of situations dealt with by the community. Thus, realizing the fact that mines and ERW are often difficult to distinguish in an operational context, we think of mines as one element of ERW. We recognize that mines and ERW are regulated by different legal documents, however, which causes some in the community to define ERW as separate from mines. When authors have written articles using this more legalistic definition of ERW, we have not changed the wording so that their articles accurately reflect their perspective.

Regardless of how you define it, ERW is more and more becoming recognized as an issue that mine-action programs must deal with on many levels. We hope we have captured that reality in this issue and will welcome further submissions on the broader subject of ERW.

Our thought is with all the victims of the recent conflict and we hope those working in the region can minimize the continued effects on the civilian population.

Nicole Nurzzey
Managing Editor
neitzenx@jmu.edu

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Did you know the Mine Action Information Center can deliver training on any humanitarian assistance topic from mine action, small arms/light weapons and explosive remnants of war to disaster relief or other civil-assistance programs? Whether you need a few days of onsite training or an intensive “Master of Business type” senior managers course, the MAIC can custom design the course you need.
Letters to the Editor

As an independent journal, we provide topics that stimulate conversations. We give the mine-action community a place to sound off. Every issue brings us rants and raves—happily, usually many more raves than rants. We’re sharing some of them here.

I was disappo...
The Mine Action Express... or the Wreck of the '09

The author discusses current challenges relating to an effective global mine-action strategy; he considers approaches and policies that could enhance or impede demining efforts worldwide. There are many emerging concepts to consider in order to improve mine action, such as mainstreaming, risk management and national ownership. The author discusses potential future plans of action the community must undertake regarding these issues in order to deal effectively with landmines and explosive remnants of war.

by Dennis Barteo | Mine Action Information Center |

I n the 20th century, railroad lines became famous for highly efficient, progressive and dependable travel—or for dramatic accidents which epitomized the height of negligence and bad planning. Whether these railroad events are agonizing or amusing, the images and emotions they evoke—similar to mine-action accident acolytes—still vividly etched into our minds.

At the Mine Action Information Center, it seems to us that the rapidly developing state of mine action has reached the point where we can, like great and majestic train lines, combine the best of many technologies and innovations to provide effective and secure service—or it can force us together in dangerous and ineffective strategies that cause its own "great train wreck."

Over the past year, some of the best practitioners, policymakers and pandemics involved in mine action have developed some thought provoking and timely concepts that should be considered for integration into mine-action campaigns. I will discuss a few of those ideas here, not only with a view to their validity but also to make an eye to integrating them into a total system that will yield the greatest overall efficiencies.

National Ownership

While sustainability of nationally owned mine action programs seems to be a universal goal, it is becoming evident that it is an elusive condition. Studies by Morris Kjellmand and Harppiken of the Geneva International Centre of Mine Action demonstrated that landmine action needs to get its train on track by seriously addressing issues like national ownership, development, and control goals in order to avoid disastrous consequences.

Mainstreaming

If mine action is a viable and valid humanitarian endeavor, it is because it is tied to the concepts of development, infrastructure, stability, confidence and security. In other words, the individual tragedies of landmine accidents, while emotionally compelling, pale in numerical comparison to other threats (AIDS, malnutrition, factional violence, motor vehicle accidents, etc.) which individually claim far greater numbers of victims than landmines.

Landmine action, therefore, should begin by considering integration among other national programs, to the extent that it supports socioeconomic development. Ah, but the rub comes when trying to disengage the highly successful mine-action juggernaut, which has carved out such a huge niche in defining its role among donors, nongovernmental organizations, diplomats, journalists, governments, and a worldwide public following, and fit it into a larger and less discrete development program. Many in the national action community are afraid to turn the choronic over to develop- mental officials and more toward the task of the train, out of sight of the engine, gauges and view ahead. Their voices may range from the altruistic to the purely selfish, but their concerns are real nevertheless.

Development plans and official services are not always enamored with or cognizant of the complexities of mine action, nor are donors necessarily eager to pledge funds to support activities other than those specifically earmarked for mine action projects. It remains for those in the global community to foster vehicles such as the Millennium Development Goals to promote settings that will promote an environment of trust and comfort in which mine-action activities can be integrated with other projects and programs.

Landmines and Other Explosive Remnants of War

To achieve any end, we must first determine what is impeding our way. The great railroad planners were able to scout ahead and surmise the challenges that terrain, indigenous populations and climate would pose. In the area of mine action, we were forced to add more and more threats to the initial concerns that began with the singular task of finding anti-personnel landmines.

We realized that battlefield landmines are not usually contained unexploded ordnance. Thus we had to accept that caches of ammunition, small arms and light weapons, booby traps, and improvised explosive devices could each be part of a post-conflict environment. While the Ottawa Convention is concerned solely with APLs, countries that have had to deal realistically with all potential explosive remnants of war. The landmine strategy has been successful, but it still needs to address the question of the growing threat of other EWR.

Some, such as Tim Carstairs of Mines Advisory Group, argue that the mined weapon consideration must be taken into account and that donors and policy makers must get beyond the concept that landmines, small arms and light weapons, UXO, etc., should be considered and planned together in order to ensure that the land is indeed safe and preparation for future use is assured.

The good news is that many organizations, such as the European Commission, the U.N. Mine Action Service and the Geneva International Centre for Humanitarian Demining have taken the pragmatic step of including broader EWR considerations into mandates to support mine action, and some countries such as Cambodia have adopted a holistic approach to post-conflict EWR threats. The need to deal separately with APLs and EWR as defined by the Ottawa Convention and the Convention on Certain Conventional Weapons is a concern.

Release of Land

When humanitarian demining was beginning as a new movement, it developed an admirable method for trying to identify mined areas—which after all, is the prerequisite to dealing with the landmine threat. Impact surveys were instituted in most countries at risk from APLs. Based on these surveys, suspected mined areas were identified. Predictably, in an effort not to pass over contaminated areas, many suspected mine areas were identified as they were originally seeded with mines. It now appears that upwards of 90 percent of operational mines and resources are being spent in areas where there are no mines.

It will require imagination and courage to deal with this situation, for the cold, hard fact is massing questions to the mixed weapon consideration must be taken into account. It is because it is the mixed weapon consideration is the only way that the mixed weapon consideration must be taken into account.

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mine-action managers find themselves faced with today. In the simplest of all strategy formulæ, we ask “Where are we? Where do we want to go? How do we get there?” If we do not know where we want to go, no effective strategy can be planned, and we will surely never reach our goal.

There are various guidelines for global mine action, but none so universally applied as the requirements of the Ottawa Convention. Article 5 (Clearance) of that document states, for instance: “Early steps will be unambitious: “Each State Party undertakes to destroy or ensure the destruction of all anti-personnel mines.” Thus the Convention seems to call for what some (such as the Landmine Monitor) define as a “mine free” world. And yet the very first words of the Convention imply that the reason for the formal agreement is that the States Parties are “Determined to put an end to the suffering and casualties.” This suggests the reason for implementing the Convention was to alleviate the practical threat of landmines. Some have taken that position under the rubric of “impact free.” Sasa Sekulic of the United Nations Development Programme points out that neither term—mine-free nor impact-free—is found in the Convention.

Nevertheless, it is not difficult to find champions for each point of view. Richard Kold of the U.S. Department of State provides a sharp and succinct explanation of why he believes that a “mine-free” global endpoint is impractical. “No donor, lending institution or national institution is indicated a willingness to put up the huge amounts of resources required to find and clear every last mine.”

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by both sides across the border along with an Israeli ground invasion into Lebanon. In particular, Israel dropped or fired over a million submunitions from cluster munitions into Lebanon land.\footnote{Editorial note: See Endnotes, page 109}

The destruction was systematic, leading to an environment at the end of the war that is not only very unkempt but also continues to be critically dangerous to civilians due to the massive quantity of bombs, bomblets, shells and rockets that remain everywhere in southern Lebanon.

To the outside world, it seems during Israel's air strikes there was little difference established between the military objectives and civilian targets. Bridges, roads and airports were destroyed to strategically cripple enemy forces; yet this also made the delivery of humanitarian aid not only hard but nearly impossible.

Suggestions for Protecting Civilians

Many measures can be taken to ensure the safety of civilians, particularly with the increased threat they face in modern warfare. In the Middle East and other regions at risk of conflict, it is important to protect civilians by providing the poorest countries with bunkers and other protective installations in the main cities during peaceful periods, with a particular focus on schools and hospitals.

Additionally, international law should strictly enforce the convention against killing civilians and destroying civilian areas during conflict, prosecuting under criminal law those who do not follow this convention. The United Nations Security Council should also be given the power—and be willing to use it—to stop any war in which genocide is observed.

Finally, in mine action, activities need to focus on providing updated awareness campaigns that are informed by the changing reality of recent conflicts to ensure that children and other vulnerable people are protected. See Endnotes, page 109

### Conference on Women in Armed Groups, Human Rights

In November 2005, Geneva Call and the Program for the Study of International Organization(s) from James Madison University, held a workshop entitled ‘Women in Armed Opposition Groups in Africa and the Promotion of International Humanitarian Law and Human Rights.’

The workshop sought ways to strengthen international humanitarian and human-rights law within African armed groups and their political groups. Thirty-nine female leaders from armed opposition groups and civil society from countries currently involved in conflict or recently involved in the post-conflict recovery process came together for the conference. The workshop also sought to increase the international community’s understanding of and ability to work with African armed groups.

Four topics were discussed in working groups during the workshop:

1. Humanitarian law
2. Human-rights law
3. Disarmament, demobilization and reintegration
4. Transition into governance rules

The final report from the conference, which presents information and analyses that came out of these four thematic working groups, is available in English and will soon be available in French. The report can be downloaded at http://snipurl.com/xiy4. If you would like a printed copy of the report, e-mail info@genevacall.org. The report can be downloaded at http://snipurl.com/xiy4. If you would like a printed copy of the report, e-mail info@genevacall.org.

The report can be downloaded at http://snipurl.com/xiy4. If you would like a printed copy of the report, e-mail info@genevacall.org.

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### Closing the Circle

The authors present a critique of the International Mine Action Standards currently in use. After highlighting gaps in IMAS related to assessment and survey, an improved aspect of mine-action planning methodology is presented, which includes a prioritization component using a socioeconomic approach. The result is LIAR: landmine impact combined with a new measurement of risk assessment. This updated model can contribute to improved safety, quality and productivity of landmine action through more effective strategic planning tools.

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**Editors’ note:**

The vast majority of mine action is paid for with donor funds, but are these funds always utilized for the optimum benefit of the affected population? Any money spent on bureaucracy leaves what is available for reducing the physical, social, psychological and economic effects of conflict. Many argue, with some justification, that attempting to impose international mine-action standards (or even International Organization for Standardization [ISO] standards)\footnote{Editorial note: See Endnotes, page 109} on populations clearly unaccustomed to these methods can, without appropriate managerial training and support, jeopardize lives for the sake of attaining a standard they may not be capable of achieving. Any increase in safety and quality requirements must be measured against productivity; in other words, any funds used to pay for stringently high safety and quality standards must be measured against the lives lost and injuries inflicted by the consequent reduction in productivity.

The original intention for standards such as the International Mine Action Standards\footnote{Editorial note: See Endnotes, page 109} was that they should form a baseline by which pragmatic implementation of a foundation of “standards” would take into account the particular situation in each affected country. However, recent interpretations of the text illustrate that the IMAS have now become a vehicle for those who wish to impose standards. The cost of some projects has been dramatically increased by those using IMAS as a quality-assurance/quality-control vehicle to increase demands on or delay the work; whether through a lack of understanding, a difference in interpretation of the text or by design. In some cases, the IMAS documents seem to confuse rather than clarify due to unclear text and a plethora of paperwork. In some specific areas—assessment and survey—the IMAS appear to have lost direction.\footnote{Editorial note: See Endnotes, page 109} The aims and objectives of these standards (and the number of other documents and references) made throughout the IMAS are the subject of this article.

**Reviewing the Present Policy, Standards and Documents**

While we acknowledge the IMAS have created a sound foundation, they have also created a mountain of documentation. For example, in IMAS 00.06–General Mine Action Assessment \& 00.20–Technical Survey,\footnote{Editorial note: See Endnotes, page 109} references are made to other documents such as the Technical Notes for Mine Action series.\footnote{Editorial note: See Endnotes, page 109} In addition, guidelines documents such as the Socio-Economic Approach to Mine Action\footnote{Editorial note: See Endnotes, page 109} and other illustrative examples of documents available just on this subject, all providing a snapshot and additional text but none of them providing a complete answer. Indeed if one collates all the relevant IMAS information and the associated documents, it amounts to a small library. Added to these are the organizational documents such as standard operating procedures, safety handbooks, documents for training courses and related lesson plans. All these documents also need to be translated into the national language, so the quantity of material and anyone involved in national programs will understand the effort, time and cost of obtaining accurate translations. While we acknowledge the IMAS have created a sound foundation, we also recognize that there is still much work to be done. If another aim of mine action is to strive for efficiency and effectiveness, then there is still much work to be done. If another aim of mine action is to strive for efficiency and effectiveness, then there is still much work to be done.

**Getting the Right Premise**

The various documents referred to above all make the right noises. However, if the aim of mine action is to strive for efficiency and effectiveness, then there is still much work to be done. If another aim of mine action is to strive for efficiency and effectiveness, then there is still much work to be done. If another aim of mine action is to strive for efficiency and effectiveness, then there is still much work to be done. If another aim of mine action is to strive for efficiency and effectiveness, then there is still much work to be done.

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**by Eddie Banks | EOD World Services | and Rob Shahrer | Environment and Infrastructure Group of Companies |**

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**Published by JMU Scholarly Commons, 2006**
The IMAS and GMAA concentrate on the local issue, and accordingly this is where the greatest impact is perceived, from the economic repercussions for families, small communities and medical facilities to the emotional aspect of injuries and deaths; but is this perception correct? Take for example the mines and UXO in Kuwait, Iran, Iraq and Angola, to name just a few. The local communities in these countries are devastated as anywhere else in the world, with injuries, deaths and economic hardships, among other problems. Yet, mines and UXO in these and other countries also delay or have delayed registration of national commercial activities such as oil and gas exploration and extraction, denying the affected country millions of dollars each and every day, which could be used to help solve the mine and UXO problem.

Commercial or Social Precedence

Allowing an emotional response or local considerations alone to dictate clearance requirements in effect delays the economic recovery of the country, maintaining a dependency on donor funds, and restricts the development of local and regional activities. A national priority that causes economic recovery and growth cannot be totally ignored due to local and social considerations, in just the same way that death and injuries cannot be totally disregarded due to the demands for national commercial precedence.

Commercial and social aspects are important but they have to be considered both separately and collectively; indeed, prioritization in order to create regional and national economic growth may well be applied in some cases to establish the sustainable future for future mine-action activities. Each country and each region within a country is different and these differences need to be defined. The defining process must be realistic, coordinated and integrated with all authorities. It must address, however, medium- and long-term requirements, provide a decision-making basis, be capable of being implemented, and be built on experience and practice. Some believe a number of activities cannot be accurately measured. An example is the importance in community area of communications and transportation infrastructure during the emergency phase, a time when medical services and accessibility to clean water and basic commodities are highly at risk. But what measures this, by comparison, is the one critical activity for which the task priority decided? In IMAS, GMAA, LIS and socioeconomic approaches, these crucial aspects are missing.

Socioeconomic Approach

For many mine action has been undertaken, Environmental Impact Assessments have been implemented, rede- fined and developed, of which socioeconomic elements (e.g., the Social Impact Assessment) are but one small part. ELAs are now the fundamental assessment without which development activities throughout most parts of the world cannot even start. This process is designed to define the problems and decide on a direction and course of action. The socioeconomic approach and LIS, while attempting to adopt the SLA mechanism, fail to undertake the assessment or approach in a systematic manner and do not involve a detailed study of identifying and providing a series of actions directed toward more effective management of the problem. Fundamentally, the LIS process lacks a risk-assessment phase that is measurable to some initial condition (a baseline). The integration of this risk-assessment phase in conjunction with the component of risk/impact reduction verification, could form a testable STR Action Impact and Risk Assessment. The methodology required for the project definition in the development of a prioritized risk-clearance program such as a LIS necessitates a systematic ap- proach that is defined with the following three core values:

1. Integrity: The LIRA process conforms to agreements.
2. Utility: The LIRA process provides a clear information for decision-making.
3. Sustainability: The LIRA results in proper impacts.

The LIRA, as a component of a Strategic Landmine Assessment, should be a systematic and transparent process, not an imitator for decision-making; address socioeconomic effects of strategic clearance operations; include policy, plans and program decisions; be undertaken when alternatives are still available or are a flexible, diversified process. The key objectives of the SLA would be to facilitate informed decision-making, contribute to socioeconomic sustainability and social and economic recovery, and identify and address cumulative effects.

Within this SLA framework, the LIRA process should be:

**Purposive**, meeting its aims and objectives
**Focused**, concentrating on the effective and necessary counter requirements. But what measures this, by comparison, is the one critical activity for which the task priority decided? In IMAS, GMAA, LIS and socioeconomic approaches, these crucial aspects are missing.

In and of reference, impact analysis, to predict the effects of specific clear- ance activities and evaluate their significance; mitigation, to establish measures to prioritize high-, medium- and low-impact activities; re- porting, to prepare the information necessary for decision-making; review, to check the quality of the LIRA report; decision-making, to approve or reject the specific clearance activities and set conditions; follow-up, to monitor, manage and audit post clearance impacts; and public involvement, to inform and consult with stakeholders. The “impact analysis” or detailed study phrase of a LIS should involve the following three steps:

1. Information: The “impact analysis” or detailed study phase of a LIS should involve the following three steps:
   - Prioritization, to identify the most effective and efficient measures to meet the objectives.
   - Monitoring, to measure the effectiveness of the measures.
   - Evaluation, to assess the overall performance of the measures.

The table below presents the advantages and disadvantages of each method:

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link action to impact</td>
<td>Difficult to distinguish direct and indirect impacts</td>
</tr>
<tr>
<td>Good method for displaying EIIPA results</td>
<td>Significant potential for double-counting of impacts</td>
</tr>
<tr>
<td>Excellent for impact identification and analysis</td>
<td>Can become very complex if used beyond simplified version</td>
</tr>
<tr>
<td>Good for experimenting</td>
<td>Heavy reliance on knowledge and data</td>
</tr>
<tr>
<td>Often complex and expensive</td>
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</tbody>
</table>

The IMAS is based on the “true measure of success of any mine action program is based on the needs of the local community, and not just about equipment, training and resources available, is almost always fewer than what is needed to address the mine and UXO problem immediately and thoroughly.”

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http://commons.lib.jmu.edu/cisr-journal/vol10/iss2/1
Conclusion

Some years ago the major issue in mine action was about safety and quality versus productivity. Now is the time to take a more pragmatic approach and look at all three subjects in a balanced manner. A foundation based on standards has now been accepted by the international community as essential to maintaining quality and safety. However, control must be exerted by donors not to fund studies and improvements that fail to provide a noticeable improvement in the quality of life of those whose daily struggle is one of survival.

What is critical is the need to modify the present IMAs and the other documents in order to conduct strategic planning in a systematic manner. Policies concentrating on local aspects need to take a broader view and a recognition of the importance of prioritization is needed, which must be initiated at the earliest possible opportunity even with the basic premise of demining that is less effective in some places than it is in others is simply demining in the wrong place and is an intellectual use of time, effort and limited financial resources. Currently the documentation presented does not complete the picture or provide a coherent approach; there is now an urgent need to “close the circle” by providing and utilizing the missing information.

See Endnotes, page 109

Quality Assurance for Mined and Survey Areas

Mechanical demining is an important and essential part of any demining process, and quality-assurance methods must constantly be revised to address the balance between safety and efficiency. Based on experience from the MineWolf mechanical demining experience, the tiler system would improve the demining process significantly, thereby increasing speed and reducing the costs of demining operations.

by Heinz Rath and Dieter Schedrher [Safety Technology Systems]

It is common knowledge that mechanical demining has to be part of the complete demining process to improve the speed of operations, defeat major obstacles for manual deminers, reduce costs and simplify quality assurance. It is also common knowledge in the car and aircraft industry that quality must be continuous and cannot be guaranteed by inspection alone.

Modern quality-assurance programs (such as the Failure Mode and Effect Analysis) have to be used to ensure a capable process. The FMEA is a method for failure-prevention and should be used for the design, system, assembly, production and, of course, demining process.

The FMEA for tiler operation must include clearing-depth control, vehicle-speed control, rate of revolution for tiler and flail, and engine-temperature control.

Based on our demining operations in Bosnia and Herzegovina with HELP (formerly Dutch Hoehiba F.BELF) and Norwegian People’s Aid, we reached the following conclusion: The tiler process suffers from limited and uncontrolled demining depth and limitations imposed by soil, terrain and vegetation—meaning it can miss intact mines. These findings are confirmed in various other publications.1 The tiler process requires intensive follow-up verification of clearance—additional demining operation by hand and dog—which is time-consuming and costly.

Important Requirements

A Total Quality Control system—a management tool for improving performance that aggressively drives for a defined set of objectives in a process—required and included the demining-organizations, equipment choices, standard operating procedures, training programs and the following essential requirements:

1. Ground-penetration depth up to 30 centimeters (12 inches).
2. Multiple operations with the tiler, to break up partially demaned or remaining mines and explosives components not completely destroyed by the tiler.
3. Effective depth control for both the tiler and flail system.
4. Monitoring of drive control to be displayed inside the cabin for all relevant technical data such as clearance depth, rate of revolution for tiler and flail, vehicle speed, engine temperature and vehicle positioning.
5. Global-positioning system navigation for directional control.
6. Driver on board to intervene if needed with difficult topography and obstacles.
7. Quality track-record for all relevant data to be printed from data logger.

The tiler process has the potential to be capable of destroying all mines, provided the tiler rotates clockwise with a rotation speed of at least 300–400 revolutions per minute and is fitted with special cutting tools to destroy all mines, avoiding slipstreaming, burying and low waves.1 In general, a Total Quality Assurance program as used in the aircraft and car industry is required because it will analyze all aspects of quality on a continuous basis. In general, a TQA program provides a modern, overall quality concept of a company or system. It is easy to see if the process is capable or not by looking at the area after the demining process. The area has to be homogeneous after a uniform process as this is the basis for a capable process.
Proposed Quality-assurance Process for Mined and Survey Areas

While the MineWolf tiller system provides a capable process with control of demining depth, tiller rotation and vehicle speed, which is the basis for hitting every mine without fail, mines can be destroyed without being detonated. Consequently, mine pieces such as TNT, fuses, or steel bodies of fragmentation mines will be left and might pose a limited risk. There is a capable technology to find the steel bodies using Foerster MultiCAT or the Ebinger large-loop detector UPEX 740. Experience has shown that most mine pieces are thrown onto the surface by the force of the tiller. Visible control of the cleared area would identify the areas requiring an additional quality measure.

There remains the risk that a small number of parts and fuses located in the ground, either ferrous or non-ferrous, will not be detected. We believe that the limited risk has to be taken. If there are records or signs of fragmentation mines or items of unexploded ordnance, the Foerster MultiCAT or the Ebinger large-loop detector UPEX 740 is capable of finding them. It should be noted that small metal parts cannot be found with 100 percent certainty by manual methods.

If we take into account statistics published by the Geneva International Centre for Humanitarian Demining in *A Study of Mechanical Application in Demining,* which indicates that only 2 percent of the demined areas worldwide are contaminated by mines, we do believe it is worth the risk.

Proposed Quality-assurance Methods

Based on our experience, we recommend the following four methods for quality assurance:

- **Scheme 1.** Visual control of the cleared area by means of an armed tractor to identify and mark areas requiring additional quality measures. If no detonations are reported or mine residue found, the area can then be declared mine safe, meaning no further quality measures are required.

- **Scheme 2.** If detonations are reported or mine residue found, a complete search of the cleared area needs to take place, by means of establishing a grid of working lanes as given by the standard operating procedures, followed by a manual or explosives-detecting dog team. Residue must be removed. The area can then be declared mine safe.

- **Scheme 3.** If only a small number of detonations were reported or residue of mines found, a partial manual-demining opera-

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- **Scheme 4.** If there are records or signs of fragmentation mines or items of UXO, the Foerster MultiCAT or the Ebinger large-loop detector UPEX 740 can be used. The search is focused on steel bodies greater than 0.7 kilograms (1.5 pounds) because fragmentation mines have steel bodies that cannot be fully destroyed by mechanical demining (only the fuses are cut). Foerster and Ebinger equipment is proposed to find the remaining bodies because they are specialized to locate steel objects within this range. The equipment can be fitted to an armed tractor to locate the steel bodies or items of UXO. Supplement the search for fuses and explosives with a handheld detector around the steel bodies to excavate fuses and explosives. The area can then be declared mine safe.

Summary

The tiller-demining process, combined with total quality-control methods, strives to move from the ground-preparation process currently used, to a “mine free” process. By using the follow-up verification system, additional quality control after mechanical demining will be minimal, fast and more cost-effective without reducing aspects of safety.

For additional references for this article, please visit http://snipurl.com/15ixk.

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**News Brief**

**Taliban Suspects Killed Emplacing Mines**

Pour suspected Taliban terrorists died while emplacing land-mines along roads in southern Afghanistan in late July. Three Taliban members reportedly blew themselves up in one incident as the landmines were laying on a road in the Afghanist province of Kandahar.

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**Heinz Rath** Chairman of the Supervisory Board of MineWolf GmbH, inventor of the MineWolf Toolbox concept and founder of MineWolf Systems GmbH. In 1995, Rath retired as International Director for Research and Quality at TRW Automotive Holding Corporation. Rath is also the recipient of the Bundesverdienstkreuz, the highest award from the Federal Republic of Germany.

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While the former hard-line Islamic regime was deposed by Coalition Forces in 2003, supporters of the Taliban have recently increased attacks in southern regions of the country.
Explosive Remnants of War and the Reality of Azerbaijan

This article explains the danger of explosive remnants of war when located within communities and the precautions that need to be taken in order to get rid of this problem. It also describes how the Azerbaijan National Agency for Mine Action is trying to address the problem of abandoned ammunition storage in one of the most highly contaminated areas among existing abandoned ammunition storages in the world.

by Nazim Ismaylov and Emil Hasanova [Azerbaijan National Agency for Mine Action]

Today, there are still some discussions on the definition of explosive remnants of war, but it is generally understood that the problem of EPR cause both widespread and long-term, and that the number of casualties and deaths caused by both unexploded and abandoned grenades, mortar shells, fuses and cluster bombs is high and equivalent to landmines. The physical and psychological impacts of ERW on a community are significant considering the number of deaths and nature of injuries caused, which can overload often stretched medical infrastructures. ERW also have a wider socioeconomic impact on affected communities in terms of land use and blockages to reconstruction and development activities.

The main points related to the threats caused by ERW are:

• Injuries or deaths can take place at a distance from the explosion.
• Items of unexploded ordnance are generally more powerful (and therefore more lethal) than anti-personnel mines.
• When UXO accidents do not involve deaths, they typically result in severe wounds.
• ERW are generally found on the surface and are therefore more visible, which can result in more interaction with ERW than mines. Also, UXO can be located sub-surface where clearance can be particularly difficult.
• The fear of UXO is generally lower than the fear of mines because UXO can be more visible and this gives people a false impression of safety, which can be very dangerous.
• ERW are unpredictable and can detonate at anytime due to a variety of stimuli.

Azerbaijan has not signed the Convention on Certain Conventional ‘Weapons’ or the Ottawa Convention, for several reasons including some political issues with neighbouring countries, particularly the conditions of the war with Armenia. Armenia occupies the territory of Nagorno-Karabakh and seven surrounding regions, totaling 20 percent of Azerbaijan. Today there are just under eight million people in Azerbaijan. Of these, 450,000 are internally displaced persons and 500,000 are ethnic Armenians who came to Azerbaijan from Armenia.

Despite the fact that Azerbaijan has not signed the Ottawa Convention, the country is supportive of it according to “Azerbaijan and the Ottawa Process.” This document states, “The government of Azerbaijan has supported from the outset the idea of having a comprehensive international legal document on prohibition of use, stockpiling, production and transfer of anti-personnel mines. Our country has learnt the catastrophe that this ammunition can bring. Therefore Azerbaijan advocates demining and destruction of mines. Azerbaijan shares all concerns taken into consideration while coming to the statement of the Convention and is involved neither in transfer, transportation, nor in production of anti-personnel mines. But continued conflict prevents Azerbaijan from according to the Document.” The government of Azerbaijan hopes to sign the Ottawa Convention once the conflicts in its territories are resolved.

UXO Operations and Abandoned Ammunition Storage Clearance

History of the problem. A military ammunition warehouse located in Agagra, consisting of 138 bunkers, was the largest Soviet warehouse in the south Caucasus. Agagra is located in the northeastern part of Azerbaijan, bordering the Karabakh region in the east, Turan in the east, the Republic of Georgia in the north and Armenia in the west. In 1991, when Azerbaijan regained independence, the war was traditionally deployed by the Soviet Army before it departed. As a result of the explosion, thousands of pieces of UXO were scattered over 44 square kilometres (17 square miles), posing serious humanitarian, socioeconomic and environmental threats to the local population.

Since the explosion, 148 UXO-related accidents have been reported, with 31 people dead and 80 injured. To collect scrap metal from the UXO, people are exposing themselves to injury and death. Some companies trying to gain profit have been involved in illegally collecting UXO from surrounding areas, devising simple methods involving very unsafe techniques. By selling the metal and non-ferrous parts of the projectiles, both individuals and companies supplement their income. This is the principal cause of many deaths and injuries among the people living near Saloglu, a village in Agagra. A recent accident involved the death of a young man searching among the unexploded bombs for copper to sell at the local market.

Azerbaijan appealed to NATO for assistance in the clearance of the Saloglu area and the destruction of stockpiled UXO. As an initial step, the NATO Maintenance and Supply Agency conducted a technical assessment of the site and consequently the Partnership for Peace Trust Fund on the Saloglu Project was established. The role of the lead nation in the Saloglu Project was given to Turkey.

On 14 February 2005 all efforts aimed at facilitating the Saloglu Project in Azerbaijan were brought together at the NATO headquarters in Brussels, Belgium. Turkey signed the Financial Management Agreement for the project at a special ceremony involving NATO Secretary-General Jaap de Hoop Scheffer and the representatives of contributing countries.

The total cost of the project is valued at €1,047,649 (approximately US$1.3 million) and is estimated to last 16 months. Azerbaijan, as a host nation, must all the commitments on the project. With contributions from NATO and individual partner nations—namely Australia, Finland, Luxembourg, Norway, Switzerland, Turkey...
Taking into account that 15 years have passed since the warehouse explosion, clearance of this ammunition is a complicated yet extremely important task. In addition to planned clearance projects such as those mentioned, ANAMA also provides rapid response to mines/UXO-related emergencies. When one Aagraf steel-scrapper worked set up by local exploded approximately 200 meters (219 yards) from a residential area, the workshop itself was totally destroyed and, according to official information by local authorities, three people were killed and 23 injured. Additionally, the explosion damaged houses as far as three kilometers (two miles) from the workshop. Immediately following the explosion, ANAMA established a team of UXO operators to carry out emergency mapping and clearance operations in the incident area. Operations lasted for one month and as a result, 175,000 square meters (42 acres) of land were cleared and more than 5,007 items of UXO (among them, 1,261 pieces containing white phosphorus) were removed from the area and destroyed. ANAMA has continued to react quickly to any mine- and UXO-related emergencies.

**Conclusion**

As the Japanese might say, “Tada yori nakara nan ne?” (“We have to pay much more for something we get for free of charge”). It is important to figure out how to solve the existing problem of UXO and abandoned ammunition and how to protect ourselves from ERW in the future. Human beings created the problem—dropping the bombs and abandoning the ammunition “for free” on Azerbaijan—and now they must correct it at great cost by cleaning up the country and making it safe again. See Endnote, page 109

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By Thomas Hvidtfield

**Protection of Soft Vehicles Against ERW**

The author discusses the challenges of protecting aid workers riding in traditional unarmored vehicles from the dangers of explosive remnants of war. He offers some practical, after-market solutions that provide a high level of protection for much less than the cost of traditional armored vehicles.

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**News Brief**

Death Valley Challenge to Raise $100K

Mines Advisory Group, in partnership with CEIA USA, will sponsor a 423-kilometer (263-mile) bike trek across Death Valley, USA. Event organizers hope to raise nearly $40,000 ($107,204) to support mine-action efforts around the globe.

From 4-11 March 2007, 40 participants will travel and cycle to raise money and awareness. The registration fee for the event is only $175 ($325), but each participant is asked to raise $2,750 ($5,100) in sponsorships, half of which will cover the cost of running the event. Included in trek costs are London-to-Las Vegas airfare, accommodations, nearly all meals, the use of bicycles and other sundry expenses.

For more information on this trip, visit www.mpclearsmines.org.

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**Endnotes**

1. The term “ERW” is widely used and covers anything from hand grenade ammunition to aircraft bombs. The majority of injuries, however, are caused by devices like anti-personnel landmines, anti-tank mines and, as seen recently in Lebanon, air-dropped submunitions “bomblets.” Apart from being the most numerous, AP mines are directed against people on foot and are normally designed to explode following a relatively small impact—often by pressure of a foot or the tripping of a mine.

The term ERW is very wide and covers anything from hand grenade ammunition to aircraft bombs. The majority of injuries, however, are caused by devices like anti-personnel landmines, anti-tank mines and, as seen recently in Lebanon, air-dropped submunitions “bomblets.” Apart from being the most numerous, AP mines are directed against people on foot and are normally designed to explode following a relatively small impact—often by pressure of a foot or the tripping of a mine.

On the other hand, some AP mines and many types of air-dropped bomblets work with fragmentation as the primary kill mechanism. The same goes for almost all mortar rounds and artillery ammunition. Contrary to a blast wave, which loses its power very quickly, the high-density fragments surrounding the explosive maintain their kinetic energy for a longer period of time, thereby doing significantly greater damage to people and property in their path.

The extent to which AP mines endanger passengers in a soft-skinned SUV depends heavily upon which type of device we’re talking about. We can separate the various devices into two groups depending on their primary kill mechanism:

- **Blast ammunition** works by creating a powerful blast wave that destroys objects in close proximity to the explosion.
- **Fragmenting anti-personnel mines** works by creating a high-speed metal fragments intended to inflict as much damage as possible to anything or anyone in the surrounding area.

Most AP mines inflicts injury primarily through the blast effect and normally detonate by pressure. The effect from the blast wave decreases rapidly with distance and it is often a “one kill” weapon. On the other hand, some AP mines and many types of air-dropped bomblets work with fragmentation as the primary kill mechanism. The same goes for almost all mortar rounds and artillery ammunition. Contrary to a blast wave, which loses its power very quickly, the high-density fragments surrounding the explosive maintain their kinetic energy for a longer period of time, thereby doing significantly greater damage to people and property in their path.

SS-20 2P13 warhead model: Kuwait, designed and developed by the former USSR.

Artem Morozov, Operations Manager
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Emil M. Hasanova has worked as Operations Manager for the Azerbaijan National Agency for Mine Action since 2001. From 1986 to 2001 he worked in various positions within the Ministry of Justice. He earned a master’s degree in Law and in 1995 he was certified as a Captain of Justice. He is the author of various articles related to human rights, terrorism, small arms/light weapons, firearms, and humanitarian mine action and law.

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their energy for much longer and can inflict injury quite far away from the explosion. Due to this extended range, most types of fragmenting AP mines have the option of tripwire detonation, which enables the mine to go off when a person or a vehicle trips a wire up to 10 metres (33 feet) away. A person at risk in two different areas is travelling in an SUV. If the vehicle detonates an AP device that works primarily through blast, the distance from the expected impact point (below a vehicle) to the shrapnel in the vehicle is normally high enough to create a safe distance. However, if the device creates fragments, people not wanting to take the same risks will offer almost no protection against the high-velocity steel fragments. The standard car-body steel is 0.8 millimetre (0.03 inch) thick and will not prevent fragments from entering the cabin.

To express it another way, when we are talking about various AP devices, the main concern for passengers in a vehicle is fragmentation rather than the shock or blast effect from the explosion.

For that reason, in an area with a high risk of setting off fragmenting AP ammunition, fully armoured SUVs are recommended. However, apart from being very costly, excessively heavy and hard to obtain in sufficient numbers, fully armoured SUVs tend to give the wrong impression of the humanitarian workers—namely that they are not willing to take the same risks that the inhabitants must take on a daily basis.

A less expensive alternative to fully armoured vehicles, there are a number of retrofit solutions on the market today that can provide a level of protection for passengers travelling in soft-skinned vehicles. Although retrofit does not provide the same level of protection as factory-armoured SUVs, some can work well against a large number of ERW threats for a fraction of the price of a fully armoured vehicle. Consequently, a much higher number of vehicles—and thus passengers—can be protected for the same money. In addition, the retrofit solutions can protect soft vehicles like ballistic blankets and much more. Consequently, a much higher number of vehicles—and thus passengers—can be protected for the same money. In addition, the retrofit solutions can protect soft vehicles like ballistic blankets and much more. Consequently, a much higher number of vehicles—and thus passengers—can be protected for the same money.

Building Ballistic Blankets

Most retrofit solutions to protect SUVs are based on aramid fabric, such as Twaron® or Kevlar®, which is the ballistic material used in most body armour. By using flexible armour, it is possible to design solutions that fit into the curved interior floor of the SUV.

In terms of level of protection, flexible solutions using aramid on the exterior and floor of the vehicle generally represent a lower level of protection than those found on the sides of a factory-armoured SUV. Ballistic blankets are available from several sources and are a system of tailor-cut and overlapping blankets that cover much of the interior of the vehicle as possible up to the windows.1

Ballistic blankets offer a good level of protection against fragments coming from below or from the lower sides. They are installed below the carpet and inside the side panels and doors and require a complete stripping of the vehicle. After reinstallation, the interior of the vehicle looks the same as before, with no visible signs of it being protected.

The protection level of the blankets is normally specified according to a North Atlantic Treaty Organization standard STANAG [Standardisation Agreement] 29201 and the standard level by most non-governmental organisations is a level referred to as 600 m/s. It is not possible to connect this level directly to any specific mine or grenade as the actual conditions have an enormous influence on the real threat. However, a level of 600 m/s can be directly compared to other means of protection; for instance, standard body armour (without vest-insert plates) represents a level of protection of 450 m/s and contains only 12 pieces of ballistic material. A passenger in a vehicle that is fragmenting ERW is much better off if the vehicle is equipped with ballistic blankets than if he is wearing body armour; in addition to a higher ballistic level, the ballistic blankets will offer protection of the extremities and not only the torso.

Interestingly, compared to a fully armoured SUV, many soft-skinned vehicles equipped with ballistic blankets are better protected against landmines detonating on the ground. The reason for this seeming inconsistency is because most armoured SUVs are equipped with a level of floor protection according to an old German standard for armoured limousines known as the “two hand grenades” level. Unfortunately, the specified grenade—the German type DMS1—is quite small and contains relatively small fragments that are easily stopped. In addition to blankets, various systems exist on the market to shield the passengers from fragments.

New technologies with in-the-field armouring options can be fitted and removed when there is no immediate danger. This type of protection is designed to provide an increased level of protection against ERW and other threats that vehicles are exposed to.

In turn, these options and those developed and implemented in the future continue to better the working conditions of personnel exposed to such risks.2

Note:

1. See Endnotes, page 109

Explosive Remnants of War and Their Consequences

This article examines the post-conflict situation of Tajikistan, which has not only anti-personnel mines but various kinds of explosives remnants of war. Recently Tajikistan signed Protocol V of the Convention on Certain Conventional Weapons,3 which includes a commitment to clean the nation’s territory. The author highlights some of the different sources of ERW in Tajikistan as well as the progress being made by authorities to clear and destroy ERW.

Impact of ERW in Tajikistan

In addition to the landmine problem, items of UXO also pose a great challenge in Tajikistan. It is presumed that most ERW remnants in the country date to the civil war (1992–1997). The UXO in Tajikistan that remains on the ground is the result of being fired from military planes and helicopters, as well as shelling. A large number of Tajik citizens have reportedly died or been seriously injured.

It is necessary to note that items of UXO also appear in the country for reasons unrelated to war, including armed conflict and attempted revolts. In Tajikistan, as in many other countries, mandatory military service requires continued and regular military training for the Armed Forces. It has been the case in Tajikistan. Interestingly, compared to the military training for the Armed Forces, it has been the case in Tajikistan. Currently, there are approximately 20,000 people annually, one third of them children.4

In recent years, the international community has not paid serious attention to the risk posed by the UXO problem, i.e., explosive ordnance that is used during armed conflicts but fail to detonate. It is impossible to accurately count the number of unexploded mines and it is also uncertain how much UXO remains. However, it is believed that the total number of items of UXO has a much worse effect than the total number of mines. UXO and other remnants such as triggered ordnance (all grouped together under the term explosive remnants of war) continue to appear in huge numbers in previous conflict areas. Some countries, like Laos and Vietnam, are affected more by UXO than mines.

Nowadays the international community is paying more serious attention to the risks posed by the UXO problem. This is reaffirmed by the adoption of Protocol V to the Convention on Certain Conventional Weapons. The adoption of Protocol V on 28 November 2000 was possible thanks to governments acknowledging the seriousness of the post-conflict problems posed by UXO as well as the necessity to minimize the risk and impact of UXO. Tajikistan ratified Protocol V on 20 December 2005, and the Protocol entered into force for all parties on 12 November 2006. In accordance with the Protocol, the term ERW encompasses UXO and abandoned explosive ordnance in conflict areas. This Protocol allows the contributing parties, as well as States Parties, to be responsible with regard to all UXO under their control. Tajikistan also has a landmine problem and has signed the Convention. Together, these two documents stipulate that after active military fighting ceased, countries should mark and clear the mines as well as liquidate and destroy all mines and UXO under their control.

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JOURNAL: The Journal of ERW and Mine Action Issue 10.2

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3. New technologies with in-the-field armouring options can be fitted and removed when there is no immediate danger. This type of protection is designed to provide an increased level of protection against ERW and other threats that vehicles are exposed to.

4. For example, in February 2006, two teenagers—brothers N. Yorov, 15, and sister M. Yorov, 16, from Boimais village in Hisor district—were injured by UXO explosion while cutting wood. N. Yorov’s leg was seriously injured and his sister received injuries to her stomach. Due to the lack of financial means, the family was unable to provide necessary medical care for the teenagers, which has greatly hampered their recovery. An investigation into the cause of this explosion revealed

By Jonnahmad Rahbajan (Tajikistan Mine Action Centre)
that the piece of UXO had been just beyond the limits of a local military training area. No other source of UXO contamination was identified in this case.

A similar accident happened to Z. Usayev, 15, an inhabitant of Rudaki district. Having found a piece of UXO while tending animals in the community grazing area, he lost his right hand and eye as a result of the explosion.

Additional examples of incidents involving ERW are noted in the brief stories at the top of the page. These are clear indications of continuous suffering in the Rahbe and Ta’vilad areas where ordnance was fired from aircraft during the civil war.

Collection and Demolition of ERW Tajikistan, as State Party to both the Ottawa Convention and Protocol V of the Convention on Certain Conventional Weapons, takes all the necessary measures to find and demolish mines and ERW.

On 2 December 1994, the President of the Republic of Tajikistan issued the Decree on Voluntary Surrender and Recapturing of Fire Arms and Military Ammunition from the Population. This decree became an instrument for disarming illegal armed groups and recapturing firearms that remained in the hands of the civilian population. Table 1 shows the number of firearms returned from 1994 to 2006.

| Kalashnikov gun | 9,101 |
| Pistol | 2,846 |
| Rifa | 3,070 |
| Other types of guns | 1,042 |
| Hunting gun/ERW | 9,006 |
| Total | 28,685 |

Table 1: Firearms returned between 1994 and 2006.

In accordance with the agreement between the government of the Republic of Tajikistan and the Organization for Security and Co-operation in Europe dated 16 May 2005 and within the framework of the Programmes of Small Arms and Light Weapons, an Explosive Demolition Centre was established within the Ministry of Defence. Its major objective is to facilitate the demolition of ERW. More than 70 metric tons (77 tons) of ERW have been demolished as of 19 October 2006, and the work is ongoing.

Conclusion Taking the serious consequences of ERW into consideration, it is necessary to point out that the adoption of Protocol V by the international community and its entry into force has great importance for the safety of civilians. Of course, it significantly depends on the process of accession of the governments and the fulfilment of its provisions by State Parties. TMAC hopes the implementation of Protocol V allows all parties to take practical measures to demolish ERW efficiently and productively to provide safety for all.

See Endnotes, page 109

Industrial Ammunition Stockpile Recovery: Saving Energy and Resources and Protecting the Environment

This article presents the opportunities for the disposal of ammunition in an economically and environmentally feasible way, focusing on post-conflict disposal of larger stocks of ammunition with a special view to the ongoing Ammunition Stockpile Destruction Programme in Afghanistan managed by the Afghanistan New Beginning Programme. The contents of the article are based on the experiences gathered under the umbrella of the research and development programmes Western European Armament Group European Cooperation for the Long-Term in Defence and European Union L’Instrument Financier pour L’Environnement (EU LIFE), together with a study carried out for NATO’s Maintenance and Supply Agency, followed by field studies on ammunition stockpile destruction in mine-action programmes.

by Erik K. Lauritzen, Mogens Skaarup and Inés García Sánchez / NRAS DEMEX & NRAS Chemcontrol

O bulder ammunition is a major problem in many countries, especially in war-torn countries like Afghanistan, Iraq, Sudan and Lebanon. To restore peace, it is imperative to dispose of the ammunition, as this will reduce the capabilities to continue the warfare. Explosive remnants of war are normally destroyed by open burning or open detonation (OB/OD) in suitable amounts according to national regulations or according to International Mine Action Standard 11.10 and 11.20. These methods create environmental problems, however, as huge quantities of metal fragments, dust and nitrogen oxides (NOx) are emitted to the environment.

Agenda for ERW and Ammunition Stockpile Disposal

As a result of the end of crises and conflicts around the world, vast quantities of ammunition have been destroyed by OB/OD. They have come from a variety of sources, primarily:

• Excess stocks of military ammunition resulting from the ending of crises/conflicts
• Unexploded ordnance on former military training or gunnery ranges
• Mines and UXOs remaining from military and some civil conflicts

The amount of ammunition in abandoned stockpiles in Iraq and Afghanamens comprises several hundred tonnes of various types of munitions. In the wake of the recent conflicts in the Persian and Balkan areas, many questions have been raised about post-war effects, such as the environmental pollution caused by OB/OD of ammunition stockpiles. Kuwait has claimed compensation from the Iraqi government for severe damage of the desert environment caused by chemical pollution of sand and soil because of OB/OD disposal of abandoned Iraqi ammunition after the First Gulf War in 1991.

Today the international market for scrap metal is very favourable, and the prices of scrap iron and especially copper, stainless steel and aluminium are rising.

Recovery and recycling of explosives for industrial use has not proven feasible. Recyclable explosives from ammunition are not competitive with industrially manufactured explosives. However, explosive compounds might be incinerated for energy recovery or redressed for fertilizing or other chemical purposes.

The distance of abandoned ammunition stocks in a post-conflict area, necessary logistics management and implementation of appropriate ammunition-disposal procedures require a lot of human resources. The work related to ammunition-stockpile management is highly suitable for demobilization, demineralization and reintegration programmes.

Taking all environmental, economical and social benefits derived from the recovery of ammunition stockpiles into consideration, industrial ammunition stockpile recovery is far preferable to the currently applied, normal practice of OB/OD. However, further investigation and proof of concept is urgently needed.
Principles of Demilitarisation and Ammunition Disposal

Demilitarisation of ammunition can be performed in many ways. Different techniques and methods for demilitarisation of ammunition are presented in DMAS 11:10. Figure 1 illustrates a general methodology for demilitarisation. There are many phases to follow and options that can be chosen. Each phase is composed of a set of processes and many of the stages consist of a number of sub-stages. The most appropriate demilitarisation process to be implemented will be dictated by a number of factors, such as available technology, environmental legislation, contract conditions, commercial issues and safety regulations.

Munitions are inherently dangerous and the demilitarisation process involves considerations about explosive safety and environmental risks. In particular, demilitarisation and treatment stages are the most critical, during which the explosive constituents are subjected to processes that can be hazardous depending on the working methods, sensitivity of the explosive components, etc.

In order to save resources and protect the environment, demilitarisation processes must aim for maximum recycling and minimal waste disposal. Furthermore, the processes must be as harmless as possible with respect to worker’s health and safety, and emissions into the atmosphere, soil and water. Munitions are, with few exceptions, designed with a focus on the use phase, and little or no thought is given during the design phase to the end-of-life stage, when demilitarisation is required. Consequently, demilitarisation of munitions is often a more complicated process than initial construction. Modern design of munitions is becoming more and more complex, and therefore demilitarisation has to be more carefully considered at this initial stage. With growing requirements for insensitive munitions,1 the energetic constituents are evolving and becoming more difficult to deal with compared with traditional explosives, such as TNT. Munitions containing TNT can easily be melted out, since TNT’s melting point is lower than that of water; however, new filling compositions tend to be based on nitramines2 embedded in a cross-linked polymeric matrix3 with a higher melting point.

Mobile Ammunition Disposal Plant

In May 2000 NIRAS DEMEX published a report, Research and Development Technologies for Safe Disposal of Explosive Waters, which compiled the results of a project carried out under the EU-LIFE Programme. The project demonstrates by means of laboratory tests that it is possible to extract the explosive content from the ammunition shells, mix it with water and incinerate the resulting mixture without risk of explosion.

NIRAS Chemcontrol has designed and set up both large incinerators and small-scale, mobile incinerators for disposal of hazardous waste like portraits, PCB, etc., such as the one shown in the right. NIRAS DEMEX and NIRAS Chemcontrol have further been responsible for the design, construction and setup of a plant for ignition of small ammunition at the Danish Ammunition Arsenal, as shown in the photo on the next page. The process ensures any remaining explosive material within the disposed ammunition items is burned out and is done in a way that guarantees safe handling and eventual recycling of the shells.

During the incineration of explosives, it is possible to recover the generated energy and clean the exhaust gases to the emissions comply with the environmental requirements in the area. This technique is therefore preferable to DB/DOS from an environmental perspective. Moreover, mobile incineration units can be established on-site and thus offer the same logistic advantages regarding local disposal of ammunition as the currently DB/DOS.

The extraction of the explosives from the ammunition shells and their incineration has only been tested on a laboratory scale, however. A full-scale demonstration test is under preparation.

Proposed Design for Mobile Ammunition Disposal Plant

Overview. Due to the safety risks associated with the transport of ammunition, having a relocatable or transportable facility for its safe disposal constitutes an essential advantage.

The proposed design for mobile ammunition disposal plant has a capacity to handle 30-50 small ammunition items at a number of depots, and it is preferable to dispose of the ammunition on premises instead of transporting it to a central facility. For practical reasons, it is also preferable if the disposal unit can be shipped by normal road transport.

Extraction of explosive material and preparation of explosive/water mixture. Explosive content is extracted from the shells by high-pressure water. The shell is then cleaned so the metals can be recycled, constructing a considerable income from the overall process. In regions where armed conflicts are still ongoing, shells should be transported inside the country to prevent them from being reutilised with explosives. The transport of ammunition shells is not problematic, as they are composed of non-explosive and non-hazardous materials.

The extracted explosive material is mixed with water in such a proportion that the resulting mixture has some specific properties with respect to explosive capability. An important criterion is that the mixture should not explode by shock or exposure to temperatures below 60°C (140°F). The mixture is not considered explosive material, and can therefore be stored in dedicated vessels until disposal. In case of improper operation or unexpected events, a tentative sketch of the overall process is shown in Figure 2 below.

Control system. The incineration process is carefully controlled by a computer system to ensure safe and environmentally sound operation. In case of abnormal operation, the process will be stopped in a controlled manner. Mechanical safety measures are incorporated to protect the equipment from damage in case of improper operation or unexpected events. A tentative sketch of the overall process is shown in Figure 2 below.

Ammunition Stockpile Destruction Programme of Afghanistan

The Afghanistan New Beginning Programme launched the ammunition destruction project in December 2005, based on the Anti-Personnel Mines and Ammunition Stockpile Destruction Project. The Coalition Forces and the International Security Assistance Force in Afghanistan have conducted and continued to conduct the destruction of ammunition stockpiles in Afghanistan. However, this work is not coordinated with the United Nations Mine Action Centre for Afghanistan or ANRB and has sometimes resulted in failed bulk demolitions and the accidental displacement of ammunition, requiring time-consuming explosive ordnance disposal clean up operations.

The ammunition destruction project is a continuation of the Afghan Disarmament, Demobilisation and Reintegration Programme managed by ANRB. During the DDR activities, a large amount of stockpiled ammunition was found and ANRB became aware of the need for ammunition stockpiles to be destroyed. Parallel to the ammunition destruction project, ANRB is also running the Disbandment of Irregular Armed Groups

Figure 1: Schematic illustration of the typical sequence of demilitarisation.
New strategy. The EU prepared a new strategy for ammunition management for the Afghan government. Current demilitarisation practice by OBO-OD may only be used up to 2007. Starting in 2007 demilitarisation of ammunition shall be performed in an environmentally friendly way. By 2012 all unusable and unwanted ammunition currently stored shall be destroyed.

It is proposed that the demilitarisation should be performed in accordance with the European Commission principles of best available technologies not entailing excessive cost, the EC directives of waste management and the International Mine Action Standards.

Most likely a large proportion of the ammunition that has been consolidated will turn out to be obsolete or unusable stocks that must be destroyed. However, ammunition stocks contain valuable materials that can be recovered. If innovative, environmentally friendly demilitarisation techniques are proven to be cost-effective, then scrap metal and explosives could be recycled for commercial use. Energy and nitrogen-based compounds can be recovered from explosives to be used in fertilisers and scrap metal can be recovered from the casing materials. The present world prices for scrap steel are relatively high and it is therefore recommended that an industrial demilitarisation system should be analysed in detail, with the indirect objectives of improving business activities and creating employment for the local Afghan population. An industrial demilitarisation system could be established in connection with the Temporary Ammunition

Consolidation Points, for example a mobile demilitarisation plant based on closed incineration or similar technologies. It is strongly recommended that recycling/open demotion of ammunition should not continue as a demilitarisation technique, due to the proven environmental damage and inefficient use of resources.

Furthermore, it is mentioned that the UNMEE, South Eastern and Eastern European Clearinghouse for the Control of Small Arms and Light Weapons has considerable experience with demilitarisation technologies, and the publication ‘Baking the Bullet’ gives practical guidelines for the ammunitions stock management.

Capacity building. It is a priority for EC projects to build up local capacity. After one year of ammunition stock destruction, an appropriate national capacity has been established. A capacity-building plan is supposed to be prepared with special focus on local ammunition technicians and leaders of Ammunition Survey Teams. Furthermore, the capacity-building plan must be accompanied by a plan for transfer of ownership from ANBP to a local organisation and by a specific exit plan for ANBP, the international implementing partners and Technical Advisors.

It is assumed that the initial phase of the ammunition destruction programme will be implemented via cooperation between U.N. humanitarian organisations, international NGOs and other civil implementing partners on one side and the military society (including the Coalition Forces/International Security Assistance Forces), ANA, police, and security forces on the other side.

It has been proposed that industrial ammunition recovery might be transferred to commercial companies—possibly international companies in cooperation with local companies—in accordance with specific international procedures stipulated by the donor organisations. The contract must be based on industrial demilitarisation policies in compliance with the above-mentioned requirements for health, safety and environmental protection.

For additional references for this article, please visit http://institut.com/1543.

In many countries where landmines and unexploded ordinance threaten populations, people ignore warnings about these hazardous explosives to collect explosive remnants of war for the valuable scrap metal they contain. The author discusses a program proposed by the Golden West Humanitarian Foundation to manage this dangerous practice...

**Golden West Humanitarian Foundation**

These numbers certainly do not mean we should abandon efforts to educate the population about avoiding death and injury from mines and UXO. On the contrary, what it may suggest is new ideas are needed to address specific types of hazards and categories of potential victims, particularly younger scrap-metal collectors. According to reports by the Cambodian Mine/UXO Victim Information System, 353 people were injured or killed between January and August 2006 in Cambodia. Of those casualties, 62 percent were men, 8 percent were women, and 30 percent were children under 18 years of age. Fifty-eight percent of the casualties were people injured or killed by UXO and 42 percent by landmines. These numbers indicate a disturbing trend in which casualties are increasing despite greater efforts to eliminate threats. This trend also exists in Vietnam, Laos, and other areas. We think it points to an underlying problem—collecting scrap metal is the new growth industry in these countries.

The Golden West Humanitarian Foundation has taken a pragmatic approach to MRE, generalizing it to become ERW threat indicators education. We strongly support education but believe the best way to prevent deaths and injuries is to use education as one element in a program designed to eliminate the ERW threats as quickly as possible.

**Sneaky Devices**

In central Vietnam and Laos, many deaths or injuries are caused in particular by unexploded cluster submunitions or 40-mm grenades. These unstable, long-lasting munitions are a widespread hazard, frequently concealed by tall grass or shallow dirt. Not only are they hit by farmers’ hoes or plows, exploded when fires are built on top of them and irresistible to children, but these dangerous munitions are often the very devices scrap-metal collectors intentionally gather, disarm and sell.

In addition, unexploded mortar projectiles can be a threat. Mortar projectiles come in a huge variety of sizes and contain a number of different fillers. In Vietnam, mortars can be found from 60-mm to 160-mm. Fillers may include metal, rubber, or explosive debris. Fuses may incorporate proximity devices, or use impact, powder-spray or timing mechanism for initiation. Unfortunately, once the paint and markings are washed away, it is very difficult to identify the type of filler and, therefore, the explosive threat. Mortars can be small, easy to move and less intimidating than artillery projectiles and bombs. They can also be deadly.

These munitions, submunitions and grenades share a single deceptive characteristic: that can help both victims into a false sense of security: inconsistency. They often fail to fully arm and detonate due to a virtual and permanent mechanical fault in their arming or firing mechanism. However, at other times, the fuse, impact, powder-spray or timing mechanisms may be damaged but the device is still arming or preventing firing. In these cases, items of UXO may require only heat, shock or friction to detonate—sometimes years later. Firing mechanisms are complex and designed to accept input from almost any direction. Because these munitions are so often damaged and prevented from functioning, people come to believe they are harmless. When a civilian picks one up and it doesn’t kill him or her, that person is more likely to pick up the next one. However, the next munition or the one after that may detonate without warning, killing or seriously injuring both the person who picked it up and anyone nearby.

**Challenges to Conventional Mine-risk Education Practices**

So what might the problem be? Why would anyone who has received training pointing out the dangers of interacting with unexploded ordnance intentionally do it anyway? Is there something about the training that makes it ineffective? Are there other factors at the warnings? Are there ways to enhance the training to make it more effective? The answer is yes to these questions and there are no easy solutions. Most programs engaged in MRE recognize that people are frequently injured by landmines and UXO they knew was there. As the numbers from Cambodia show, successful compliance with an MRE program in no assurance anyone will not fall victim to a mine or item of UXO. Many victims are children who play with interesting ‘mystery’ toys or ‘finds’ from a recent explosion. People need to be given the education and training in order to try to make this inevitable behavior safer. This proposed approach will undoubtedly find many opponents who feel we are simply encouraging more risky behavior; however, at Golden West we believe in taking a pragmatic approach to behavior that we think will continue with or without our intervention.

Golden West believes that we can successfully combine our experience with Explosive Remnants of War Indicator Programs and at our popular Explosive Harvesting System into a concept that addresses the growing number of scrap-metal-related casualties. Educating people and providing a more robust explosive ordnance disposal response to ERW reports will hopefully encourage the public to make more reports. Rather than use training to eliminate threats from the most dangerous items (primarily submunitions, grenades and mortars), there might be ways to develop an exchange system for the less hazardous ones.

**A New Response to Scrap-metal Collection**

In this concept, expanded explosive ordnance-disposal teams respond to UXO reports from civilians, assess the threat and return harmless items to be sold as scrap. For quotable items that cannot be safely treated on site, a fee equal to the weight of the usable metal would be paid by the team to further reduce the need to search for items that would be transported to a small explosives-processing facility for treatment (when feasible) and the metal parts sold to reimburse the team. UXO deemed too dangerous for movement would be destroyed in place by the safest method possible. Remaining items deemed too dangerous for processing or lost during treatment would be considered a program cost.

A hands-on procedure for small items (like individual submunitions or grenades) can use field-expedient damage-mitigation methods such as Ms. BIP. Larger items may be controlled by dishing, sandbags or rendering. Whenever possible, items will be moved away from occupied areas prior to any procedures being initiated. For larger items deemed too dangerous, simple render-safe procedures will be applied; no complex procedures will be attempted and absolutely no procedures that include any degree of risk to operators will be conducted. Safety must never be compromised in the interest of scrap metal. Only items the senior EOD

**Table 1: Examples of options for different threats.**

<table>
<thead>
<tr>
<th>Status</th>
<th>Action</th>
<th>Reinbursement</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmless: contains no explosive</td>
<td>None</td>
<td>None</td>
<td>Turn over to finder for sale</td>
</tr>
<tr>
<td>Extreme hazard: contains explosive (do not move)</td>
<td>Mark price</td>
<td>Destroy on site</td>
<td></td>
</tr>
<tr>
<td>Dangerous: sized and contains high explosive (transportation hazard)</td>
<td>Attempt render-safe procedures</td>
<td>Market price</td>
<td>Treatment facility or BIP</td>
</tr>
<tr>
<td>Dangerous: fuse and contains high explosive (no transportation hazard)</td>
<td>Transport to safe holding area</td>
<td>Market price</td>
<td>Treatment facility</td>
</tr>
</tbody>
</table>

*As determined by EOD only.*

Team Leader considers safe transport to be moved off the site. These items will then be independently inspected by EOD personnel prior to being brought into any safe holding area.

Reminders will be established as a reward system for reporting and leaving items undisturbed, and as a safe means for...
people to obtain needed money in exchange for suspect items. There will no longer be an excuse that they had no choice because we are providing a choice. People do not need to endanger their families, neighbors or themselves to make a little extra money.

The soldier EOD Team Leader will be provided with small amounts of cash to do on-the-spot reimbursements for dangerous items removed by the team. Scrap resulting from processing of munitions will be sold and any profits reinvested in the program. Any recovered explosives will be used to support disposal of other unusable munitions. There will be a strict system of accounting for funds. The physical inventory of munitions in the program’s safe holding area validates the expenditure of funds. Despite the close-loop character of the concept, there is no expectation that this will be a balanced system; that is, the investments will never equal the profits from sale of metal.

A munitions-removal facility should be located in a remote area with plenty of buffer zone in all directions. Barricades will be field-expedient: locally produced and using rubber tires filled with sand or sand-filled concrete pipes; no permanent facilities will be constructed. Disposal tools will be remotely operated and procedures monitored via closed-circuit TV. With some modification, many of the tools and procedures used by the Golden West Explosive Harrowing System may be appropriate for use in the demilitarization facility. When fuzes cannot be safely removed, projectiles can be cut behind the booster or fauz waft. Once the forward part of the projectiles is removed, the explosive can be removed out the rear and the fuzed portion burned in a portable demilitarization furnace. Once the explosive charge is removed, the metal is added to the scrap to be sold. No fuzes containing primary explosives will be handled and all will be treated with heat or destroyed by detonation.

The key to this program will be well-trained, competent EOD and demilitarization personnel. They must be willing to submit to a stringent training and quality-assurance/quality-control program and concentrate on safety at all times.

All the skills needed to make an EOD team effective can be taught or reinforced by this program. Large areas of land can be cleaned of the most dangerous items in fairly short order by these teams. While the teams will do no subsurface clean-up past shallow-buried projectiles or surface explosive, the surface clearance will pay big dividends.

Conclusion

Despite repeated warnings and dedicated MRE programs, casualties from scrap-metal collection continue to increase. It seems warnings aren’t enough and high-risk behaviors like collecting scrap metal must be addressed by either technical or economic solutions. This proposed program combines these two elements and helps address root economic issues through the application of new technologies and incentives. The concept includes provisions for assisting scrap dealers who currently traffic in dangerous munitions. The program may also help eliminate the illegal collection and use of explosives for fishing or other illicit purposes. It certainly is not a total solution, but it may begin to reverse the climbing rates of injuries and deaths resulting from the illegal metal business. Costs of this program could easily be offset by real reductions in the fiscal and societal costs resulting from scrap-collection-related deaths and injuries. Golden West will develop and implement this program when funding is secured.

See Endnotes, page 110

Finding More than Honey with Bees

Buried within the USD$46 billion appropriations bill for the U.S. Department of Defense’s fiscal 2007 budget is $5 million for a new military tracking system—honey bees. The program would train honey bees for a variety of military and commercial uses, including finding landmines and other buried explosives.

Researchers at the University of Montana and Montana State University claim the bees can be monitored via a laser-tracking system. With further development, the bees may be able to detect more than just landmines and buried explosives—researchers believe the bees may also be capable of finding methamphetamine labs, dead bodies and other hard-to-detect items.

Still, the primary focus of the honey-bee experimentation is on the discovery of explosives because bees are very attuned to the scent of TNT and similar material. Recognizing the acute sensitivity of honeybees to different molecular compounds, scientists have studied the bees’ reaction to the scent of the food and, through a Pavlovian technique, trained the bees to react positively toward the scent of dangerous materials. Funding for honey-bee programs is difficult to secure, and the technology still is not in a marketable form.

The Aftermath of War

The recent conflict between Hezbollah and Israel resulted in many civilian victims, and though the fighting has ended, the problems are nowhere near over for the civilians of Lebanon whose country is littered with cluster bombs. This article explains the effects of the conflict on Lebanese civilians and describes how organizations are trying to eradicate the cluster-subsidizations problem and provide aid to affected civilians.

by Katia FitzGerald | Mine Action Information Center

A

fter 34 days of fighting between Israel and the Hezbollah militia in southern Lebanon, the United Nations Security Council adopted Resolution 1701 on August 11, 2006, which was aimed at ending hostilities, and a ceasefire entered into force August 14. Despite only a month of fighting, the conflict greatly disrupted the normal lives of many Lebanese due to the damage to their homes and fields, and the remaining unexploded ordnance—mainly cluster submunitions—littered the ground.

The conflict killed over 1,500 people, many of whom were Lebanese civilians, and displaced approximately 900,000 Lebanese and 300,000 Israelis.

The Victims

Many of the victims of this conflict were civilians in Lebanon and Israel. As artillery and missiles were fired by both Hezbollah and Israel, approximately one quarter of the Israelis killed by Hezbollah and the majority of the Lebanese killed by Israeli forces are reported to have been civilians.

Little information is available on UXO in Israel, but it is clear that the estimated 1,800 cluster bombs (containing over 1.2 million cluster bomblets) fired into Lebanon have devastated the local infrastructure. Along with houses and fields destroyed, hospitals, schools, bridges, roads, factories, airports and main sewers were demolished. Particularly affected areas were southern Lebanon, Beirut, and the Bekaa Valley. The northern part of Israel was most affected by Hezbollah attacks, which sometimes consisted of 150 rockets fired per day.

It has been reported Israel used cluster munitions primarily directed by artillery projectiles, followed by Multiple Launch Rocket Systems and a lesser number of aerial cluster bombs. MLRS in particular are believed by many to be highly inaccurate.

They are capable of firing a high volume of mostly unguided munitions. The rockets are designed to burst into submunitions at a planned altitude in order to blanket the enemy army and personnel on the ground with small explosive rounds. The cluster rounds that fail to detonate—believed by the United Nations to be up to 40 percent of some munitions fired by the Israeli Defense Forces in Lebanon—remain on the ground as unexploded submunitions. In addition to the cluster submunitions, an estimated 15,300 items of unexploded ordnance—including air-dropped bombs of 500 to 2,000 pounds (220 to 900 kilograms), ground- and naval-launched artillery rounds and air-delivered rockets—now litter the ground in southern Lebanon.

In an August 30 Reuters AlertNet article, Stephanie Jaunpier, a United Nations High Commissioner for Refugees representative in Lebanon, said the organization’s top priority following the conflict was the safe return of the approximately 1 million Lebanese who fled the month-long war. Though U.N., Lebanese Army and nongovernmental clearance teams immediately started removing bomblets and other UXO, the United Nations and the government of Lebanon have remained seriously concerned about the danger residents could encounter. At the time of writing, the United Nations Mine Action Coordination Centre of Southern Lebanon assessed approximately 85 percent of southern Lebanon for cluster-bomb strikes, and it is estimated that up to one million
unexploded submunition subtypes may be on the ground." However, this has not stopped many Lebanese from returning to their homes. As soon as the ceasefire went into effect on August 14, slightly more than half of the 900,000 displaced Lebanese residents packed up their belongings and headed home to find access to their houses and farming fields blocked by UXOs, most frequently by bomblets or explosive submunitions.9

According to Andy Gleeson, Program Manager in Lebanon for Mines Advisory Group, residents moved back to their villages for two reasons:

1. They wanted to assess the damage and protect what remained of their property, so they lived in their front yard if required supplies were provided.
2. Hezbollah handed our US$35,000 per house to pay for 12 months’ rent after the government paid US$55,000 per house.

If you are not home, you miss out on the payments," said Gleeson.10

Children in Danger

As of October 8, 2006, 770 cluster-bomb-strike locations had been identified in the north,11 and according to Gleeson, there were 320 affected communities with each community having around 300 to 350 items for Clearance Officer.9 Unexploded cluster submunitions may be a major problem to children, who some- times mistake unexploded bomblets for toys. The United Nations Mine Action Service and the United Nations High Commissioner for Refugees have partnered to provide mine-awareness training for children from villages near Tyre, where they have documented cleared Lebanon.12

In addition to the dangers of UXO, upon return, children have faced the threat of disease and waterborne infections from chemicals and dirt, which have polluted the air, causing serious health issues.

Who is Helping?

Since the conflict ended, the main goal of the United Nations and other interna- tional organizations is to work towards making southern Lebanon clear of cluster submunitions and to provide humanitarian assistance in reconstruction and recovery. UNMCC –SL, and the National Demining Office are coordinating clearance efforts which have so far resulted in 45,000 cluster bomblets being cleared and destroyed. Clearance, explosive ordnance disposal and information-gathering are being carried out in part by the Lebanese Army, the United Nations Interim Force in Lebanon, Mines Advisory Group, BACTEC and the Swedish Rescue Service Agency.9 Lebanon is also now food-secure and its commercial sector has rebounded sooner than expected.13

World Food Programme. WFP has reached more than 700,000 people since it started its emergency operation in July, target- ing approximately 350,000 of the most affected people in Lebanon, the majority of them in southern Lebanon.11 In all, WFP has distributed more than 7,250 metric tons (7,791 U.S. tons) of food (an estimated 400,000 monthly rations) and helped the government of Lebanon import 12,300 metric tons (13,558 U.S. tons) of wheat during the blockade period.11 The WFP also assisted the United Nations in transporting relief supplies such as fuel, shelters, materials, water, and hygiene and medical equipment.11

UNHCR/UNMAS. The partnership between the United Nations High Commissioner for Refugees and the United Nations Mine Action Service has focused primarily on help- ing the residents return to a safe environment. It has provided tents, blankets, mattresses, plastic sheeting and cooking kits to the most heavily damaged villages.14

Since the end of the conflict, UNHCR supported UNMCC-SL with warehouse facilities and five 4x4 trucks for rapid deployment of the mine-action teams in Lebanon.11 UNHCR has also been working with the Lebanese government to find the best ways to repair houses.11

UNICEF. UNICEF has supported the National Demining Office’s Mine Risk Management Unit to develop a country-level strategy to imple- ment a campaign on radio and television and in print media to increase civilian awareness—especially in children—about the dangers of UXO. UNICEF distributed 100,000 leaflets at army checkpoints as well.13 UNICEF has also provided over 300,800 liters (79,463 gallons) of bottled water to communities in southern Lebanon and 385 water kits containing collapsible contain- ers, and purification tablets, vaccination

Cluster Munitions and ERW in Lebanon

The recent 34-day conflict between the Lebanese armed faction Hezbollah and Israel from July 12 to August 14, 2006, saw extensive use of surface-launched munitions and air-dropped munitions (to a lesser degree), resulting in wartime casualties for military and civilian actors in both Lebanon and Israel. Since the ceasefire agreement, international post-conflict attention has focused on Lebanon due to the large number of explosive remnants of war left behind the conflict. In particular, cluster munitions are proving problematic for post-conflict reconstruction activities in Lebanon due to their apparent high failure rate15 and the potential threat they pose to returning civilians, aid workers and military personnel. This article examines cluster munitions and the impact of their presence in Lebanon.

by Danielle Ressler and Elizabeth Wise [Mine Action Information Center]

Cluster munitions were used in World War II and were later deployed extensively by U.S. forces in Southeast Asia during the American/Vietnam War. Millions of tons of cluster submunitions were dropped on Laos, Cambodia and Vietnam—500,000 tons on Laos alone.1 Cluster munitions were further used extensively during the Gulf War (1990–1991, United States and allies), in Kosovo and Yugoslavia in 1999 (United States, United Kingdom and Netherlands), Afghanistan in 2001–2002 (United States) and Iraq in 2003 (United States and United Kingdom).

A cluster weapon consists of a munitions container deployed by a weapon-delivery system such as a bomb dropped by aircraft, rocket launcher or artillery projectile, which then releases smaller munitions in mid-air that are spread over a particular area. These smaller submunitions, or submunitions, are designed to explode on impact or close to the time of impact. Typically the delivery systems are designed to carry and deploy hundreds of submunitions in a target area. Submunitions are also called bomblets, bomblets, BLUs (bomb live units) or grenades.

Cluster munitions can be delivered by air or surface. Air-dropped cluster dis- pectors (air bomb and submunition) are released from airplanes, and after a specified amount of time or distance, the dispenser opens to allow submunitions to fall to the ground. With the exception of surface-launched munitions, CBUs all fall into the “dumb bomb” or unguided category, meaning once released, their trajectory cannot be controlled or redirected.4 Surface-launched munitions are delivered by artillery launchers on the ground that are fired over a long range to detonate either in the air or on impact. In the case of cluster munitions, (e.g., missile, rocket, projectile) carries a payload of submunitions that is released after the dispenser is in flight, to drop over the target area. During a conflict, cluster weapons are used by the military for attacking an area where the target may be moving, such as a military convoy, either to attack and destroy the enemy by dropping explosive bomblets (impact) or to prevent or deter enemy movement from or to an area by dropping devices that essentially function as

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as landmines (area denial). It is important to note that submunitions are different and not a distinct munition, but instead are victim-activated and classified as landmines. For the purpose of this article, the term submunition will be used to mean that to be means to explode on impact.

The area a single cluster munition can cover is determined by its design, print, and depending on the delivery system and type of weapon, one cluster munition salvo may strike an area as large as one square kilometer (247 acres). Cluster munitions are useful to a military because the size of the cluster-munition footprint is much larger than that of a single bomb. Because there are many kinds of cluster munitions and berminals with different abilities and uses, a consolidated understanding of the problem is not possible. In the case of an IRLRS rocket salvo is capable of releasing thousands of submunitions over an area within a one-kilometer (0.66-true) radius, but most other strikes have fewer submunitions and a far smaller area of impact.

Impact, dead or averted from each submunition can be projected over a radius of up to 50 meters (55 yards) from the largest bomb that struck it by sea, however, most of the submunitions found in Lebanon and destroyed in Lebanon were between 3 and 10 meters (9 to 33 feet) of the center of impact. When, clusters Munitions

However, these (and other) conflicts, clearance teams have found that some unexploded cluster munitions are still present in Lebanon as well as after the conflict (see the story on the next page). Effects on Civilians in Lebanon

When cluster munitions are dropped, the bomblets can be scattered intentionally or unintentionally over a large area. The Multiple Launch Rocket System, for example, fires 406-millimeter rocket motors with a 15,000-ton of explod, unexploded cluster munitions contributing to Lebanese civilian casualties. It is for this reason that Human Rights Watch and other observers express concern when they report that Iraq was using cluster munitions in Lebanon in the recent conflict. First reported on July 19, 2006, in the New York Times, Human Rights Watch has documented more than 700 cluster-munition strike locations as of April 2006. The United Nations has estimated that Lebanon may have as many as one million unexploded cluster submunitions in Lebanon from 2000 and 2005. To be fair, it must be understood that these casualties include both landmines and UXO; however, after these (and other) conflicts, clearance teams have found that some unexploded cluster munitions are still present in Lebanon as well as after the conflict (see the story on the next page). Effects on Civilians in Lebanon

When cluster munitions are dropped, the bomblets can be scattered intentionally or unintentionally over a large area. The Multiple Launch Rocket System, for example, fires 84-millimeter rocket motors with 15,000-ton of explosives. Unexploded cluster munitions can in some cases be extremely unstable and unreliable. While some submunitions may be moved successfully without detonation depending on how they landed and the causes of failure, others may explode with even a touch. Older unexploded submunitions dropped by Improved Conventional Munitions artillery projectiles may be more unstable and unreliable with age; additionally, small submunitions

Although incidents of cluster bomb use in Lebanon are not currently reported, there have been reports of the use of cluster munitions in or near civilian areas violating the ban on indiscriminate attacks, because of the large footprint of cluster munitions, which would be excessive in any scenario. The United Nations has estimated that Lebanon may have as many as one million unexploded cluster submunitions in Lebanon from 2000 and 2005. To be fair, it must be understood that these casualties include both landmines and UXO; however, after these (and other) conflicts, clearance teams have found that some unexploded cluster munitions are still present in Lebanon as well as after the conflict (see the story on the next page).
Cluster Munitions Reportedly Found in Lebanon and Israel

As discussed in the adjacent article, early reports soon after the end of the Lebanon war have documented that initial findings of unexploded cluster submunitions on the ground in Lebanon include M42a, M46a, M85s, M77s and BLU-63s. Human Rights Watch also released an unconfirmed report that states Hezbollah fired Chinese cluster munitions with Type-90 submunitions into Israel during the conflict. Most of the unexploded submunitions so far reported are surface-launched Dual Purpose Improved Conventional Munitions, with one air-delivered submunition also documented. These submunitions and their cluster weapon dispensers are examined here.

Surface-launched DPICMs Found in Lebanon and Israel

Most of the unexploded submunitions being found in Lebanon are Dual Purpose Improved Conventional Munitions. DPICMs are designed to have two effects: anti-armour and anti-personnel attack. The anti-armour result from a “HEAT” (High Explosive Anti-Tank) shaped charge in the submunition that allows it to penetrate metal, while the anti-personnel feature occurs via an enhanced fragmentation case on the submunition that explodes to create a powerful blast wave with shrapnel. Two of these Israeli-produced DPICMs do not have this feature. While both the self-destruct and non-self-destruct varieties have been found unexploded, further research is needed to determine their individual failure rates, the condition they were left in and why each variety failed to explode.

M85 (via M3955/396).

Two other types of cluster munitions used in Lebanon are the M42a and M46a 155-mm artillery projectiles. These two Israeli-produced munitions contain 63 and 49 M85 submunitions, respectively. The range of the M3955 is 25 kilometers (14.3 miles) and the M396 has an extended range to 30 kilometers (18.6 miles) [35]. The M3955/396 are similar in ballistic performance to the M44A1 [36]. Unlike the U.S. model, however, reported submunition failure rates in testing are much lower at 1.3 to 2.3 percent; this lower rate is due to the addition of a self-destruct device and a highly sensitive impact fuze [35]. However, by September 13, 2006, the UNMAG-SL reported that out of a total of 5,849 submunition duds they had located and destroyed, 4,776 were M85 submunitions. Steve Gosse of HRW noted that the number of M85 duds was strikingly high for a submunition with a self-destruct feature that claims to dramatically reduce the failure rate [35].

However, Colin King, international landmine and explosive ordnance disposal consultant, reports that in Lebanon, initial findings suggest that rather than one type of M85, clearance teams are actually finding three variations of the M85 with completely different detonation characteristics. Two of these Israeli-origin cluster munitions do have the self-destruct capability, but the third type also used does not have this feature. While both the self-destruct and non-self-destruct varieties have been found unexploded, further research is needed to determine their individual failure rates, the condition they were left in and why each variety failed to explode.

As M85 submunition, one of the types recently found in Lebanon. PHOTO COURTESY OF COLIN KING.

and/or self-destruct. This also implies it is problematic for reports to refer to the “M85” without specifying which variety is meant.

M77 (via M483A1). A third type also used does not have this feature. While both the self-destruct and non-self-destruct varieties have been found unexploded, further research is needed to determine their individual failure rates, the condition they were left in and why each variety failed to explode.

As M77 submunition, one of the types recently found in Lebanon. PHOTO COURTESY OF COLIN KING.

Conclusion

The Menonette Central Committee has used the phrase “drop today, kill tomorrow” to describe the danger cluster munition UXO can pose for civilians [36]. This is clearly the case in post-conflict Lebanon, where unexploded cluster submunitions are already killing civilians. However, not all cluster munitions are created equal, and this issue is complex. The debate continues with some defending the use of cluster munitions, others advocating for improvements in technology or stronger legal regulation and still others desiring any use at all. What is undeniable is that cluster submunitions have resulted in explosive remnants of war that continue to injure innocent civilians. There may be one more solution to the problem of cluster munitions, but it demands an answer and should not be ignored.

Additional research on the use of cluster munitions in the recent Israeli/Hezbollah conflict, see the MACF fact sheet on page 113.

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NGOs have called for a moratorium on use, production or trade of cluster munitions until humanitarian concerns can be addressed; this is part of the Cluster Munitions Coalition, created in 2003 and now with over 150 member NGOs [32]. Rather than prohibiting use, some militaries have instead started taking a technological response to cluster munitions, creating weapons with lower failure rates, improved accuracy, self-destruct/self-neutralization capabilities or various backup secondary fuses [33]. Rather than stop using them, the goal is to increase reliability. Not all military support this, with poorer ones, such as Russia and China, arguing that they cannot afford such an approach [33]. Yet improvements to cluster munitions are supported by many within the military who have experienced the danger of fratricide to ground troops by unexploded submunitions deployed by their own military.

The U.S. Department of Defense’s 2006 proposed military spending budget requested funding to update outdated cluster munitions [34]. Upgrading cluster munitions would presumably improve targeting and the dual rate. The Army requested $124.8 million to purchase 1,026 Guided Multiple Launch Rocket System munitions [35]. The GMLRS claims to reduce the dual rate of the current MLRS by 95 percent and the impact area by 85 percent [36]. These new munitions aim to solve many of the problems of the older cluster munitions: indiscriminate effects, high dual rates and attacks on civilians.

The M42, M46, M85 and M77 have a drag ribbon, which, when fired, unfurls to stabilize the bomblet. The ribbon will vibrate in the wind, arming the bomblets if the ribbon does not unfold, or becomes entangled, the bomblet will not be armed, and therefore will not explode on impact, resulting in a dud that could explode later. Due to the compact size of these bomblets (sometimes compared with the size of a D battery), it is possible for a majority of the duds to become hidden when they land, resulting in UXO that may only be hard to see but may also look like a toy to a child.

M42 and M46 (via M483A1). One type of surface-launched cluster munition in Lebanon is the M44A1 155-mm artillery projectiles. The M44A1 is delivered from a Howitzer, a type of cannon artillery that can fire from the ground at high angles. During firing, the barrel of the artillery piece is blown off by a pre-set fuse, with the explosion forcing 88 submunitions out of the container to fall out over a target area [34].

The submunitions in the M44A1 are M42a and M46a. Sixty-four of the submunitions (the M42a) are scored, or notched, to cause them to explode into anti-personnel fragments of metal; the HEAT warheads of all 88 of the submunitions can penetrate combat vehicles (2.75 inches) of armor [34]. The M42a/46 DPICMs have a tested failure rate of 2 to 4 percent; higher than additional rates of existing stocks has produced a dud rate close to 14 percent [34].

M42a DPICM submunition, scored (courtesy of Colin King).

M42 DPICM submunition, marked (courtesy of Colin King).
Explosive Remnants of War in the Republic of Croatia

Explosive remnants of war represent a constant threat to normal life and activities of the population living in mine-affected areas in the Republic of Croatia. The author considers the extent and impact of unexploded ordnance and other ERW contaminating the country as a consequence of military operations between 1991 and 1995.

Mine and UXO Contamination Analysis in the Republic of Croatia

Based on the publication of the Geneva International Centre for Humanitarian Demining, Explosive Remnants of War (ERW)—A Threat Analysis, the factors affecting overall ERW threats are:

1. The type of conflict (e.g., international versus civil war)
2. The number of forces involved
3. The tactics used by the warring parties (e.g., use of air power rather than ground assaults)
4. Types of weapon systems deployed
5. The duration of conflict
6. Ammunition expenditure
7. Failure rate of ammunition used
8. Terrain (soft, wooded areas will generally lead to more failures than concrete, urban areas)
9. Population density
10. Population movement in contaminated areas
11. Population awareness
12. Progress of clearance operations

The text below presents mine- and UXO-contamination analysis for the Republic of Croatia. Each of the items on the above list is described in more detail.

Details of the Conflict

The conflict described is widely known as the Croatian War of Independence or to others as the Homeland War. The basic premise behind the conflict was Croatia’s desire to be a full, self-sufficient republic after being oppressed by the Communist state of the former Yugoslavia. This attempt at independence was met with resistance by Croatian Serbs, who felt that this new republic would be a threat to them since in this new state, they would be considered minorities; therefore, Serbian rebels, with the aid of the Yugoslav People’s Army, fought against the newly formed Croatian Army to determine control over the country. The conflict lasted from 1991 until 1995 with the Croatian government ultimately claiming victory over the rebels and the JNA.

The types of weapon systems deployed during the conflict include (see below for specific information):

- Small arms
- Cannons
- Howitzers
- Self-propelled guns (76-mm Helcak, 90-mm M36, etc.)
- Rocket weapons (including cluster munitions)
- High-explosive anti-tank (HEAT) rockets
- Aircraft bombs and rockets (including cluster and “dumb” bombs)
- Air-to-ground rockets
- Anti-aircraft rockets

Mine Situation in Croatia

Between 1998 and 2001, records indicate 1,009 demining projects covered a total area of 160,216,879 square meters (62 square miles) of land. The projects found 17,765 anti-personnel mines, 13,030 anti-tank mines and 144,152 pieces of unexploded ordnance. The Republic of Croatia consists of 21 counties and the city of Zagreb. Twelve counties are within a mine-suspected area, totaling 1,140 square kilometers (715 square miles) of land. Around 1.1 million inhabitants are directly endangered within the MSA; nine in five inhabited is threatened by a possible accident within the MSA. ERW that has been located and removed and remaining ERW was emplaced in mine-locations within the MSA. Surfaces where ERW has been detected are smaller, at present totaling approximately 500,000 square meters in area. The subsequently 30,000 people live near locations still contaminated with ERW.

Progress of Clearance Operations

One of the issues on the third international symposium organized by the Croatian Mine Action Centre and Centre for Testing, Development and Training Ltd., held from April 24–26, 2006, in Sibenik, Croatia, was UXO detection at depths over 20 centimeters (8 inches). This is an important concern for safely carrying out construction activities in certain areas where it is necessary for UXO found in the Republic of Croatia, representing a huge threat for locals. Their removal, displacement and destruction were of medium risk. Two persons have died from this type of ammunition and six have been wounded since 1991.

Submunitions. Attacks deploying sub-munitions occurred in 1991 (around the Vranisko lake area, Gospić and Madžena) and in 1995. In 1995, the most commonly used submunition was the deadly KB-1, produced by Yugoslavia. Between 33 and 66 percent of the submunitions were found; high risk is involved for their removal. Eleven persons have died and 19 have been wounded by this type of submunition since 1991.

Hand and projected (rifle) grenades. These grenades are common in the Republic of Croatia. They represent a huge threat for locals. It takes medium risk for their removal, transport and destruction. Thirty-three people have died and 66 have been wounded from this type of UXO since 1991.

Mortar ammunition. A huge quantity of mortar ammunition was found because it was used for destroying targets up to six kilometers (four miles) away—the range between parties to the confrontation. This type of UXO represented a high threat because it included a certain number of unexploded mortar HE shells that usually were 60-mm, 82-mm and 120-mm caliber. These require a very high risk for removal and destruction and represent a medium threat for locals. One person has died from this type of UXO and 14 have been wounded since 1991.

Free-flight rockets (ground-to-ground and air-to-ground). These rockets were found in medium quantity and are a huge threat for locals, although their destruction is relatively easy. Six persons have died from this type of UXO and 15 have been wounded since 1991.

Guided missiles. A small quantity of guided missiles was found, but they represented a huge threat for locals as it takes a medium risk for their destruction.

Ammunition Expenditure/Failure Rates

An unexpected KB-1 submunition, such as this one found in Govici, poses a high risk during the removal process. ALL PICTURES COURTESY OF CRDMC.
to first survey the ground to large depths (usually up to 4 metres [13 feet]). In some of these survey areas, cannon shells may have been dropped, which represents a threat to the local population.

Also discussed were specific problems related to UXO and ERW laid within mine-suspected areas in the Republic of Croatia. During the symposium, the following guidelines were agreed upon to improve detection and removal of UXO:

- Improvement of legislation concerning UXO
- Definition of scope and location for which some indications of UXO at depths of over 20 centimetres (8 inches) exist
- Application of new methods, operating procedures and devices
- Improvement of safety measures

A database that includes information on types of UXO found, the amount collected, location of the UXO, methods used to retrieve them and methods of their destruction.

From 2003 to 2005, CROMAC surveyed the land and concluded that 1,174 square kilometres (455 square miles) of Croatia were contaminated with mines and UXO. Included in this area, CROMAC classified 121 towns and areas within 12 counties as suspected of being within the vicinity of mined areas. As of January 2006, Croatia re-used that number to 1,147 square kilometres (443 square miles) as being contaminated with mines. There are still an estimated 155,198 anti-personnel mines and 88,078 anti-vehicle mines that need to be demined. Fortunately, pieces of UXO are not too threatening to the community as they have been well-marked and made recognisable to the public. Croatia is now working towards a goal of clearing 346 square kilometres (134 square miles) of mine-contaminated land by the end of 2009. This goal is subject to change due to the speed of demining activities, which varies depending on the availability of funds, the cost of demining, and capacity.

Conclusion

The ERW problem has not yet been successfully solved in the Republic of Croatia. It is important to point out that all projects for ERW removal in Croatia require considerable funds to fulfil capacity requirements, equipment procurement needs, work methodology and other expenditures. From the knowledge and experience gained so far, Croatian explosive-ordnance-disposal professionals are able to apply their expertise to other ERW-affected countries. Professional personnel dealing with ERW are CROMAC employees as well as employees of the Ministry of Internal Affairs and Ministry of Defence. The Republic of Croatia, and CROMAC specifically, will be working to solve the ERW problem as a part of the broader humanitarian-demining issue.

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No victim has been registered from this type of UXO since 1991.

Aircraft unitary bombs. These bombs were found in a medium quantity and represented a huge threat for locals. It takes a moderate amount of risk for their destruction. Most aircraft unitary bombs are found in exploded ammunition depots in Volimac, on the border between Croatia and Bosnia-Herzegovina, and at the former military airport in Udbina, Croatia. In most cases, aircraft unitary bombs were found individually.

Anti-personnel mines. AP mines were found in large quantities during demining. According to the CROMAC database, since 1998, 17,705 such mines have been found and destroyed. They are highly risky to remove and create a daily threat for the local population.

The ERW problem has not yet been successfully solved in the Republic of Croatia. It is important to point out that all projects for ERW removal in Croatia require considerable funds to fulfil capacity requirements, equipment procurement needs, work methodology and other expenditures. From the knowledge and experience gained so far, Croatian explosive-ordnance-disposal professionals are able to apply their expertise to other ERW-affected countries. Professional personnel dealing with ERW are CROMAC employees as well as employees of the Ministry of Internal Affairs and Ministry of Defence. The Republic of Croatia, and CROMAC specifically, will be working to solve the ERW problem as a part of the broader humanitarian-demining issue.

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This article looks at explosive remnants of war in North Africa (Algeria, Egypt, Libya, Morocco and Tunisia) from different perspectives, including the scope and history of the ERW, its impact and its relationship to security.

by Ayman Soroor [Protection of Armaments and Consequences]

Several countries in North Africa are affected by mines and ERW as a result of the North African Campaign of World War II, also known as the Desert War, which was fought between 1940 and 1943. Algeria, Egypt, Libya, Morocco and Tunisia are dealing with the contamination that has resulted from internal and regional conflicts over the past 60 years in addition to the Desert War contamination.

Algeria

Algeria is affected by ERW as a result of World War II, the Algerian War of Independence and ongoing conflicts with terrorist groups. There is no distinction between landmine and ERW estimates, and the contamination of each affected area is different depending on the periods that are being considered. The contaminated areas in the east and west, known as the Mitidja and Chelfa lines, are most affected by mines, as are the strategic areas in the north that the Algerian Army secured with mines in its ongoing fight with terrorist groups. The other affected areas of the country are mostly ERW-affected due to battles fought during WWII. Algeria estimates there were 500,000 mines and ERW during and after the independence war, 5–7.5 percent (22 square miles)—3.06 hectares (12 square miles) in the eastern border area and 2.64 hectares (10 square miles) in the western border area. Terrorist groups have emplaced approximately 35,000 homemade bombs, and the Ministry of Interior cleared 20,000 of them between 2003 and 1997. Those bombs killed 4,000 people and injured 13,000 people.

Humanitarian impact. Fifty-seven victims of mines and ERW have been identified in Algeria since 1998, this includes 44 in 2002, 12 in 2003 and one in 1998. There is no mechanism to survey mine/ERW victims; some figures mention the number of civil victims contaminated by mines and ERW during and after the independence war was 120,000, which is comprised of 40,000 killed and 80,000 injured. The National Solidarity, there are 7,000 mines/ERW victims registered with either the Ministry of National Solidarity or the Ministry of Migration. However, it is difficult to have exact statistics on both mines and ERW.

Economic impact. There is no evidence suggesting scrap metal from ERW is collected by civilians in Algeria as being a potential resource in some countries with ERW contamination. In recent years, livelihood activities have not been seriously affected because the majority of ERW is found in remote and mountainous areas. The National Association for Protection of Environment and Fight Against Pollution, a non-governmental organization, said that mines and ERW caused the death of 580,000 cows, 373,000 horses, 827,000 sheep and 9,000 camels during the colonial and independence era. They also destroyed 935 agriculture trucks, and presented the use of 725,000 hectares (2,784 square miles) of land for grazing.

ERW have not blocked access to community resources such as health centres, schools or religious sites. An Algerian Ministry of Defence official stated that ERW affected the implementation of development projects in the affected areas, such as road and railway projects. The Ministry did not give any details, stating that they do not have such information.

Outlook. Algeria became a State Party to the Ottawa Convention 1 April 2002. Algeria created a national committee in 2003 that is responsible for implementing the Convention and to deal with the mine/ERW issue. Clearance began in November 2004, but it is progressing very slowly. The committee is in the process of finalizing agreements to do the assessments and planning with the United Nations Development Programme and the Geneva International Centre for Humanitarian Demining.

Egypt

Egypt is affected by ERW in two main areas. The first area is in the west and includes many localities from Borg Al-Arab, which is 60 kilometers (37 miles) west of Alexandria, to the Egyptian-Libyan border, with a 30-kilometer (19-mile) distance from the Mediterranean Sea, which is affected as a result of World War II battles in North Africa during 1942 and 1943. The second area is in the east and includes all of the Sinai Peninsula, the western coast of the Red Sea and the Suez Canal as a result of Egyptian-Israeli wars (1956, 1973, 1979). In addition to the Army of the Sinai National Solidarity, there are 7,000 mines/ERW victims registered with either the Ministry of National Solidarity or the Ministry of Migration. However, it is difficult to have exact statistics on both mines and ERW.

Humanitarian impact. In 1999, Egypt declared there had been 8,313 mine and ERW victims in the previous 20 years. It is very difficult to know how many of these were ERW victims since specific records were not kept. However, by extrapolating the data, we find the ERW victims can be estimated between 1,662 and 2,078.

Information on ERW from 1998—in addition to the ratio of mines/ERW in Egypt—shows that the 500,000 people living in the Sinai are more affected by ERW than mines. Being a mine or ERW victim in one of the affected regions in Egypt is a complicated health issue because of the limited health services in those areas.

All of the victims are found in three groups of people—those who work on the development and repair of infrastructure, Bosnians, or farmers, which means that they lose their main income once injured. The social system in Egypt does not give any assistance for mine/ERW victims; they might receive a monthly payment of up to USD40 after a long period of forgetting their work to prove their injury. This amount is the same given to people affected in natural disasters. Every adult victim is responsible for a family, which, on average, consists of five persons, and the injury affects the family’s future. Some of the families have had to take their children out of school to begin working to help the family survive after the main breadwinner in the family was injured. Women have suffered the burden of work for mine/ERW victims in Egypt, and this increases the victims’ suffering in other ways.

Economic impact. Irrigation projects, which are an essential facet of development projects in desert areas, have experienced delays and increased costs because of the need to clear mines and ERW from prospective sites and routes. This happened with both the El Hamman Canal in the western area and the El Salam Canal in the eastern area, with a total of 833,000 soldiers (864,454 workdays) needed to be cleared before the irrigation and follow-on agriculture projects could begin. Mines and ERW are also a serious impediment to the development of traditional and nontraditional sectors of the power-supply industry in Egypt. The need to remove ERW delayed large-scale “wind farm” projects in the western area and increased the costs of 500kW power cable connecting Alexandria (the main port for Egypt) and the second largest city) with the existing eastern electrical network, scheduled to be connected through the western area to the North African network, then maybe to the European Union.

The petroleum sector, which plays a leading role in Egypt’s national income, is also affected by mines and ERW. Egypt’s estimates there are 4.8 billion barrels of oil and 13.4 trillion cubic metres of gas in the western area, and all petroleum areas (except for those in the sea) are in mine/ERW-contaminated or suspected areas. Any petroleum/gas project must budget for mine/ERW clearance before beginning production; this amount varies from area to area.

In 1998, a German tourist was seriously injured due to an accident involving an unexploded ordnance in Elain Elshokhna on the Red Sea coast. In 1999 four tourists, two German and two Swiss, were injured after their car hit an unidentified anti-tank mine. The other kind of ERW in the western area. In addition, all tourist sites in Sinai and on the coast of the Red Sea are in close proximity to mines/ERW. These two accidents have not affected tourism; however, one tourist in Egypt’s largest tourist site could have a serious impact on tourism, which is Egypt’s second largest source of revenue.

Mines/ERW affect accessibility to schools in the eastern area. In the government of 2002 it was decided to build more schools to make them easily and safely accessible for children. Mines/ERW affect the infrastructure and development of the new port and the attached fixed industrial zone of Elain Elshokhna on the Red Sea, which is on track to become the largest port in the Middle East by 2010. The Egyptian Army cleared this area for infrastructure, but some mine/ERW incidents occurred subsequently, requiring the area to be demined again to make sure the land was clear. Three million accidents worked fast and delayed the project completion. In the north, Egypt has a very ambitious plan to move large numbers of its population to the western area in the next 20 years and there is a national committee in charge of the development of the northern coast. This will be a result of the current infrastructure, irrigation, agriculture, oil/gas exploration and tourism projects. While the Egyptian Army is the only authority that demels that delayed the 20-year development plan for the northern area, there has been very little determining of locations affected by mines/ERW.

Libya

Libya is affected by ERW in different areas in the northern part of the country because of the World War II campaign in North Africa, in the northeastern area at the Egyptian-Libyan borders because of the Egyptian-Libyan conflict in 1977, and in the southern area, including the Libyan-Sudanese border and the Libyan-Chadian border from 1977 to 1987.

There are an estimated 1.5 to 5 million mines and ERW in Libya; some officials make estimates up to 10 million. This makes the country the worst mine-affected country in the world. Three million mines that were planted by the Libyan Army in the northeastern area and the border with Egypt. All available statistics, publications and photos show that ERW account for the majority of those numbers in the north and some areas in the south.

Humanitarian impact. There is no current estimated number of mine/ERW victims in Libya. It is estimated there were 12,258 victims during the period of 1952 to 1976, which included 3,876 deaths and 8,384 injuries. Some publications show
In 1972, the Ministry of Agriculture and Land Reclamation published an estimate of the total income lost from not using affected lands at 18,897,760 Libyan Dinars (LSD 47,578). Raising livestock is a very important source of income for people in Libya, and having adequate land for grazing is critical to the livestock industry. In 1976, Libyan authorities estimated 1,452,077 hectares (5,607 square miles) of affected land could not be used for grazing. In addition, 75,000 camels, 4,870 sheep and 1,250 cows were lost because of mines/ERW incidents. Due to rising population rates and the slow process of demining, these statistics have not seen much improvement over the past 30 years. Many ports in Libya were affected by sea mines/ERW and clearing them was too expensive. These included Benghazi, Derna, Tobruk and Tripoli ports. Mines/ERW have affected the infrastructure of the transportation network in Libya, causing delays in road reconstruction. The oil sector is also affected by mines/ERW; they increase the costs of any petroleum project due to the need for_beginning before drilling can begin. The Great Man-Made River that brings water from underground in the south to the populated areas took much longer and cost significantly more than was originally expected to complete because of the mine/ERW clearance.  

**Economic impact.** Mines/ERW affect the agricultural sector in Libya. It is estimated that approximately 255,005 hectares (1,139 square miles) in Libya cannot be used for agriculture because of mines/ERW. In 1972, the Ministry of Agriculture and Land Reclamation published an estimate of the total income lost from not using affected lands at 18,897,760 Libyan Dinars (LSD 47,578). Raising livestock is a very important source of income for people in Libya, and having adequate land for grazing is critical to the livestock industry. In 1976, Libyan authorities estimated 1,452,077 hectares (5,607 square miles) of affected land could not be used for grazing. In addition, 75,000 camels, 4,870 sheep and 1,250 cows were lost because of mines/ERW incidents. Due to rising population rates and the slow process of demining, these statistics have not seen much improvement over the past 30 years. Many ports in Libya were affected by sea mines/ERW and clearing them was too expensive. These included Benghazi, Derna, Tobruk and Tripoli ports. Mines/ERW have affected the infrastructure of the transportation network in Libya, causing delays in road reconstruction. The oil sector is also affected by mines/ERW; they increase the costs of any petroleum project due to the need for beginning before drilling can begin. The Great Man-Made River that brings water from underground in the south to the populated areas took much longer and cost significantly more than was originally expected to complete because of the mine/ERW clearance. **Outlook.** After decades of sanctions and with Libya’s new strategy for trade and immobilization with the world, many projects are planned to take place in different parts of the country, including for tourism. This will bring more people to the affected area, which will have both humanitarian and economic impact. Libya established a National Program for Demining and Land Reclamation in 2003. However, the country still does not have a future plan for national mine action.  

**Morocco**  
Morocco is not affected by ERW and mines except for the territories it controls in Western Sahara. Between 1975 and 1991, Western Sahara territories witnessed a sovereignty conflict among Morocco, Frente Popular de Liberacion de Saguia el Hamra y Rio de Oro (The Polisario Front)—a Sahrawi nationalist organization—and Mauritania, before its withdrawal from the conflict in 1979. This conflict came after the withdrawal of the Spanish colonial forces from the territories. All parties to the conflict used a variety of weapons and munitions throughout their fighting.  

**Tunisia**  
Tunisia is affected by an unknown number of ERW and mines because of World War II conflicts in North Africa and anti-tank and anti-personnel mines is emplaced to secure its borders with Algeria and Libya. During its conflict with Libya from 1970 to 1980, Tunisia planted 1,530 anti-tank mines (including the Egyptian Mk7 and Mk4, the American M62 and the Yugoslavian TMAT1/TMAM1) in nine minefields along its border with Algeria and Libya. ERW-affected areas in Tunisia include Maerch, Marmata and El Hamna regions in the south, Kasserine and Faiadh regions in the center, Le Cap-Bon and the northeastern region of the country. Minefields planted by Tunisia include several booby traps that are attached to some of the anti-tank mines to prevent removal. However, the exact number of booby traps is unknown.  

**Humanitarian impact.** The humanitarian impact of mines in Tunisia is very minor but the humanitarian impact of ERW from World War II is more significant, although it remains relatively small by international standards. Most of the minefields and ERW-affected areas are located in remote desert areas with few or no local population. From 1995 to 2005, there were nine mine victims. Those were killed because of World War II ERW: one in 1995, one in 1995 and one in 1996. In 2001, one child was injured by ERW while he was working as a shepherd. In 2002, four children were injured in two different accidents by ERW in the same manner. Economic impact. ERW economic impact is limited due to the location of ERW in remote areas, except in some areas that are used for grazing. Any large-scale construction or engineering projects in Tunisia require prior clearance of all ERW by the engineering supervision of the armed forces.  

**Outlook.** Tunisia has a national committee responsible for implementing the Mine Ban Convention and currently the Tunisian Army is the only authority that conducts demining. Tunisia began demining in late 2004 and is nearing clearance completion. The plan has been made jointly for ERW clearance. The Tunisian government intends to construct new roads throughout the country, including a road between Tunis and Tripoli. It also plans to build up a gas pipeline that will cross the Tunisian/Libyan border. To begin these projects, clearance of the mines/ERW on the border area is needed.  

**ERW in North Africa and Security Concerns**  
Beyond the basic economic and humanitarian impacts these North African countries face due to the presence of mines/ERW, these weapons create a security risk for civilians as well. Incidents involving the use of ERW and mines in criminal and terrorist activities have occurred in many of the affected areas in North Africa. Removal of ERW is important for the security of the region. ERW can be used for criminal activities such as smuggling, illegal immigration, illegal fishing and disrupting political and security stability in affected communities. ERW can also be used in terrorist activities because it offers a significant amount of active explosive energy that can be used easily with a little bit of experience. 

In October 2004, an unknown terrorist attack blew up the Hilton Taba Hotel and two small tourist camps located in Taba and south Sinai in Egypt. The official declaration of the Egyptian Ministry of Interior stated that the terrorist used explosives that they took from mine and ERW in Sinai. According to the Promotion of Armaments and Consequences, a nongovernmental organization working on the mine and unexploded ordnance problem in Egypt, unconfirmed reports stated that some people in the western desert used to sell explosives that were taken from mines and ERW to fishermen or to those who work in mining. Some claimed that the organizations of Miners in Afghanistan use explosives that they took from mines and ERW in Algeria. The Polisario Front stated that it used mines that Morocco employed in the six bermes, or defensive walls, it built in Western Sahara during the sovereignty conflict. See Endnotes, page 110.
Successful Implementation of Protocol V

Protocol V of the Convention on Certain Conventional Weapons recently entered into force, and the author hopes lessons learned from the operations of the Ottawa Convention can be applied to this Protocol.

by Kerry Brinkert (Geneva International Centre for Humanitarian Demining)


This "Protocol on Explosive Remnants of War" (Protocol V) contains "remedial measures of a generic nature in order to minimise the risks and effects of explosive remnants of war." With the Protocol having become binding international law for 20 States Parties, attention has turned toward the work necessary to implement it.

Much of this attention has focused on practical operations of the Protocol. For instance, it has been frequently mentioned that various lessons from the operations of the Ottawa Convention (e.g., an informed stockpile elimination sponsorship programme) could be applied to Protocol V. While valuable operational lessons can be applied in terms of how the Protocol functions, what is often overlooked is the important conceptual lessons that can be applied from the Ottawa Convention regarding what might be implemented.

Lessons Learned from the Ottawa Convention

Some central concepts in the work to implement the Ottawa Convention are:

- Responsibility: It is the responsibility of each individual party to the Convention to fulfill certain obligations in areas under its control or jurisdiction.
- Measurable and time-bound obligations: Key provisions of the Convention call for actions that are clearly quantified and must be carried out over a set period of time.
- Cooperation and assistance: Notwithstanding the fact that States Parties are responsible for fulfilling certain measurable and time-bound obligations, other States Parties are required to assist when feasible and to the extent possible.

A complication exists, though, in instances where obligations are not measurable and time-bound, or even universally applicable. In such cases, it is difficult for cooperators and assistance to manifest because objectives and deadlines are not clearly defined. A central and active role of the States Parties to the Ottawa Convention have dealt with the ambiguity surrounding the Convention's obligations in relation to mine victims.

The imperative to assist mine victims is manifested in a legal obligation for "each State Party in a position to do so" to "provide assistance for the care and rehabilitation, and social and economic reintegration of mine victims." However, unlike the Ottawa Convention's clear obligations to destroy or ensure the destruction of stockpiled or emplaced anti-personnel mines, the obligation concerning mine-victim assistance is ambiguous. It is neither defined nor measurable. Moreover, even if defined, the implementation of objectives and deadlines would not be universally applicable.

The Ottawa Convention's States Parties have first dealt with the ambiguity of mine-victim assistance by clearly defining mine victims and victim assistance, and adopting common understandings regarding the place of victim assistance in broader contexts.

Second, a number of States Parties have chosen to "self-identify," an act of indicating that addressing the victim of mine assistance is truly relevant and necessary for them. Certainly it is understood all States Parties have a responsibility to support mine victims, no matter the number of victims in a particular state. However, this responsibility is particular to those States Parties that have indicated significant numbers—hundreds or thousands—of survivors in areas under their control or jurisdiction.

A total of 24 States Parties have self-identified, acknowledging that comparatively they have some of the gravest needs and greatest responsibilities to provide victim assistance.

Third, because these Parties are ultimately responsible for their populations, the manner of identifying was chosen. The manner of choosing was by what deadline has been turned over to each individual state because conditions are unique to each of them. In addition, while acknowledging that assisting victims is a long-term task, a timeline has been established for the achievement of a meaningful level of victim progress: the Ottawa Convention's Second Review Conference in 2009.

Applying these Lessons to Protocol V

Protocol V contains an obligation in Article 8.2 to assist victims of explosive remnants of war that is basically identical to the obligation in the Ottawa Convention. Hence, the lessons of the Ottawa Convention can easily be applied to the effort to implement victim assistance under Protocol V. However, even beyond victim assistance, the Ottawa Convention's lessons can be applied to Protocol V's Article 3, which addresses the clearance, removal or destruction of ERW.

While valuable operational lessons can be applied to Protocol V on a more immediate and noticeable scale, these lessons might also be applied to Article 7, which contains an implicit appeal that clearance, removal or destruction measures be undertaken without delay to divert ERW.

Protocol V's Article 3 calls for each High Contracting Party to "mark and remove or destroy explosive remnants of war in affected territories under its control," according priority to those areas posing "a serious, humanitarian risk." Article 3 includes specifics regarding how these provisions should be applied, including surveying, clearing and destroying, marking and recording activities (in accordance with high standards [left to the reader to define]), and mobilising resources to carry out these activities.

However, despite these specific provisions, success or failure in the application of Article 3 could be affected by problems of measurable, time-bound or universally applicable.

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Second, a number of States Parties have chosen to "self-identify," an act of indicating that addressing the victim of mine assistance is truly relevant and necessary for them. Certainly it is understood all States Parties have a responsibility to support mine victims, no matter the number of victims in a particular state. However, this responsibility is particular to those States Parties that have indicated significant numbers—hundreds or thousands—of survivors in areas under their control or jurisdiction.

A total of 24 States Parties have self-identified, acknowledging that comparatively they have some of the gravest needs and greatest responsibilities to provide victim assistance.

As the responsibility to address problems caused by ERW rests with individual Parties that have self-identified, these Parties could be asked to provide assistance if necessary—to provide baseline information on the problems they face and to establish specific, measurable, achievable, relevant objectives and timelines for achieving these objectives.

States could be asked to develop and implement plans to achieve their objectives. As part of these plans, there should be a clear articulation of priorities for assistance.

High Contracting Parties in a position to provide assistance could respond to prioritised assistance needs as articulated by Parties that have well-developed plans. High Contracting Parties could periodically hold Conferences of States Parties to ensure that a planned approach is followed and that progress in achieving the objectives as previously articulated by the self-identified Parties is ensured.

Conclusion

This approach may sound self-evident, but such was not the case when similar work to implement the Ottawa Convention began. Moreover, there is an important nuance to this methodology that places the affected Party at the front and centre of addressing its Protocol V needs and obligations. As such Parties hold ultimate responsibility, notwithstanding the responsibilities of others to assist, these affected states should have their voices heard when it comes to their needs and aspirations. Equally, these should not be demands for large-scale assistance until affected states have also demonstrated a solid, realistic and measurable plan for implementation.

See Endnotes, page 111

Since January 2002, Kerry Brinkert has served as the Manager of the Geneva International Centre for Humanitarian Demining’s Anti-Personnel Mine-Ban Convention Implementation Support Unit. Prior to that, Brinkert was the Section Head of Research, Policy and Communications with the Mines Advisory Group Canada’s Department of Foreign Affairs and International Trade.

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Spacetoon Kids TV: Educating Kids on ERW

by Daniele Ressler [Mine Action Information Center]

Spacetoon, a non-governmental organization, has established a Kids TV Regional Office in Jordan in order to bring a specific kind of message to kids: mines and UXO are dangerous. The Jordan office is the only regional office responsible for developing humanitarian-specific educational programs and campaigns on topics such as democracy, human rights and mine risk education, which can then be broadcast to any or all the Arab countries in the Middle East and North Africa through Spacetoon media. Hadi Allawama, Regional Manager, and Rami Allawama, Program Planning Manager, say that due to the dangers the Lebanese and Iraqi children face these days, they feel a great need to warn them about the dangers of cluster bombs. The Spacetoon Jordanian office creates humanitarian and educational messages that disseminate to non-governmental organizations want to disseminate. The company staff designs a storyboard and characters who deliver these important messages, such as MRE, to children throughout the Arab region via cartoons, TV documentaries and programs, posters, leaflets, calendars, gifts, activity pads and more. Hadi and Allawama note, “Because the children in the Arab world need and love this channel, its programs and characters, we are able to communicate effectively timely messages to parents and children alike.”

Lebanon faces a post-conflict situation in which the need for MRE is great—especially for children. According to the United Nations Mine Action Coordination Centre of South Lebanon, children have accounted for seven of the 23 fatalities and 49 of the 136 injuries as of November 13, 2006. Cluster submunitions can be particularly dangerous because some may resemble toys due to their small size and colorful ribbon. Children playing may find these curious items and touch them, which can detonate the unexploded ordnance. Spacetoon Kids TV recognizes the need in Lebanon for MRE for children. Hadi and Allawama say that at the Regional Office in Jordan, “we have a full package campaign designed especially for Lebanese children including TV spots, posters, flyers, activity books and notebooks.” The company is looking for donors who are interested in distributing their educational materials, which are designed to provide MRE in Arabic using child-friendly and culturally sensitive techniques with cartoon characters and popular programming.

Spacetoon’s Regional Office has experience providing MRE and awareness-raising campaigns about the dangers of mines and explosive remnants of war through its work with Iraqi children. RONCO Consulting Corporation of the U.S. Department of State funded two projects in 2004 through Iraq’s National Mine Action Authority and the Ministry of Planning, and in 2005 Mines Advisory Group funded a one-year project through the Iraq Health and Social Care Organization.

Conclusion

With the help of new donor sponsors, Spacetoon’s Regional Office in Jordan plans to address the urgent need of ensuring children’s safety in Lebanon, as well as continue to deliver MRE activities in Iraq where children are also at great risk.

See Endnotes, page 111

Daniele Ressler works as a freelancer, Writer and Assistant Editor for the Journal of Mine Action. She holds a Master of Science's violence, conflict and development studies from the University of London’s School of Oriental and African Studies. She has studied in Switzerland as well, earning a Certificate for Applied Peace Research from the Robert Bosch Stiftung and the University of Geneva.

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Spacetoon Kids TV: Educating Kids on ERW

As a young man in a war-torn area of Azerbaijan, Enur Gamimov experienced the shock of being severely injured by a piece of unexploded ordnance. Today, Gamimov’s personal experience has inspired him to work as the Team Leader of the Training and Quality Assurance Team at the Azerbaijan National Agency for Mine Action to ensure what happened to him will not happen to other citizens of his country. Gamimov’s resilience and dedication to his work make him a hero in the mine clearing community.

Enur Gamimov is all too familiar with the physical pain of being involved in a UXO incident. In 1993, his family was living in an area of military conflict in the Republic of Azerbaijan. When he was 13, a shiny metal object along the road caught his attention. Unknown to Gamimov at the time, it was the fuze of an unexploded hand grenade.

“Some areas were occupied by Armenian forces and there were a lot of military munitions spread around. At that time, there was no mine risk education in Azerbaijan,” Gamimov recalls. This lack of MRE proved to be very dangerous for the young Gamimov. When he tried to touch the unknown object, it exploded, causing him to lose three fingers on his right hand. After receiving treatment in a local military hospital for about one month, Gamimov was able to return to school and finish his education.

Seven years after the incident, Gamimov made the decision to pursue a career in mine action. “One day I got an encouraging opportunity to join the humanitarian mine action movement. I started working with a national NGO [non-governmental organization] and eventually with ANAMA.”

In 2000 after graduating from university, Gamimov began working as a surveyor for the International Eurasia Fund—an NGO working under the ANAMA umbrella. Gamimov quickly explained his work at the IEFP. “One year after training, I worked as a surveyor around the border collecting information from villages about contaminated land and mine victims.” After a year with the IEFP, Gamimov went to work with ANAMA as an instructor in humanitarian demining with the monitoring and training team. As part of his work as an instructor,
Gasimov taught mine-risk education to schoolchildren in affected areas of Azerbaijan. “I used to go to schools, conducting mine-risk education in order to prevent incidents such as my own,” he reminisces.

Gasimov’s commitment to his work in mine action helped him to receive the promotion to Team Leader of the Training and Quality Assurance Team at the Azerbaijan National Agency for Conventional Weapons Destruction. The TKO Team at ANAMA was created specifically to oversee the clearance operation of the demining organizations and to identify and address any problems that arise during the demining process.

As part of his training for the TKO Team at ANAMA, Gasimov attended a number of courses in mine action. He provided the following description of the main functions of his team: “We conduct trainings, work on capacity building, conduct monitoring, investigations as a part of QA, and also ensure that the land clearing by the de-mining agencies has been done in accordance with the National and International Mine Action Standards.” He adds, “We make sure that nothing remains and there was no ordinance mixed.”

Gasimov recognizes mine clearance as it is an overwhelming undertaking, sometimes marked by unplanned barriers. “All of my achievements in this field have been so amazing. We work and we learn. Sometimes, we learn by making mistakes, but our first goal is to make a land free from mines using the approved standards.” Gasimov is happy to dedicate his life’s work to the destruction of devices that are so harmful. “Each destroyed mine and each neutralized piece of ordnance means someone’s rescued life or protected bodies.”

In spite of the difficulties that accompany working in minefields, Gasimov feels that…

Gasimov is happy to dedicate his life’s work to the destruction of devices that are so harmful. “Each destroyed mine and each neutralized piece of ordnance means someone’s rescued life or protected bodies.”

In addition to having mined spots along its border, Peru resulted from a conflict resolved long ago, Peru currently focuses primarily on civilian landmine accidents in the areas surrounding the towers of the power-transmission lines that cross the country. In the mid-1980s, guerrillas of the Sendero Luminoso group launched a strategy to knock down towers with high-tension lines to cause blackouts in several regions, including the capital, Lima. In 1986, in one day—the day before elections—10 towers were knocked down, resulting in a nationwide blackout.

After that incident, authorities decided it was urgent to prepare their power-transmission infrastructure. However, it was not feasible to keep guards around every tower, many of which were located deep in the jungle, in inhospitable areas or at high altitudes. The solution was to emulate landmines quickly around these towers, but as with every plan created in haste, many mistakes with fatal consequences resulted.

Charged with the task of eradicating the landmines, the National Police developed an “explosive device for self-protection,” which was basically an adapted army grenade, equipped with a system of pressure activation and assembled at the very site where it was placed. Eventually this device was nothing more than an improvised landmine. Later, the country’s Navy would develop a maze of its own. It was smaller and more powerful, but a little safer in its functioning...

In 1989, a group of 60 policy officers was assigned to plant 30 to 50 landmines around each of the 1,711 towers located at strategic spots in the departments of Lima, Junín, Huancavelica, and Huaura. Of those 60 professionals, only 23 had had some kind of training and qualification in explosives, and they transferred their knowledge to their co-workers. Until each time one of the towers needed technical maintenance, those professionals were sent abroad to “report a shock” to the towers, disarming and removing the landmines from a spot of land where they would be replaced and reactivated later.

They had no personal protective equipment and no plan for transportation and rescue if required. There were no specific maps of mine locations, either, since many of them had to be planted quickly in areas with alluvium of over 5,000 meters (16,404 feet). The fact that the physiologic threats posed by high altitudes, or were affected to possible displacements caused by rain, floods, landslides, vegetation growth, etc. The lack of proper training and qualifications, personal safety equipment and accurate maps, in addition to the quality of landmines themselves and the...
mistaken strategy of removal and reinstallation of the landmines, caused dozens of accidents. Eighty-one of the professionals who had worked in the Division of Safety in La Gomera Activation-Explosive Devices for Self-protection Unit were involved in explosions. Many of them were simulated and five died as a result of their wounds. Of the 41 convicts, 14 were injured too badly to return to work, and 35 are still working with mild injuries. Eight continued the Association of Victims and Survivors of Ground Mines to represent them before the government and National Police, and to organize mine-risk education for the populations of the affected areas.

From 1989 to 2003, over 500 landmine incidents were recorded in Peru, 173 of them in the areas surrounding power-transmission towers.

There was case like the one of Freddy Mendoza, who, at the age of 13, waspagination the shop near a high-tension tower in the department of Junin and saw a dusty object he believed to be a radio on the ground. His childhood curiosity and naiveté lead him to take the artifact in his hands and pluck the battery, causing it to explode. His family found him unconscious and thought he was dead. The boy would only move again after 16 hours, when he was finally taken to hospital. Mendoza lost three fingers on his right hand, two from his left, and became permanently blind from the explosion, he still gets infections in his eyes from time to time. Today he lives in a poor neighborhood on the outskirts of Lima in a wooden house with neither water nor electricity. He depends on financial support for medical care from the International Committee of the Red Cross, and on his 12-year-old sister to help him sell candy on buses.

According to the 2005 Landois Ministry Report, approximately 60,000 landmines were removed from areas surrounding the 1,711 towers from June 2002 to February 2004. Until July 2005, however, only 50 of those power transmission towers had had quality-assurance procedures done. In June 2005, the National Police reported that 1,431 previously demined power towers in Huancavelica, Ica and Lima were still considered dangerous.

As a signatory of the Ottawa Convention, Peru today recognizes that the necessary international assistance and support to have formidable, re-equipped mine-risk teams was the Department of National Police, the División de Seguridad Contraminas (DIVSECOM), with approximately 80 members, received support for training and learning new techniques from the Organization of American States. The new methods are completely different from those employed in the 1990s and comply with certified interna-
tional standards. División de Seguridad Contraminas methods now no longer searched for and explored on location with total safety.

Each demining squad comprises eight professionals—one squad leader, two deminers, one escort in explosives, one male nurse and one team member responsible for the campaign of awareness and mine-risk education for the communities living near the affected areas. They use detection and protect themselves with proper boots, vests and anti-impact helmets.

Diminishing quality assurance for all towers should have been completed by June 2006, but, due to bureaucratic problems, the deadline for the agreement between Peru and OAS was post-
poned, which led to a great financial loss, purging of these activi-
ties for a long period. As there have been regular MRE activi-
ties in Peru since 2003, accidents involving civilians continue. Consequently, Nice Nahum Cendana, a little boy who lived with a native family in Huancavelica department, didn't know he shouldn't touch an object he found. As Freddy had done, Nice also picked up from the field an object he did not recognize. He took the artifact home and on the following day, tried to smash it into the time it first went off, but only a hand and the 10-year-old boy had his right arm ripped off, lost an eye and had to undergo surgery on the other eye to receive an intraocular lens. He also lost blood, but her injuries prevented her from moving. Three of her children in the incident before help arrived because knowing another bomb—and “killed”—exploded.

The village decided to help Pierre and his children. She was taken to hospital for a hour after hearing the explosion. She was taken to hospital for a while, but her injuries prevented her from moving. Three of her children in the incident before help arrived because knowing another bomb—and “killed”—exploded.

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MINE-RISK EDUCATION PROJECT MANAGER

Handicap International

Ends: Michel Dabouy

01.10.06

Journal of Conventional Weapons Destruction, Vol. 10, Iss. 2 [2006], Art. 1

Geele District is a small village in Somaliland located 45 km northeast (26 miles) east of Hargeisa in a mountainous area on the road between Hargeisa and Barbula. With a population of approximately 300 inhabitants according to the Landmine Impact Survey conducted in 2005, its citizens usually go to Hargeisa (the capital of Somaliland) to sell their products. The villagers’ main income is from small irrigation farms surrounding the village where they raise tomatoes and vegetables, such as papayas, oranges, green, and tomato, as well as some fruits.

DURING THE CIVIL WAR THAT BROKE OUT IN SOMALIA IN 1991, SNM TROOPS SCATTERED INTO TOWNS, LEAVING EMPTY CAMPS OPEN NEARBY. WHEN THE SNM Captured SOMALILAND (PREVIOUSLY THE NORTHWEST SECTION OF SOMALIA) IN 1991, SNM TROOPS SCATTERED INTO TOWNS, LEAVING EMPTY CAMPS OPEN TO THE PUBLIC.

Mohamed Gahayr Geele was an SNM guerrilla fighter, and he lived in Geele District. He later told journalists that he had covered short, intensive training in mine-clearing. In 1991, the war began, and several areas of Somaliland endured a disastrous shortage of food that he collected and had kept buried in a tree near his farm. To keep it safe, he piled brush on it as well. From 2000 to 2005, demining agencies, especially the Danish Demining Group, visited the village several times to advise and remove unexploded ordnance, but Gahayr continued to keep UXO until 2005.

Then, in 2005, Handicap International, with funding from Ireland Aid/UNICEF, began mine-risk education in Somaliland and trained its mine-action partners—Somaliland Mine Action Centre, Registered Licensed Officers, the Police Explosive Disposal Team, the National Demining Agency, and the Quick Response Teams of the HALO Trust and DDG—ON GRIDWORK WITH HARGEISA IN SOMALILAND.

IF MRE TEAMS ALSO DEVELOPED AN MRE RADIO PROGRAMME THAT CONTINUOUSLY AIRS IN THE LOCAL RADIO. THE PRODUCTION TEAMS OF Radio Hargeisa and HAVOCCO conduced an Audience Feedback Survey in 32 highly and moderately mine-infested villages in the Galbaddel region (Hargeisa area) including Geele District village. The team met with Mohamed Gahayr Geele, whose village

Emphasizing their objective was to escape a safe environment for inhabitants. During the survey, the team also collected use data to be used for the production of MRE radio programmes such as interviews and reports. The team sought to disseminate how mines/UXO affected the area. During his interview, Gahayr admitted he had hidden some UXO items on his farm, and said he wanted to hand over the leftovers to the demining agencies.

Radio Hargeisa did not notify the authorities; instead, it aired the interview with Gahayr three weeks after the fact. Omid Jamali, MDG Programme Manager, was then contacted, and a Shoulder Handicap International’s MRE team to identify the person who admitted he was willing to hand over the remains of UXO to demining agencies. Together in late February, HI’s MRE team, SMAC Deputy Manager, MDG Programme Manager, a Radio Hargeisa journalist, and a representative from Somaliland National Television went to Geele District and met with Gahayr. He showed them the stockpile, and the DDG Quick Response Team collected the items safely.

Later, the Radio Hargeisa journalist interviewed Gahayr again, asking him how and what perspectives he could provide on other communities with UXO in their area or in their homes. He replied that he was very proud to hand over the UXO. He said he had the scars on his face to prevent injuries to children. Recently, however, he had begun to think that the hiding place was not secure enough, that someday heavy rain or children might bring them up, and it might kill or injure them. So he had a change of heart and decided to turn the items of UXO over to authorities.

Before MRE they are often not aware of the danger, and these children tend to gather pieces of UXO to anti-tank land-mined mines. Another range of MRE is adults and younger children aged 14–29. Representing around 30 percent of all mine and UXO survivors, they are thought to be above the area. This group is not aware of the reason for the fear of the location of dangerous mined areas. Other groups who benefit from this programme are refugees and the population as a whole, especially people who have never been educated on mines and UXO dangers.

In January 2008, the team from Radio Hargeisa and HAVOCCO conduced an Audience Feedback Survey in 32 highly and moderately mine-infested villages in the Galbaddel region (Hargeisa area) including Geele District village. The team met with Mohamed Gahayr Geele, whose village

...
THE HUMAN FACE OF EOD
by Howard M. Thompson
H.M.T. Insurance Brokers Ltd.

For many years now, my company has specialised in the insurance requirements of mine-clearance and explosive-ordnance-disposal organisations operating around the world. During this time, I have learnt much about the skills and methods engaged in the field and have been fortunate enough to visit many mine-clearance operations, particularly in Bosnia-Herzegovina and Kosovo.

In 2006, I joined one of my clients, Mines Advisory Group, for a 10-day visit to their operations in Cambodia, and there saw even more first-hand what the “human” element of humanitarian demining is really all about.

Having seen many specialists working in the field, demining by hand with the aid of machines and dogs, I have nothing but admiration for their work. However, this visit showed me something to which, until then, I had not attached a real human face. How many times have I heard, heard and even said “the purpose of humanitarian demining is to rely less on people”?

Only when you meet the remaining people and see the pride they have in their home and recovered land, do you think how much mine clearance really means to the people of mines-affected communities.

While in Cambodia, I visited many places as a tourist in Phnom Penh and Sihanoukville and played operator on a remotely controlled Tampox model (see photo 1). My thanks to dear Bamboo and Brush in the field certainly did nothing for the environment, at least as a result of my earlier approach to trees and anything else that grows in the way. I soon realised not to push! The quantity of locations we visited and the many individuals encountered will remain in my memory for a long time.

The familiar sights of a demining programme were all in evidence; whether manual, mechanised—such as the Bronco (see photo 2)—or of the canine variety as displayed by the Cambodian Mine Action Centre team in photo 3.

And of course there were some less familiar sights: for instance, MAG is unusual in engaging female as well as male deminers. One such young woman explained her story. Her husband had been killed by a mine, at which she had to provide a living for herself and her eight children. Working for MAG made things much better, she said, helping her community and providing herself with a good living (see photo 4).

Another deminer (see photo 5), taking a break in the heat, was himself a mine victim. He also had a family to support—and a large one, at that—living in a part of Cambodia where demining is commonplace. He therefore gave him a better-than-average living to maintain his rather-than-average family.

Moving on from where the work was being carried out, we entered the small village of Preah Pot, which had been built on cleared land just a short drive from the area where clearance work was still being carried out. In this village, we found a lady in a t-shirt that made so much sense; she was helping her community and providing herself with a good living (see photo 5).

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Increasing the Impact of Mine-action Surveys

While mine-action surveys are an important tool in mine clearance, there are several challenges that must be overcome for survey results to be fully effective. Some of these changes include alterations in priority setting, information management and impact scoring. This article presents some potential obstacles to completing and evaluating mine-action surveys and proposes possible solutions to these challenges to increase their effectiveness and impact.

by Charles Downs [New York University Wagner School of Public Service]

Mine-action Surveys and Priority Setting

Priority setting is the most critical process in mine-action programme management. The approach to priority setting should support the goals of the respective programme. These include direct mine-action goals (rapid reduction of new victims, elimination of all landmines and effects of landmines) and support to local and national development (e.g., support to local economic development, support to regional road or electrical system rehabilitation).

Priority setting based on hazard alone may eventually lead to the elimination of all landmines and permit more efficient clearance planning and logistics, although it may not provide much immediate relief to the population nor support government development activities. Priority setting based on community impact will respond better to perceived community needs, although it may not fully support national development. It makes a difference which communities are addressed first and which communities are left for later, and proper consideration of these opportunity costs requires appropriate priority setting. This is a management process that requires information, consultation and judgments—including periodic review of results and reassessment of the assumptions and decisions made.

General Approach to Landmine Impact Surveys

Feedback to government and communities. While Landmine Impact Surveys always begin with the agreement of the host government, actual commitment to the survey often is maintained only when the results begin to

Integration of landmine-impact assessment as the essential strategic component of mine-action survey has created the conditions for a qualitative advance in planning and management of mine action. This assessment is further supported by the spread of the Information Management System for Mine Action1 as the core information system for mine-action country programmes. Landmine Impact Surveys provide a comprehensive assessment of the effects of landmines on local socioeconomic activities, through systematic interviewing of residents in all communities suspected by experts or the local population to be mine-affected. Governments use the landmine-impact-assessment results to obtain a better understanding of their national mine problem and to better allocate resources to respond based on a shift in strategic focus from the minefield to the community and from hazard/contamination to socioeconomic impact.

While this shift has improved the ability to strategically plan and set priorities for mine action generally, it faces a number of challenges in areas where it is not necessarily well-adapted, including accurate estimation of Suspected Hazard Areas; the need for Technical Survey follow-up for operational planning; development of DMMSA as the comprehensive database for mine-action programme management; updating of national impact scores to reflect results of actions undertaken; community involvement in operational planning and priority setting; and measurement of the progress and impact of mine-action programmes nationally and globally.

Notes from the field

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to the total area estimated prior to the survey. Furthermore, because all mine-affected communities and known SHAs were visited and the earliest contamination estimates validated or denied by the new survey, the new database is more complete.

Rapid appraisal bias. Landmine Impact Surveys utilise group interviews, key informant interviews, community mapping and visual verification. These are the typical tools of rapid appraisal, and the results have the strengths and weaknesses of the method. The data collected relies on local knowledge for a ‘reliable understanding of the impact of landmines on the community; however, this information collected is only as complete and reliable as the community sources providing it. It could be limited by the absence of displaced populations or by the lack of participation of women or others not available during the short visit. Problems may be overrated with the hope of obtaining immediate assistance or underrated to avoid interruptions of relief assistance, tourism or travel. The possibility that information is biased or provided ‘strategically’ reinforces the need to seek multiple data sources or to reconcile the data obtained from different sources. The ranking methodology, a tool that attempts to integrate high-impact communities proved to be significantly lower than expected by those working in the country, which led to the concern that other communities with improved data collection may be left to a lower category (and thus would get less attention) due to deficiencies in the scoring system. To avoid such a situation, it is important to maintain international support to support operations, some of which have been incorporated into later versions of IMSMA.

Use of Impact-Survey Data Community impact scoring. Design of the LIS scoring system produced a simple system for ranking community impact as low, medium and high. The ranking system proved very powerful in directing attention to high-impact communities by highlighting them and their limited number, which presented a more “bounded” problem. However, it is necessary to avoid reducing high-impact communities to a number that may not be reflective of reality. As new mine-affected communities or SHAs are discovered, or new mine incidents occur, they should be added. The results of mine action to clear or mark areas to eliminate blockages should be updated into the database. A procedure is needed to remove the previous results, because the problems of a community have been fully treated, so that progress can be properly reflected. Finally, the strategic summary of community impact status should be updated and reported annually.

Assessing the Results of Mine Action Post-clearance impact assessment. Pregnancy data from surveys, donations, and the local community are all concerned with creating the greatest possible benefit from the impact status. High priority is a possible result of considering communities and SHAs within the framework of national priorities. The set of high-impact communities provides the core of a working list of communities warranting priority attention, initially through follow-up survey to confirm the blockages of specific communities. This process provides more information on the boundaries and planning for clearance or marking as appropriate.

Overestimation of total SHA. The LIS data tend to overstate the extent of the areas affected. There was an expectation not trained to carefully determine boundaries. This apparent increase of the total contaminated area reduces the credibility of the survey results. It is also important to improve accuracy of mine density information. The 2005 Survey Working Group proposed on “visual inspection,” supported by appropriate training, equipment and inclusion in the survey teams of members with extensive experience in efficiency of site operations, they are not meaningful indicators of programme results. The LIS has established meaningful country-specific baselines against which progress can be measured. Among the success indicators to consider are:

- Number of blockages existing/removal
- Number of high- and medium-impact communities in a country
- Share of high- and medium-impact communities in annual work plan
- Number of high-risk SHAs
- Number of new mine victims
- Number of mine-affected communities
- Number of people living in mine-affected communities
- Total area contaminated
- Traditional output measures Changes in any of these indicators will reflect progress against national mine problems, and they can be aggregated to estimate global progress toward solutions for the worldwide landmine problem.

Conclusion

The mine-action survey process today—with its focus on community impact—has developed from the mind-action surveys of the 1990s and the rapid appraisal approach of other development fields. Landmine Impact Surveys have been conducted in at least 10 countries and regions as of May 2006 (as seen in the above map), and IMSMA is now the core database in most mine-action programmes. In this process, much has been learned, yet further challenges remain.

This article is derived from a chapter in A Study of the Role of Mines Action’ and reflects on the exact studies contained therein (Angola, Bosnia and Herzegovina, Cambodia, Chad, Ethiopia, Mozambique, Thailand and Yemen) and the author’s own experience, including discussions with colleagues in many countries and organisations around the world conducting or using the results of mine-action surveys.
Contributing to Progress in Sri Lanka

This article highlights the activities of People to People International in Sri Lanka. As part of its commitment to Sri Lanka, PTPI not only assisted in the clearance of high-priority minefields, but also provided aid following the 2004 tsunami. Today, PTPI remains dedicated to helping the Sri Lankan people.

by Liz Wegman | People to People International |

P eople to People International was founded by President Dwight D. Eisenhower in 1956 and is now led by his grand- daughter, Working with The HALO Trust, a nonprofit organization specializing in the removal of unexploded ordnance (UXO), PTPI has cleared 13 high-priority minefields totaling 9,292 square meters (2.3 acres) and containing nearly 600 mines in Sri Lanka since joining the U.S. Department of State’s Public-Private Partnership Program for Mine Action in 2002, according to Mary Jean Eisenhower, President and CEO of PTPI. People to People has embraced Sri Lanka and become a major contributor to the rebuilding of a country wracked by both manmade and natural disasters.

Today PTPI remains committed to helping Sri Lanka achieve its identified goal of becoming “mine free,” thereby making it easier for the thousands of civilians who were displaced or forced out by the conflict to resettle in their homes and resume cultivating their land. In addition, PTPI has built three schools in the Jaffna area, which was hit hard by the December 2004 tsunami.

The 20 years of civil war between the government and the Liberation Tigers of Tamil Eelam took place mainly in northern and eastern Sri Lanka, home to a significant number of ethnic Tamils. Both the Sri Lankan Army and the LTTE used mines extensively throughout the conflict. The HALO Trust established an operations base in the northern Jaffna district, where the landmine problem is most significant. Its focus is government-controlled areas, though it does provide assistance in LTTE-controlled areas on request.

Mary Eisenhower and PTPI’s Deputy CEO Marc Bright made their first trip to Sri Lanka in late 2003 to visit the Jaffna region. Struck by the beautiful scenery lost due to the risks posed by mines, they returned with an increased determination to raise the funds necessary to finance a demining team.

Also in 2003, the government of Sri Lanka declared its goal of becoming a mine-free country within three years. The expansion of capacity needed to meet this goal is progressing more slowly than anticipated, forcing the date to be set back. Total clearance of high-priority areas, however, is achievable in 2007.

The goal set for PTPI’s project included clearance of 13 minefields, all of which are high-priority sites. Areas where landmines lay in close proximity or denied access to schools were of main concern.

The first two cleared minefields were in the village of Chirupaddal, approximately seven miles (11 kilometers) north of Jaffna town. It is a naturally fertile area—one of the best on the island for growing crops. The soil allows several crops to be grown in rotation annually and the need to remove arable farmland was urgent. The demining team cleared two minefields of 341 mines, and farmers have subsequently returned to the land.

Next, the team moved 12 miles (19 kilometers) northwest of Jaffna to the village of Sivilan. Sri Lankan security forces seized this area in 1992, which led to the displacement of many citizens in the area. Previously, the land belonged to 70 people who mainly engaged in farming. In an area of 927 square meters (0.23 acres), the team cleared 62 mines.

The deminers also began clearing a minefield that lay in close proximity to a primary school. The minefield was separated from the school by nothing more than an old military defense line formed by a mound of dirt. It also denied access to agricultural land and blocked resettlement. Several accidents, some resulting in casualties, have taken place in the area.

Clearance of the premises of a second school followed, this time in Alassiri village. The number of students had decreased dramatically due to injuries on school grounds. In total, 14 mines were removed from the area, restoring it to a usable state.

The second minefield in the Alassiri northern region lay in another area captured by Sri Lankan Security Forces. People had been permitted to resume the use of the areas in 1992, but livestock were often injured or killed by remaining mines in the years prior to the clearance of the area. A total of 397 square meters (0.1 acres) was cleared, and 14 mines were found and destroyed.

The team then moved on to clear two minefields in the high-priority area of Ravalai. This village is located just before the entrance to the Military High Security Zone. An estimated 2,000 mines had been laid in the area by the SLA since 1995. The local population was

in desperate need of land as houses were being built closer and closer to the minefield.

Once the field was demined, it was put to use immediately for planting, grazing and transport to other agricultural areas.

Several schools in the same area were situated on or near LTTE-laid minefields, with no records available of where mines were laid. Mine removal within those fields required total clearance to a depth of about six inches (15 centimeters). In the Ravalai area, 74 mines were removed from an area of 1,218 square meters (0.3 acres).

The final project for the PTPI-funded section was at the Mantikai School in northeast Jaffna. There, an SLA minefield crossed a path that was used by over 400 schoolchildren each day, clearing it restored confidence in safety to the local residents.

Eisenhower returned to Sri Lanka in 2005. While it was difficult to see the physical effects of the progress made by PTPI’s demining team, the effects of the 2004 tsunami were readily apparent. The Jaffna region was one of the hardest hit. Land around the schools may have been cleared of mines, but the schools themselves were swept away.

Eisenhower soon realized that the contributions made to PTPI’s Tsunami Relief Fund would be best put to use in Sri Lanka by continuing to assist the people of the country on the road to normal life in their native land. In less than a year, three new schools were built in the Jaffna region. Eisenhower and Bright returned a third time in April 2006 for the schools’ dedication ceremonies.

News Brief

Sweden Supports OAS

The government of Sweden provided US$600,000 to the Organization of American States to support demining work in Nicaragua. The grant will also support a mine-risk education program, “Safe Step without Mine,” and rehabilitation/reintegration services for landmine victims.

Operations made possible by the grant from the Swedish International Development Agency are expected to de-mine and render safe 1,168 hectares of land in at least 87 municipalities from January 2006 through December 2007.

Since 2003, Liz Wegman has played an active role in spreading People to People International’s mission of promoting peace, understanding and tolerance around the globe through the organization’s many projects and programs. She currently serves as the Managing Director of PTPI’s Operation Iraqi Children program and handles public relations for the organization.

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Humanitarian Landmine Action in China and the Role of the NGO

Though China is not a State Party to the Ottawa Convention, the country has long been involved in humanitarian efforts to alleviate the landmine problem. Nationally, China has launched mine-clearance campaigns, and has become a State Party to the Convention on Certain Conventional Weapons. Two organizations have also been established to alleviate the landmine problem.

Internationally, China has sponsored several mine-clearance workshops, and has promoted international partnerships to work toward mine clearance.

by Zhai Deqian [China Arms Control and Disarmament Association]

Being a State Party to the Convention on Certain Conventional Weapons and its Amended Protocol II, China has made tremendous efforts to promote exchanges and cooperation with the States Parties to the Ottawa Convention. China attaches great importance to the humanitarian issues of landmines and supports the efforts of the international community to address the problems. It carried out humanitarian demining assistance in 24 countries and regions and trained 120 experts and mines for the local personnel.

In the 1990s, China successfully undertook two major campaigns to clear the landmines in the provinces of Yunnan and Guangxi, removing the threats to the local civilians. This effort helped restore the local environment, rehabilitate victims and ensure the safety of border trade. In the two mine-clearing campaigns of 1992–1994, China cleared 800 square kilometers (116 square miles) of 83,000 landmines and pieces of UXO along the China–Vietnam border and demobilized 700 metric tons (772 tons) of old munitions and explosives without committing a single error.

When it ratified the CCW Amended Protocol II in 1998, China indicated it would continue the national mine-clearance training courses for the personnel from seven mine-affected countries: Angola, Bosnia-Herzegovina, Cambodia, Ethiopia, Mozambique, Namibia and Rwanda. China also donated US$100,000 to the U.N. Voluntary Trust Fund for mine clearance in Bosnia-Herzegovina. In 2001, China provided mine-detecting and clearing equipment worth $1.2 million to seven mine-affected countries: Cambodia, Namibia, Ethiopia, Eretra, Rwanda, Angola and Mozambique.

In 2002, as part of a bilateral border agreement with Vietnam, China started mine-action activities in Guangxi and Yunnan. China and Vietnam agreed to complete the Technical Survey of mined areas by the year 2005, and it was completed on time.

In December 2005, China sent an expert mine-clearing group to Thailand to train the local personnel with Chinese-equipped aid. Representatives from China have also attended numerous mine-related meetings around the world.

In April 2004, an international workshop on humanitarian mine- and unexploded ordnance clearance technology and cooperation in Kunming, the capital city of Yunnan province in southwestern China, was co-sponsored by the Arms Control Department of the Ministry of Foreign Affairs of China, the China Arms Control and Disarmament Association and the Australian Network of the International Campaign to Ban Landmines. Representatives from 13 countries and eight international organizations and nongovernmental organizations were present. All the Chinese speakers at the opening ceremony acknowledged the need to address the continuing humanitarian crises caused by landmines and unexploded ordnance.

The workshop featured an extensive exchange of views from research findings, mine-risk education, mine-victim assistance, rehabilitation and community reconstruction to mine-action standards, increased regional cooperation, and shared experiences in mine-action efficiency and technologies, including mechanical, explosive and manual practices.

On October 15, 2005, the Chinese delegation voted for Resolution L6 to implement the Ottawa Convention. This significant act shows that China attaches importance to the role of the Convention and identifies with its final aim. It also shows that China is ready to join hands with the other States Parties to render new contributions to the thorough resolution of the humanitarian problems caused by AP mines. In November 2005, the Chinese Observers Delegation attended the Sixth Conference of the States Parties to the Ottawa Convention in Zagreb.

NGO and Corporate Activities in China

The China Arms Control and Disarmament Association, founded in August 2001 in Beijing, is the only nationwide nonprofit nongovernmental organization in China in the area of arms control, disarmament and nonproliferation of weapons of mass destruction. While CACDA is active in promoting national and international cooperation in mine action, it is also energetic in addressing the problems caused by AP mines by cosponsoring workshops or seminars for academic exchanges of demining experiences and techniques, and updating equipment.

Among CACDA’s dozens of corporate members, there is one called Huakai Security Science and Technologies Co. Ltd, which is a private enterprise solely devoted to mine clearance. It was established in November 2004 after being approved by China’s State Department of Industrial and International Administration. Huakai has a team of proficient and well-disciplined experts in mine clearance. Many of the personnel are demobilized former military officers and engineers from the Engineers Corps of the People’s Liberation Army of China. Huakai has established two training facilities in Nanjing and Kunming to train international deminers. Huakai’s mine-clearance equipment is ranked among the best in the world. It was used and proven in the mine-clearance campaigns of the 1990s for its practicability, reliability, simplicity, operability, and low cost—all of which are particularly suitable for mine-clearance activities in developing countries.

Compared to organizations in other countries, CACDA and Huakai are novices. Their goal is to contribute to humanitarian mine clearance and improve the lives of those in need by working in partnership with other organizations. Recently, CACDA and Handicap International–Belgium cosponsored a documentary film about mine action. It is designed to be used for mine-risk education. The film covered the whole process of eliminating landmine hazards—from the devastation of human lives, to the livelihood and property to humanitarian-dimming activities and rehabilitation with domestic and foreign assistance to community reconstruction. Another MRE film the company developed detailed the history of landmine development; the present international mine-action institutions and systems; conventions, protocols and agreements to limit, ban or destroy landmines; rules, regulations and mine-action standards; technological elaboration of landmine types, composition and their uses; reading markings; and demining methods and techniques. This film is designed to raise the landmine-risk awareness of the community.

China’s Demining Future

Although the need for mine clearance in the mine-affected countries of the world is extensive and demanding, the usual practice of multilateral cooperation among states, international institutions, enterprises and NGOs often falls short of a total solution to the problem. Therefore, it is necessary for all parties to explore new ways to cooperate with one another, such as working on the same project, dividing work equally and taking full advantage of the facilities, resources, information, technology, equipment, management, etc. The United Nations’ institutions must continue to be involved in organizing, coordinating and monitoring various activities.

See Endnotes, page 111

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IMSMA Version 4: A Collaborative Approach

From July 24 to 27, 2006, the Geneva International Centre for Humanitarian Demining hosted a workshop in Murten, Switzerland, to introduce and discuss the release of the Information Management System for Mine Action version 4. Participants included management, operations and technology professionals involved in mine-action information management. During this workshop, results from IMSMA v4 pilot field tests were presented, v4 changes and innovations were explained, and a demonstration of IMSMA v4 with new handheld and Geographic Information System components was offered. IMSMA v4 reflects a collaborative effort to improve the accuracy and ease of mine-action information management in the field.

IMSMA is a licensed and registered trademark produced by the Geneva International Centre for Humanitarian Demining, created as a database to assist in managing and standardizing mine-action data collection and information management. IMSMA has undergone several updates since its first release in 1999. The most recent version of IMSMA, v4, has gone through pilot tests in five countries and is being refined for distribution by the GICHD to all existing IMSMA users by the end of 2007. The information-management workshop hosted by the GICHD provided a forum to discuss, plan and ask questions about the then-forthcoming v4.

IMSMA v4: A Collaborative Effort

As Alan Arnold, Program Manager for the GICHD’s Mine Action Information Systems and host of the July workshop, noted, IMSMA v4 is not simply an updated version of IMSMA v3, but is new and different in significant ways. The updates to IMSMA reflect an expanded effort utilizing the collaboration of various groups in a variety of subject areas of expertise.

System and program improvements. After feedback from field users was collected to determine how it could be improved, the GICHD completed an open tender process for the work required to redesign and develop a v4 application that would enhance IMSMA’s capabilities as an information-management tool. FGMI, Inc. assisted in providing information technology services to design some of IMSMA’s updated program applications. Version 4 is written in the Java programming language, allowing it to be compatible with a variety of operating systems, including Linux, and IMSMA no longer requires users to have Microsoft® Office or Microsoft Access database capabilities.

Building on the concepts expressed in v3, v4 provides even greater flexibility and allows users to create a customized information-management system that suits the needs of their specific mine-action situation. One example of this is that, unlike previous versions of IMSMA, which offered only predefined forms, v4 allows users to create or alter all data-collection tools (e.g., forms and surveys), reports and elements. Version 4 provides some default forms with most of the elements that were in the v3 forms, but v4 now allows these to be changed.

Additionally, new forms can be completely designed locally and from scratch. Also, v4 users can add their own forms and elements to IMSMA, arming them to the preferred “user-defined data fields” that already exist in the system. This allows users to customize the data collection process using locally produced forms and systems-access permissions.

Flexibility is furthered with the introduction of expanded language options. Using new language-translation features, v4 can be translated into virtually any language and currently ships with Arabic, English, French, Portuguese, Russian and Spanish. If there are system users with different language preferences, the shared system allows any of these languages to be used simultaneously and information to be listed multiple times in different languages. Users can also now add and publish locally created forms in other regional languages.

GIS and “locality” basis. One of the major updates in v4 is the integration of a Geographic Information System component. This additional provides a graphical map on the basic screen that is used to organize IMSMA data around the concept of “location.” Data and reports are represented by symbols on the map found on the main screen and can be accessed by theme, report, incident, date or location for geographic reports and analysis. Multiple reports associated with a single location can be stored and evaluated cumulatively over time.

The University of Kansas’ Department of Geography and Kansas Applied Remote Sensing Program joined the collaborative effort of v4, and the University of Maastricht presented a module on GIS at the conference. The University of Kansas team has created a new and standardized set of humanitarian-mine-action symbols that are used in v4 display. They have also supplied joint operations graphic maps, LandSat satellite imagery, elevation data and population data published into IMSMA v4 that are specialized for each country.

Handheld unit. A final innovation to IMSMA v4 is an additional handheld tool that allows field personnel to capture information and transfer it to their main IMSMA database with ease. The Swedish Armed Forces engineered the handheld unit through their Swedish Explosive Ordnance Disposal and Demining Centre and it consists of a laptop computer (Windows Mobile 5) with a Global Positioning System, laser rangefinder binoculars and a digital camera all connected by Bluetooth® wireless technology. Formally called the Explosive Ordnance Disposal Information System Survey Tool, the EOD IS-SURVEY allows users:

• Download IMSMA forms and data to the wireless handheld computer unit
• Enter data into forms while in the field during surveying (with location information from the GPS and the laser binoculars connected directly to the wireless handheld unit)
• Attach and save photos or other files (e.g., maps, gazetteers, dataset information) to or from the wireless unit
• Transfer all data back to the main IMSMA database

With the technical assistance of FGMI, Inc., the IMSMA v4 developers, the mine-action (eXtensible Mark-up Language) was programmed into IMSMA v4 to allow for the transmission of standardized data between different information systems: maXML is the schema that links the metadata specifications and therefore the information between IMSMA (in Java) and the EOD IS-SURVEY (using a Microsoft product) by creating a common language. Unlike the data collection/implementation used with v3, IMSMA v4 allows for the direct translation of data between the handheld and IMSMA program, making it easier to transfer information between the two.

The EOD IS-SURVEY has been field-tested in a number of locations and the team from the University of Kansas has also produced a formal report documenting these evaluations.

EOD IS-SURVEY Demonstration and Country Presentations

Two highlights of the conference were a hands-on demonstration of the new EOD IS-SURVEY handheld unit as the field survey and reporting tool for IMSMA v4 and presentations about the results of IMSMA v4 pilot testing in five countries.
also refer to be able to electronically trans- 
mits data between regional centers and or-
genations rather than traveling through con-
nict zones. Jordan discussed using v4 as a 
tool for improved quality management and 
organizational coordination activities. 
In the case of the Falkland Islands, the use 
of v4 will allow Argentina and the United 
Kingdom to coordinate and share 
national data for clearance efforts. Uganda’s 
future goals for v4 highlighted the potential 
for IMSMA to not only operate within its 
national mine-action centers but to also 
expand beyond mine action, with plans for 
the integration of health, refugee and develop-
ment data to collect and manage disaster-
management/early-recovery planning. In all 
five cases, the expanded language options 
were noted as important and useful.

Conclusion
Some of the changes in v4 offer poten-
tial improvements in mine-action informa-
tion management by allowing flexibility, 
creativity and linkage of different systems 
in IMSMA. The integration of a fully func-
tional GIS into the system allows users to 
navigate the database using the map rather 
than working directly in the database itself. 
Combined with the direct transfer of field 
data to IMSMA from the EOD IS-SURVEY 
v4, users will find that IMSMA v4 can 
reduce data-collection errors, speeds up the 
integration of new data from the field and 
makes it easier to visualize the threat situ-
ation in a country or region. The updated 
v4 allows for new languages, the freedom to 
create and modify forms and reports, and 
the ability to combine and link data in ad-
vanced ways. The pilot test results from five 
countries reinforced the potential that v4 has 
to address a variety of different mine-action 
situations with its new multilingual, custom-
able and innovative features. The GICHD 
distributes IMSMA software 
at no charge and provides on-site train-
ing for its use. GICHD staff can transfer 
all data from earlier versions of IMSMA to 
v4. New or updated equipment is not 
required for v4 and users do not need to pur-
chase GIS software or licenses in order to use 
the mapping features. The GICHD, in col-
laboration with FGM, Inc., the University of 
Kansai and the Swedish Explosives 
Ordinance Disposal and Demining Centre, has 
applied these efforts to create not just an updated 
version of IMSMA, but a different and in-
novative one.

F
following the theme of quality for 
guidance section in this edition of the 
JMA, the GICHD continues to work 
in all areas of the quality-management 
cycle. The most obvious is the development 
of the International Mine Action Standards, 
which are produced on behalf of the United 
National Mine Action Service. The process 
Involving various new standards, reviewing 
existing standards, conducting training and 
hosting the IMSMA Review Board. In addi-
tion, the GICHD is able to help countries 
adopt the IMAS to their own national stan-
dards by providing expert staff to guide 
national authorities through the process. 
This capacity has recently been enhanced by 
the creation of a staff post, the National 
Mine Action Standards Officer, within the 
Centre for National Mine Action Standards.

New Guidebooks
In collaboration with UNICEF, the 
GICHD has recently completed a series of 
IMMST risk education best-practice 
guidebooks.1 These guidebooks address a 
wide range of issues, including coordinating 
MRE, disseminating public information, 
implementing projects, establishing 
community mine-action liaisons, and conduc-
ting MRE in emergencies. The primary aim 
of the books is to provide advice, tools and 
guidance to undertake MRE programmes 
compliant with the IMAS. They are also 
intended to provide a framework for a more 
predictable, systematic and integrated ap-
proach to mine-risk education. They will 
be useful to anyone engaged in planning, 
managing funding or evaluating MRE pro-
grammes and projects.
Mine Victims Needs Assessment and Assistance Coordination

A UNICEF feasibility study conducted in early 2001 showed that medical and surgical facilities in Azerbaijan are adequate to meet the immediate needs of mine survivors. In general, physical-rehabilitation facilities are also considered suitable; however, the lack of psychosocial support to assist mine survivors with a disability is of particular concern. The study concluded that an integrated and comprehensive assistance program could not be established for the mine victims of Azerbaijan until a needs assessment was completed. In response, Azerbaijan planned and conducted a national survey to assess mine victims’ needs, including prosthetic, social and economic needs, as a first step to developing national mine-victim-assistance priorities and programs. The results of the assessment are discussed in this article.

In January 2001, UNICEF Mine Action Coordinator Telnaz Danarz conducted a national mine-action feasibility study in Azerbaijan, which highlighted the need for a comprehensive mine-victim-assistance program. Since then, the Azerbaijan National Agency for Mine Action has been developing mine-victim assistance and implementing MVA-related activities. ANAMA’s strategy involves combining the efforts of national and international organizations in assisting disabled people, both as well as in developing and implementing a long-term MVA strategy for Azerbaijan. The Countrywide Mine/UXO Assessment Survey project was developed in 2003 and implemented in 2004 to collect the data necessary to address MVA needs in Azerbaijan. The MVA Assessment Survey’s objectives included establishing an extensive database, developing a well-articulated strategy and creating an efficient network of relevant stakeholders in MVA. This survey was an integral part of the overall project entitled “Support to Azerbaijan Mine Action Programme,” which was funded by the European Commission. An MVA working group was established to complete the project planning, design, drafting and drafting phase. The working group consists of representatives of relevant ministries, governmental agencies, and national and international nongovernmental organizations.

The working group thoroughly discussed project-related issues and predefined partner organizations for the implementation phase. These discussions also encouraged ANAMA to conduct a pilot survey in the Fuzuli district. The results became part of the data of MVA Assessment Survey. The working group will continue coordinating future activities based on the needs-assessment survey results.

The International Eurasia Press Fund was chosen to administer and lead the survey as this nongovernmental organization had experience gained from conducting two previous surveys in Azerbaijan. Representatives of three other NGOs actively taking part in the MVA working group—Derdabul, Shefali Eller and Babakudah—were also involved in this survey.

The Ministries of Defense and Domestic Affairs supplemented preliminary information on mine/landmine ordnance status in addition to data from ANAMA’s Information Management System for Mine Action database. The local branches and local authorities of the Republic Military Commissariat also provided information on mine/UXO survivors. The Ministry of Health and the Ministry of Labor and Social Protection of Population actively facilitated arrangements related to the survey.

IMSSA and an MVA Assessment Add-on

Data on almost 2,300 survivors was extracted from about 70 different source lists. The most comprehensive list was for the ANAMA/IMSSA database, although much of this information was already outdated. Unfortunately, media announcements failed to attract participants who could offer additional information about mine/UXO victims. In addition to information gathered to answer the standard IMSSA form, which is mainly focused on details of each incident and emergency medical care provided, an MVA Assessment Survey questionnaire gathered comprehensive information on the needs of survivors for medical and psychosocial care, physical and vocational rehabilitation, economic assistance and advocacy, as well as for education, training and sports.

Consequently, the incident details and needs of 1,883 mine survivors were en- tered into both the standard IMSSA incident casualty report and another relational Microsoft® Access database for the additional comprehensive questionnaire data. This new database consisted of seven tables for medical care, physical rehabilitation, social adaptation, economic assistance, professional rehabilitation, education, sport needs, and additional information, which mainly reflects economic status of the survivors. The data was prepared as tables and charts, which were analyzed and computed on. This Access database is related to the various tables in the IMSSA database and further relations can be added if necessary.

Technical assistance was provided for the MVA Assessment Survey to develop the special Access add-on to IMSMA, ensure accurate data entry, check quality, and extensively review and analyze the data. Together with the information already stored by IMSMA about devices, general survey victim data and impact data from the Landmine Impact Survey, this add-on included multiple references of the newly gathered victim data and identified needs. A special Geographic Information System function was introduced to allow the team to present all the data according to geospa- tial distribution as well.

Capacity Developed

As a result of the project being implemented, 15 people were trained in survey procedures and interviewing techniques; 10 of them gained widespread experience in the practical application of this knowledge. Seven people learned the data-entry process, having been introduced to it through IMSMA and Microsoft Access—Shamil Vagnatun, ANAMA Mine Information System Supervisor, developed various themes with IMSMA’s Geographic Information System function to represent the spatial data. Extensive expert- ise was arranged in multi-criterion data analysis as well as finding patterns, correlations and conclusions from the responses to the different survey questions. Some results of the Countrywide Mine/UXO Victim Needs Assessment Survey are presented below.

MVA Assessment Survey Results

Medical care. Surgical intervention needs were mentioned in 1,397 cases. Fragment extraction accounted for the greatest number of these interventions (544 cases). Some expressed a need for additional surgery, including 21 operations on residual limbs. Eighty people emphasized their need for plastic surgery.

The Medical treatment or consultation with specialists was also a predominant need. The need for a neuropathologist was mentioned by 1,552 people. A vast number of surgeons was requested by 850 people. While 802 people required the services of a general surgeon, just over one-seventh of this number—127 persons—actually needed surgical operations due to recent mine/UXO trauma. The rest were suffering from age-specific problems after the incident—e.g., post-traumatic osteoarthritis, joint pain, arthritis, lesions, bone growth or shrinkage.

Some screen shots of the MVA needs-assessment survey database, in the form of an add-on to IMSSMA, national country or international.
in sign language and lip reading or additional technical means of communication.

At the same time, there were many people who were often unable to communicate due to mine/UXO trauma.

The same situation occurred with eye sight-adaptation. 132 people reported eye sight problems resulting from mine/UXO accidents. Of these, 111 people reported loss of eyesight. Forty-nine mine/UXO survivors totally lost vision in one eye and 20 lost all vision. Social adaptation for this category of disabled people requires specific training and equipment.

The social adaptation section of the questionnaire opened new prospects for mine/UXO trauma.

The social adaptation section of the questionnaire opened new prospects for mine/UXO survivors. The same situation occurred with eye sight-adaptation. 132 people reported eye sight problems resulting from mine/UXO accidents. Of these, 111 people reported loss of eyesight. Forty-nine mine/UXO survivors totally lost vision in one eye and 20 lost all vision. Social adaptation for this category of disabled people requires specific training and equipment.

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Most of the losses and injuries of civilians arise due to negligence and carelessness. Civilians involved in non-military activities accounted for 103 of 143 cases with loss of an arm or hand, eye(s) or hearing and 43 of the 192 cases of lower limb amputations. In some cases, civilians were tampering with explosive devices and in other cases they were crossing into restricted areas. It can be concluded that in a number of cases civilian casualties resulted from treating explosive ordnance carelessly.

Recommendations

The main recommendations derived from the survey are as follows:

- Further coordination of mine-victim-assistance activities: Activities of various governmental and nongovern-mental entities should continue their joint efforts within the MVA working group, ensuring constant ef-forts toward sensitizing society to the problems of mine victims and persons with disabilities in general.

- Development of MVA projects and identification of implementing agen-cies: For projects developed using the needs-assessment-survey data, the emphasis should be on projects empowering the community, e.g., through establishment of associations for mine/UXO victims.

- Establishment of a charitable fund for MVA: Acting within the Azerbaijani legislative framework, a charity should be established to attract money from national and international organiza-tions and individuals to fund various MVA projects.

- Monitoring of the level of mine/UXO victim assistance: For each victim, the level of medical care and physical rehabilitation measures, together with the degree of social reintegration and professional rehabilitation, should be evaluated over the course of a year using various methods. Articles about MVA should be published in interna-tional and national journals, newspa-pers and magazines whenever possible to continue educating the public on mine victims in Azerbaijan.

See Endnotes, page 111

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Umid Mirzazaev graduated in 1987 from the M. Gizel Institute of Literature in Moscow. From 1998 to 1993, he led the department at the Literature and Art newspaper in Baku. He is one of the founders and Chairman of the International Eurasia Press Foundation based in Azerbaijan. He has coordinated mine-related projects implemented by the NGO since 2000.

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Siyab Mametov is a graduate of Baku State University, From 1979 to 1995 he worked in the Ministry of Internal Affairs in Azerbaijan and is a former police officer. He has worked in the EFP since 2003 and supervised field activities during various surveys.

1. Manual clearance—an effective but slow process.9
2. Manual clearance with support of mine-detecting dogs—a good method but very difficult in some areas, because the dogs can become confused if they smell explosives coming from sev-eral sources at once.
3. Mechanical clearance—the fastest method, but less effective. The speed of manual demining is approximately 25 square meters (30 square yards) per hour. Using explosives-detecting dogs is also a rather difficult process because the effectiveness of the dogs depends entirely on their level of training and the skill of their handlers. Also, all EEDs are brought from foreign countries and are not used to the Sri Lankan climate, so they tire quickly. Mechanical mine clearance is the fastest method employed in Sri Lanka. The MV-4 Mini Flail System has an average speed around 2,000 square meters (2,400 square yards) per hour for light soil and 1,000 square meters (1,200 square yards) per hour for heavy soil. The Bozenta 4 clears around 2,500 square meters (3,000 square yards) per hour for light soil and 500 square meters (630 square yards) per hour in heavy soil.10
The other important factor concerning demining efforts in Sri Lanka, after speed and efficiency, is cost. Table 1 shows the factors that affect the costs of manual demining and mechanical mine clearance. By comparing Table 1 to Table 2, one can see the operating costs of demining machines is less than that of manual demining. However, the most problematic element in mechanical demining is the initial capital expenditure on the machine itself.

### Table 1: Factors that affect the costs of manual demining.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average cost per deminer</td>
<td>US$10,000/year</td>
</tr>
<tr>
<td>Daily working hours</td>
<td>8 hours</td>
</tr>
<tr>
<td>Speed of a manual deminer</td>
<td>25 m2/h</td>
</tr>
<tr>
<td>Working days per year</td>
<td>240 days</td>
</tr>
<tr>
<td>Specific cost of manual demining</td>
<td>US$0.002/m2</td>
</tr>
</tbody>
</table>

### Table 2: Costs for mechanical mine clearance in Sri Lanka.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment cost for MV- Mini Flail System</td>
<td>US$31,000</td>
</tr>
<tr>
<td>Fuel consumption</td>
<td>12 liters per hour</td>
</tr>
<tr>
<td>Area demined per year</td>
<td>1,000 m2/h</td>
</tr>
<tr>
<td>Cost of fuel</td>
<td>US$1 per liter</td>
</tr>
<tr>
<td>Cost of fuel per year</td>
<td>US$10,000/year</td>
</tr>
<tr>
<td>Working days per year</td>
<td>20 days</td>
</tr>
<tr>
<td>Specific cost of mechanical demining</td>
<td>US$0.2/m2</td>
</tr>
</tbody>
</table>

### Mine-action Society Formed in Kurdistan

Although a Mine Action Process began in Iraqi Kurdistan more than a decade ago, a considerable threat from landmines and unexploded ordnance remains in the region. Committed and qualified professionals have been working to reduce the impact of the threat, often at their own peril, but a vacuum remained in terms of formal collaboration among these parties. To address this need, the Pria Society for Mine Action Professionals was formed with the permission of the Ministry of the Interior. The Society works to improve and enhance the working conditions of demining personnel operating in Kurdistan. All mine-action personnel operating in the region are encouraged to join by registering their names with the Society. For more information, contact Jamal Jalal via e-mail at Jamal.Jalal@kmsic.org or jamaljalalman.com or by telephone at +964 6 1248 445 859.
While these objectives relate to the pillars of mine action with either a humanitarian or recovery focus, in order to achieve their stated goals, they do not make explicit provision for the definition of data collection and information management. It was decided that three more "internal objectives" would be added to ensure that the mine-action support services and information management can develop internal operational plans to support these objectives.

- **Information Management:** Establishing an efficient and effective information management system within UNMAO mine-action operations through:
  - Institutionalising the Information Management System for Mine Action as the information-management system within the Sudan Mine Action Program through the implementation of information, data collection and information policy and training.
  - Developing and maintaining a fully functional IT infrastructure to provide networking and inter-networking capabilities at UNMAO headquarters, regional offices and sub-offices.

- **Support Services:** Providing professional and effective administrative, financial and logistical services in support of UNMAS operations at the national and regional level through:
  - Coordination and facilitation.
  - Information management. It was decided that three fully functional IT infrastructures be established for each of the objectives.

**Conclusion:**

The planning process in Sudan is an inclusive, proven and holistic approach that aims at developing various planning tools that are linked and consistent with each other. The process is driven by the MAP and Work Plan, which are the focal points within the various UN and NGO programs and projects. From these priorities, the MAP and Work Plan, following the process of support in the objectives contributing to the MASF.

**Landmines Affect Citizens and Military Forces**

Landmines in two of the most heavily mined countries in the world, Afghanistan and Iraq, pose a constant threat to local populations. In 2004, the U.S. Campaign to Ban Landmines (CBM) recorded more than 120,000 casualties, including more than 20,000 deaths, in Afghanistan and Iraq. In addition, more than 100 U.S. soldiers and service members have been injured or killed by landmines. The landmine contamination also seriously affects United States Armed Forces serving in the two countries. Since 2001, more than 100 U.S. soldiers and service members have been victims of landmines in Afghanistan and Iraq. A fact sheet prepared by the USCBM cited 75 American casualties in Iraq and 55 in Afghanistan since 2001. The accidents have resulted in 35 deaths total.

For a complete report and to view the fact sheet, visit http://tinyurl.com/kq9n

Hanaa Heymans is the Planning Officer for the UN Mine Action Office in Sudan. She arrived in Sudan in June 2005 having previously been Information/Planning Technical Adviser/Technical Officer in Ethiopia and Quality Assurance Monitor for the Bosnian and Herzegovina Landmine Impact Survey. She also assisted the African Mission with establishing an information office and spent three years in northern Iraq as the Chief of Information.

**News Brief**

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The Information Management System for Mine Action is a globally used and internationally accepted database and software system that allows mine-action programmes to efficiently correlate and evaluate information. In addition, IMSMA provides powerful tools to rapidly disseminate information on hazardous areas and other important aspects of mine action by providing digital as well as printed maps and reports.

The Information Management System (IMSMA) is currently the Chief of Information Management, United Nations Mine Action Office, Building 42, Block 12, Muscat Street, El-Rajhi, P.O. Box 913, Khartoum, Sudan. Mohammad Kabir is the Chief Information Management, United Nations Mine Action Office, Building 42, Block 12, Muscat Street, El-Rajhi, P.O. Box 913, Khartoum, Sudan. Mohammad Kabir is currently the Chief of Information Management, United Nations Mine Action Office, Building 42, Block 12, Muscat Street, El-Rajhi, P.O. Box 913, Khartoum, Sudan.

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reported $15 million in confirmed and unconfirmed pledges through the Voluntary Trust Fund, which does not include funding for OEE 2 and the MME. The UN Mine Action Team will continue to update donors on resource requirements, which are evolving as the full scope of the problem becomes clear.

Update from UNDP

Iraq: The Mine Survey and Victim Assistance Workshop was held August 27–31, jointly organized by the National Mine Action Authority of Iraq, the United Nations Development Programme, UNICEF, the Office of the UN High Commission for Human Rights, UNHCR, the Swiss Agency for International Development and the U.S. Centers for Disease Control. The event facilitated policy coordination among UNMMA and key ministries with a view to increasing responsiveness and effectiveness of VVMs. A major output of the event was a Plan of Action that responsible governmental authorities and Nongovernmental Organizations in Iraq will use to target

The Iraq Landmine Impact Survey is complete, covering 15 of the 18 governorates. Landmines or unexploded ordnance contaminate 2,117 communities or about 17 percent of the total surveyed. Most of the contaminated communities are blocked from the productive use of their land. The surveyors documented 377 recent victims or suspected victims of landmines. More than 2.7 million people continue to live in these contaminated and impacted communities.

Under the field operation in Bam and Dominiq group, 10 national explosive-ordnance-disposal teams improved the safety of more than 300 farming families and made more than 24,100,000 square meters (5,954 acres) available for agricultural use in the Bam area. This was accomplished through the disposal of more than 50,000 explosive items along with the clearance of 2,214,496 square meters (5,984 acres) from May 2005 until the end of June 2006.

Key objectives include:

• Mine-awareness capability of NMMMA fully functional through its reconstituting, policy advocacy and technical support
• Promote and sustain the implementation of a national mine-action plan
• Strengthen the Mine Action Team of the National Mine Action Centre

The national workshop is targeted to stakeholders in all sectors and provides technical and financial support in planning and implementing the management and technical aspects of mine-risk education and information activities. The workshop also agreed to pilot the surveillance system in three governorates: Sulaymaniyah, Kirkuk and Dohuk. Sulaymaniyah has provided technical assistance in both the design and implementation of the localized plans through ongoing advocacy, MRE and attention to victims, participating in mechanisms for children and youth, and supporting mine-risk education and information activities. UNICEF has provided funding for institutional capacity-building activities. The money was for the department of environmental health and sanitation and provided through agreements with the governmental departments.

UNICEF continues to support the decentralization process and the 18 departmental committees for mine action already established UNICEF also advocates for the development of the remaining 11 departmental committees in order to complete the process of decentralization. Following the coordination of the departmental committees has established its own operation plan and budget, and UNICEF has begun to prioritize its new level of support.

UNICEF has provided technical assistance in the development of the remaining 11 departmental committees and in implementing the localized plans through ongoing advocacy, MRE and attention to victims, participating in mechanisms for children and youth, and supporting mine-risk education and information activities. UNICEF has provided funding for institutional capacity-building activities. The money was for the department of environmental health and sanitation and provided through agreements with the governmental departments.

UNICEF continues to support the national non-governmental organizations with technical assistance and its work across 36 municipalities in mine action for communal and institutional purposes as opposed to a pillar of mine-affected communities. In sessions was the general awareness of generic mine-assistance issues and, more specifically, its primary objectives:

UNICEF continues to provide technical support to the Centro Integral de Rehabilitación de Colombia, Pasto and Quindío regional coordinators, and to the national MRE Materials for use with different population groups. It includes local instructions in Colombia, and provides technical assistance in both the design and implementation of the localized plans through ongoing advocacy, MRE and attention to victims, participating in mechanisms for children and youth, and supporting mine-risk education and information activities. UNICEF has provided funding for institutional capacity-building activities. The money was for the department of environmental health and sanitation and provided through agreements with the governmental departments.

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UNICEF is currently conducting field tests of a facilitator’s guidebook for MRE with community facilitators and other governmental, nongovernmental, and non-governmental organizations. It will include information on the basics of MRE and will provide guidelines for integrated MRE and emergency management. The package will also be used to assist in the development of the remaining 11 departmental committees and in implementing the localized plans through ongoing advocacy, MRE and attention to victims, participating in mechanisms for children and youth, and supporting mine-risk education and information activities.

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The majority of the victims are between 14 and 49 years old, and most of them were hosting when the accident happened. Out of 582 contaminated communities, 41 percent have primary schools in the vicinity of contaminated areas, indicating that children are still at risk of landmines and UXO. The project was implemented by the General Directorate of Mine Action, which is the regional mine-action center for Myanmar and Laos.

In total, 1,312 adults completed a Knowledge Attitude Practice questionnaire, of which 54 percent were men and 46 percent were women. UNICEF and MAG secured a research grant to have four focus-group discussions with 14 groups of men and 12 groups of women. A total of 720 children over eight years of age completed the KAP questionnaire (495 boys and 225 girls), and the research team held 38 focus-group discussions with children, using UNICEF ethical guidelines.

The study distinguished between intentional (i.e., voluntary) exposure to live ordnance, in which actors aware of the risk purposely exposed themselves to live ordnance, and unintentional (involuntary) exposure. While some of the prevention activities can be the same, unintentional exposure is an important variable and particularly relevant in Laos, where UXO injury due to intentional exposure to live ordnance (for example, through the deliberate tampering of ordnance for the scrap-metal trade) is increasing.

The assessment found a generally high level of UXO awareness and knowledge of risk-taking and risk-reduction behaviors, however, the assessment also found that many people, including women and children, continue to voluntarily interact with live, or potentially live, ordnance on an almost daily basis.

The findings from the study will be used in close collaboration with the recently established UXO National Regulatory Authority to inform MRE strategy development as well as the development of new messages for at-risk populations—especially children—who are attracted to scrap-metal collection.

The UXO Needs Assessment data provides a unique opportunity to assist the government in taking the next strategic steps to develop appropriate messages and responses that more effectively target areas and people.

The upcoming activities include a four-day UXO Risk Education Strategy Planning Workshop to be conducted by staff from the Geneva International Centre for Humanitarian Demining, UNICEF and the Laos Youth Union. In addition, finalization of the UXO Risk Assessment as well as translation of the IMAS Best Practice Guidelines will continue. UNICEF will also give support to the Community Awareness Technical Working Group of the NFA for the first technical working group meeting. The UNICEF office is seeking new funding to expand support in its collaboration with the UXO NFA and the development of new risk-reduction strategies.

See Endnote, page 112

book reviews

Funding Shortfalls Exceed US$300 Million

The recently released Portfolio of Mine Action Projects 2007 published startling figures concerning funding shortfalls for groups and organizations tackling the international threat of landmines and unexploded ordnance. More than 100 nongovernmental organizations, national authorities and United Nations agencies reported a total shortfall of U.S.$317.5 million for projects in 29 countries or territories.

The 2007 edition of the report reviews more than 300 proposals with a combined budget of $429 million. Only $125.7 million in funding for these proposals has been secured, leaving nearly 75 percent of these projects unfunded.


reviewed by Dr. J. Peter Pham (James Madison University)

P"ermission programs have evolved considerably since the first program for humanitarian demining, the Mine Action Program in Afghanistan, began in 1988. Likewise, the legal basis for dealing with the problem of landmines has developed substantially from the 1980 Protocol II to the Convention on the Prohibition or Restriction on the Use of Certain Conventional Weapons Which May Be Deemed to be Excessively Injurious or to have Indiscriminate Effects, which entered into force in 1983, to the Convention on the Prohibition of the Use, Stockpiling, Production, and Transfer of Anti-Personnel Mines and on Their Destruction (also known as the Anti-personnel Mine Ban Convention or the Ottawa Convention), which was adopted September 19, 1997, and entered into force March 1, 1999.

The Ottawa Convention opted for a more radical approach to humanitarian law than previous agreements, bringing the disarmament element into the total prohibition of anti-personnel mines. While the objective of the Convention is clear, some of its core provisions can be subject to ambiguity. For example, Article 1 stipulates a State Party "undertakes never under any circumstances . . . to use anti-personnel mines." The use of a weapon is typically a single action where no distinction can be made between the actor and the beneficiary of the action (e.g., pulling the trigger on a gun). However, with anti-personnel mines, the weapon is designed with a time-lag: one person may lay the mine, another may use it tactically. Hence, would a military unit that moves into an area where mines were laid and revisits itself for its defensive perimeter violate the prohibition on use if the unit in question was that of a State Party?

For those insignificant questions such as this one, we are fortunate to have Stuart Madden’s contribution to the prestigious Oxford Commentaries on International Law series, edited by Professors Philip Alston of New York University and Vaughn Lowe of Oxford University. This work, the first volume of a projected line of commentaries on arms-control treaties, offers a comprehensive article-by-article interpretation of the Mine Ban Convention as well as a thorough overview of the Convention as a whole and the unusual fast-track negotiation—the “Ottawa Process”—that led to its adoption. Likewise, very useful is the inclusion of a long introduction describing the development and use of anti-personnel mines, assessing their military utility and reviewing the historical and legal antecedents to the Convention.

While it is undoubtedly subjective at the margins with particulars about this paragraph or that parenthetical, Madden knows his material well—he was a member of the UNICEF delegation to the 1st Review Conference on the 1980 Convention on Certain Conventional Weapons (1995–1996), as well as a member of the International Committee of the Red Cross delegation to the Oslo Diplomatic Conference which adopted the AP Mine Ban Convention—and is clearly passionate about the subject.

(he is donating all royalties from the volume to a nongovernmental organization that provides financial and technical support to local organizations rehabilitating victims in mine-affected countries). Although it is neither an easy read (but not a difficult one either) nor an inexpensive book, this work deserves an honored place on the shelf of every scholar of international humanitarian law as well as that of mine-action centers worldwide.
Brazilian photographers Vinicius Souza and Maria Eugênia Sá provide a glimpse of hope through their camera lenses in Angola—The Hope of a People. After many years of unrelenting civil war, these 48 powerful black-and-white and color images capture both the “new face of Angola” and the hope of the people to create a new identity. In September and October 2002, Souza and Sá traveled to Angola in hopes of photographing the oppressed Angolan people in the streets of Luanda, the schools and hospitals of different suburbs, and in the refugee camps of Huambo. They encountered older people who were apprehensive of being photographed, fearing in whose hands the photograph would end up, and adolescents who would often and enthusiastically ask, “Hey, friends! Could you take a picture of us, please?”

Each photograph expresses the different facets of the Angolans’ lives: from families walking for days to wait in line for food donations from the International Committee of the Red Cross to children bathing under bridge crossings despite the dangers of the ever-present landmines. The photographers’ unorthodox style focuses on the eyes and facial expressions of the subjects, rather than where they are or what they are doing, and offers a glimpse of who these people are and what they have been through. Despite their hardships, the Angolans wear smiles of strength and courage, displaying the true face of Angola.

For more information on the project and the photographers, please visit this Web site: http://mediaquatro.sites.uol.com.br.

News Brief

Tissue-regeneration Research

The Defense Advanced Research Projects Agency has awarded a US$3.7 million grant to the University of Pittsburgh’s McGowan Institute for Regenerative Medicine and a $1.2 million grant to the University of Massachusetts Lowell. The grant money will fund research into the structure and functions of lost or damaged tissues.

Researchers are optimistic that the knowledge gained will advanced studies into the possibility for tissue regeneration. The teams will investigate how tissues and cells in certain animals, like salamanders, allow for the complete regeneration of lost tissue. Researchers will begin the large, multi-center program by examining the cellular and molecular processes that allow for regeneration—while humans respond to injury with scar tissue, salamanders and similar animals develop progenitor cells that will eventually develop into specialized cells of bone, muscle, skin and nervous.

To a certain extent, humans already are capable of repairing damaged cells—liver and red blood cells self-renew—but are incapable of reforming whole limbs.
Explosive Harvesting Program

The Explosive Harvesting Program is a research and development program funded by the U.S. Department of Defense Night Vision and Electronic Sensors Directorate Humanitarian Demining Research and Development Program. The concept was designed by Golden West Humanitarian Foundation and is being jointly developed with the Cambodian Mine Action Centre.

by Roger Hess [ Golden West Humanitarian Foundation ]

F or many mine-action agencies, the three most expensive components of a clearance program can be referred to as the ‘Three E’s’, equipment, expertise and explosives. Procurement justifies the expense assumption to one-third of an operational budget and this often becomes one of the most difficult issues to resolve.

Program Background

The Explosive Harvesting Program was designed to alleviate this problem. The effort mobilized as a joint project between Golden West Humanitarian Foundation and the Cambodian Mine Action Centre in March 2005 with the following goals:

• Develop a deployable, cost-effective means to remove explosives from munitions such as artillery, anti-tank mines and anti-personnel.
• Develop the methodology to convert the recovered explosives into neutralization and/or disposal tools for demining and Sous-surface ordnance-disposal teams.

The initial concept involved using three 6-meter (20-foot) Inland Manufacturing Standardization Organization (ISO) shipping containers incorporating all the equipment required to conduct operations. The local support would be fuel, water and an unpolluted location from which to work.

Instead of building the system in a Western country and then shipping it abroad, Golden West elected to construct and develop the system in Cambodia, importing only those critical items that could not be found locally. The reason behind this approach is simple: research and development efforts designed in developed countries sometimes fail once they are sent to the field. The most common reasons are logistics and spare parts. By assembling the system in Cambodia, only the most expensive tools that were fabricated to complete the process.

The major issues we are focusing on are cost, safety, supportability, size and weight.

EHP Cutting Equipment

Based on recognized technologies used in the remote cutting of unexploded ordnance, we used available data and selected two systems: the BHR/Dajjar Osprey hydro-abrasive cutter and the metal-cutting saw. We first selected the Osprey cutter, but after using it in a production role, as opposed to an explosive-ordnance-disposal role, it was determined that hydro-abrasive methods were actually not well-suited. We then discovered that some organizations had adapted commercial metal-cutting band saws for remote operation and success was found. A functional prototype was developed for testing purposes.

The Osprey was designed for field cutting unexploded ordnance, we found it important to ensure the hydro-abrasive cutting system can be supported in field conditions. This objective includes the ability to work in remote locations where resupply is difficult, local manpower has minimal skills and only the bare essentials, such as fuel and water, are available. While the Osprey is a fine machine, it is moderately complex and the operator must be certified by a factory-authorized trainer. It also requires a large supply of imported 100-micron abrasive sand to work effectively; the sand found in Cambodia was not suitable even after screening to the correct micron size.

With these points in mind, we became aware that this approach was not feasible. However, for a production line processing many projectiles, the water must be trapped and evaporated and residue destroyed to avoid an environmental contamination problem.

Metal-cutting saws. Based on all of these issues with the hydro-abrasive method, we determined a different approach should be identified and tested. While looking at alternatives, we found an African ammunition manufacturer who had been using modified metal-cutting saws with great success. Further investigation revealed other test centers have also used metal-cutting saws on explosive ordnance. One research showed that over 3,000 pieces had been cut using this process, and only one accident occurred when a power backhoe ran out of cutting fluid and was not shut down.

After learning of this technique, the team procured an inexpensive metal-cutting band saw through local sources and tested the system on unexploded ordinance to assess the cutting speed and temperature. The team made some adjustments, modified the controls for re-use and conducted more tests, after which the team felt confident in testing the saw against explosive ordnance in our secure testing site. The results of this site is sufficient to prove the team from blasts of up to 1.5 mm high explosive projectiles, so safety is maintained at all times.

Ramps. The test results exceeded our expectations. Neither the caging nor explosives exceeded ambient temperature, nor was there a measurable loss of explosives. We found that using the metal-cutting saw allowed us to cut the ordnance four to five times faster than with the hydro-abrasive system.

It must be noted the band saw cannot perform the full range of tasks that can be done with the hydro-abrasive system. The Osprey was designed for field deployment to cut fused, fused ordnance. This task should never be attempted with a band saw.

Some more modifications and testing are planned for the band-saw technique; however, for processing stockpiled ordnance and converting it into disposal charge, the initial results show a 25–30 percent decrease in capital equipment costs with a 150–percent increase in production capability.

The sustainability in remote locations is greatly improved and training requirements for local staff are minimal. This approach also eliminates the worry of concerns of the hydro-abrasive system, and the hazardous waste stream of the production line is all but eliminated.

EHP Operations

Explosive recovery. Along with reducing the time required to open a production cut out, the Osprey, Casing, Melting and Cutting Manager improved the steam process used to extract the explosives from the ordnance casing. Compared with our previous procedures, this new equipment significantly reduced the time for rerouting the explosive by over 25 percent. The exact time varies with the projectile size and fillers; however, a broad average for TNT- and Composition B-loaded projectiles between 122 and 152 mm (5–6 inches) is now only three minutes. The explosives drop free from the projectile casing as a solid piece. Once the explosives have been allowed to dry and cool, they are weighed and inventoried.

Cutting operations. As cut TNT is sensitive to standard blasting caps, the team has analyzed mixes of TNT and other commonly available materials to produce a reliable, individual charges and to make the recovered explosives go as far as possible.

For larger charges, boosters with detonating cord are first cut; then TNT is cut over the booster, which ensures full contribution of the TNT. Maximum use is made of locally available, low-cost containers that allow the permanent marking system to be employed for accountability and reliability testing. Once marked, the individual charge can be traced back to the date it was made, who made it and from what type of projectile the explosive was recovered.

Figure 1: An early prototype of the 100-gram (3.5-oz) “caseless” charges produced by the EHP. The detonating cord initiation system is cast into the charge, so the detonating operator only has to attach a blasting cap to the free end. The red arrow indicates which end to place facing the target to initiate the effect of the blast.

Figure 2: Measuring the temperature of the projectiles casing and explosive mass charge immediately after it was cut with the modified band saw. The temperature of the cut and uncut charge did not exceed ambient temperature. Note the smooth surface of the main charge, with no noticeable contrast between the cut and uncut portion during the cut.

Figure 3: A view of a US$125-374 DT-462 TN filled projectile as cut in half with the Dajjar Osprey hydro-abrasive cutter. micro courtesy of R. Hess, GWHF

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pressed TNT-filled projectiles. Our team noticed a substantial difference between the texture and density of Russian and U.S. TNT. Working on a hunch, our Explosive Ordnance Disposal Supervisor created a detonator well in a small piece of Russian TNT for a standard blasting cap and tested it against a 20-mm (1-inch) steel witness plate. It detonated with full contribution.

Research revealed that the Russian manufacturer used a process called “screw loading” for filling large-caliber projectiles with TNT. This makes what the Western technician would call “pressed TNT.”

This fact was not referenced in any of our manuals, however when this specific type of ordnance is available, the harnessing process becomes far simpler. The recovered explosive can be quickly converted into half-moon or wedge charges without complete recasting, producing disposal charges that are extremely well-suited for explosive ordinance disposal and demining operations. As of October 12, 2006, the Cambodian Mine Action Centre and The HALO Trust have destroyed over 5,000 landmines with these charges, repurposing a nearly 100-percent-success rate.

EHP Achievements

Stockpile reduction. EHP’s working relationship with the Royal Cambodian Armed Forces is excellent, and they are fully cooperating with the program, turning over large stocks of their excess ammunition for processing. This not only identifies a good internal source of disposal explosives to support the long-term clearance efforts in Cambodia, but it also lessens the ammunition-stORAGE risks for the general public and reduces environmental damage caused by bulk demolition of ordnance.

FFE Metal. As of October 2006, nearly 6,000 kilograms (6.6 tons) of “free from explosive” metal has been returned to the RCAF. The empty shells are heat-treated for four hours, exposing the metal to temperatures exceeding 1,000 C (1,832 F). This procedure ensures all explosive residues are destroyed and that metal is completely safe to reuse.

The Future of EHP

There are still some development issues required prior to the EHP becoming a functional, cost-effective package. Recognizing this, the U.S. Army Night Vision and Electronic Sensors Directorate has provided funds to continue the research and development through 2006 to complete these tests.

The team has already made exceptional progress on the development of a “fly away” version of the EHP. The intent is to develop a smaller, less expensive package to support and supply small units. This system is designed to fit into a single 8x10-foot (2.4x3-meter) ISO shipping container for air/sea transport, or sent by individual component boxes that can lead into a single three- to four-metric-ton (3.5-5.5-U.S.-ton) cargo truck.

The modified hand saw already reduced our size, weight and cost requirements; however, the steam generator was the other major item that required attention. The current unit is a 4.8-metric (6-foot) tall, weighs 400 kg (1,058 lbs), and requires a 110-kW generator (see Figure 7 on previous page). Other commercial units were not suitable, so our Curing, Melting and Casing Manager built a system specific to the EHP needs that runs from a 10-kW generator.

The smaller steam unit and generator reduce the overall costs, particularly shipping costs and fuel consumption. Figure 8 (see previous page) puts this into perspective: the unit in the track is 18-kW, which is suitable for the basic fly-away kit.

Overall cost reductions. With the current developments, the capital expense and logistical support required to assemble and support a “fly away” version has substantially decreased. These price reductions have brought this specific version to a level that is cost-effective for nongovernmental organizations to purchase the required equipment and train their personnel in its use.

Long-term goals. Working with the U.S. Department of Defense NVESD, the U.S. Department of State Office of Weapons Removal and Abatement has recently committed funds to expand the explosive-ordnance-disposal capacity of the program in 2006 and to support EHP basic operation in the Cambodian province of Kampot Chhuy in 2007. Between the support of NVESD and WRA, the Golden West EHP team can continue training CMAC counterparts in proper explosive identification, ordnance curation, main charge removal, and charge production while providing support and assistance to the demining, EOD and stockpile-reduction efforts in Cambodia.

Given the success of the initial Explosive Harvesting Program, there is an opportunity to construct a second EHP site in Kampot Chm specifically designed for processing large-capacity air-dropped bombs and to field mobile “fly away” kits, as well as permanent units, in other locations around the world.

See Endnotes, page 112

Australia Increases Aid to Middle East

The Australian government recently announced it will increase humanitarian aid for relief and recovery efforts in the Middle East by AUD$35 million (US$28.5 million). This will bring the total funding by Australia to the region to AUD$105.5 million (US$82.2 million).

Four U.N. organizations will receive AUD$2 million (US$1.57 million) directly because they are actively involved in immediate recovery efforts in Lebanon.

• The United Nations Development Programme will receive AUD$500,000 (US$390,000) for the Quick Delivery-High Impact Initiative, a high-impact fund that helps repair infrastructure and make other improvements to the restoration of civil functions.

• UNICEF and the World Health Organization will each receive AUD$500,000 in funding for medical and health programs.

• Finally, the U.N. Mine Action Service will receive AUD$500,000 for the removal of unexploded ordnance.

UNICEF will also receive AUD$1 million (US$780,000) for emergency health services in the Palestinian territories.

Further reconstruction assistance will be forthcoming as the governments of Australia and Lebanon coordinate efforts.
T he International Test and Evaluation Program for Humanitarian Demining (ITEP) has conducted trials all throughout the world, testing and evaluating detectors that will help in the area of humanitarian demining. ITEP has partnered with different organizations to follow through with these various trials. Current activities include the testing and evaluating of various metal detectors and metal detector arrays described below.

Testing of the Bozena-5 medium flail (ITEP Project 2.2.4.16). The first test was carried out in Croatia during spring 2006. It was carried out by the Croatian Centre for Testing Development and Training (CCHTD) in cooperation with the Centre for Humanitarian Demining on Services to the ITEP Executive Committee. A set of mechanical-demining equipment, mainly flail and combined flail/tiller equipment, was tested during spring and summer 2006 by Canada, Italy, and the United Kingdom, respectively. The results of these trials were disseminated at the Cen Workshop 26 held in May 2007. Additional Projects

The ITEP Work Plan 2006 compiles all test and evaluation activities that will be carried out during 2006 by the ITEP member countries, either as single-country activities or as ITEP collaborative efforts. The following summary provides an update on collaborative test initiatives started during 2005 and continuing in 2006, including also some of the new test and evaluation efforts envisaged.

Test and Evaluation Activities

Systematic test and evaluation of metal detectors (ITEP Project 2.1.2.6). The first three of the three originally planned regional trials took place in Malawi and Croatia to evaluate the current fleet of available metal detectors were carried out during 2005 by the Joint Research Centre of the European Commission in cooperation with several ITEP partners. The corresponding final reports are available at the ITEP reports website. The third and last regional trial was originally proposed by the JRC/EC and then cancelled. The Bundesanstalt für Materialforschung und -prufung took on the responsibility of running the remaining STEMD trial during October 2006. They were assisted by participants from Belgium, the Netherlands and the Croatian Centre for Testing Development and Training. This last STEMD trial was combined with another trial (ITEP Project 2.1.2.8), evaluating two metal-detector arrays for humanitarian demining.

Evaluation of metal-detector arrays for humanitarian demining (ITEP Project 2.1.2.5 and 2.1.2.6). Two metal-detector arrays were tested in the winters of 2005 and 2006. The first project (ITEP Project 2.1.2.5), which started at the beginning of the year, was carried out by the Institute of Forest, Landscape and Wildlife (IfW) in cooperation with other ITEP participants. The second project (ITEP Project 2.1.2.6), to be led by the Netherlands (partners still to be defined), aims at continuing this testing in less controlled conditions (different soil types) and in mine-affected countries.

The first project started in mid-2007. HSTAMIDS operational field trials and demonstrations project (ITEP Project 2.4.2.5). The three planned field trials that started at the end of 2004 have been finalized. The main objective of the trials was to evaluate the performance and suitability of the handheld Stand-Off Mine Detection System (HSTAMIDS) dual-sensor detector in multiple humanitarian-demining environments, was fully accomplished. Trials were carried out in Thailand, Namibia and Afghanistan. A final test report was expected to be released at the end of 2006. In the course of 2006, Long-term Operational Evaluations of the HSTAMIDS took place in Cambodia (started in April 2006), Afghanistan (started in July 2006) and Thailand (started in September 2006). During these trials, the system was operationally employed as a primary and sole detector for extended periods (up to 6 months) by local deminers in minefields in a variety of environments and with varying levels of threat. Local demining entities are collecting data on system and operator performance and will provide periodic status reports.

Assessment of the dual-sensor detector MINEHOUND (ITEP Project 3.2.4.10). This long-term trials of the MINEHOUND dual-sensor detector began in the summer of 2005 and ran parallel in tandem in Cambodia, Bosnia and Angola. The main objectives of these trials were to determine the reduction in false alarm rate when a dual-sensor detector is used in the minefield and to gather data on the performance of the MINEHOUND with respect to depth and soil type. Almost all ITEP participants were represented as to see “ITEP invigilators” during one or more of the regional trials. ITEP
Visor Scratch Repair and Prevention

Severe eye injuries occur in 30 percent of demining accidents.1 VIsors are known to be effective personal protective equipment when worn properly, but deminers often lift or remove their visors because scratches, glare or fog make them hard to see through, or because they are hot, heavy and uncomfortable to wear.2 Addressing each of these specific design problems could increase visor use and prevent a significant number of debilitating injuries. This paper presents methods for preventing and eliminating scratches on demining visors.

by Andrew Heafitz | Massachusetts Institute of Technology | Benjamin Linder | Franklin W. Olin College of Engineering | Marta Luczynska | Massachusetts Institute of Technology | and Mark Scott | Cambridge University

S
ince deminers rely heavily on their eyes, they have two choices when their visors become scratched: Either they leave the visors down and work with impaired vision, which could increase the chances of an accident, or they raise the visors, which breaks standard operating procedures. Their eyes and face vulnerable to injury in the event of an accident. The following scratched visor story is one of many in the Database of Demining Incidents and Victims:3

“...we were baked and when they were heated using a hot air gun, or heat gun. However, heating involves bringing plastic to an elevated temperature for an extended period of time, which requires a special jig and additional equipment to prevent a shield from sagging and losing its shape. Heat guns work quickly and warm up a large area of a shield in a minute or two, and they do not risk misshaping visors. Heat guns were deemed to be more controllable and appropriate to the task than the torches needed for flame polishing. However, it is possible to overheat a polycarbonate shield in the plastic or medium-heavy shields could be adapted for flame polishing.

Process

The heat-gun process for repairing medium-heavy polycarbonate visor shields is simple and only requires the use of a heat gun and the ability to wash the shield. For more heavily scratched visors, this drying is necessary, which requires the use of an oven. Polycarbonate absorbs a small amount of moisture (typically 0.1 to 0.35 percent by weight), which results in bubbles forming in the polycarbonate when it is heated to high temperature. Drying for an extended period of time drives off this moisture and prevents bubbling during subsequent heat-curing. Smaller scratches—those that can be removed with a heat gun in less than 10 seconds—can be cleared without drying if done carefully. Attempting to remove larger scratches in undisturbed plastic almost always leads to bubbles forming.

The following process to repair a heavily scratched polycarbonate shield may need to be adjusted for different visors, equipment or environmental conditions in any case, experimentation with scrap materials is advisable.

Wash the shield. After disassembling a visor, wash the shield with a drop of non-abrasive, liquid dish soap applied with the fingers. Rinse the shield until the soap and any debris are removed. Pat the shield dry with clean cloth. Washing is necessary to remove dirt marks, which an operator can mistake for scratches in the removal step, potentially causing him to overheat the plastic. Furthermore, dirt could become permanently embedded in the plastic when it is heated.

Dry the shield in an oven. This step is optional for removing light scratches and haze, but must be used to prevent bubbling when the visor is dried. Preheat an oven to 120 °C (250 °F) for a five-millimeter- (inch-thick) shield. Place the shield in the oven without allowing the optical surface to touch the rack. Dry the shield for 24 hours. The drying time is a function of material thickness and must be obtained from the material supplier or by experimentation. Instructions for drying different shapes and grades of polycarbonate are available from plastic materials suppliers.4 A five-millimeter-thick dried shield can be stored for up to 24 hours in moderately humid conditions (50 to 60 percent humidity) and still be treated effectively.

Cool the shield. Remove the shield from the drying oven and let it cool for 20 seconds before removing it from the oven. The intermediate cooling step is necessary to avoid heat buildup during the scratch removal step, which can lead to overheat and damage.

Position the shield. Hold the shield up to a light source with one hand so that you are looking at the scratched side of the shield and toward the light (see Figure 2). Scratches are easier to see when illuminated from behind. However, an operator must be careful to not mistakenly try to remove a scratch that is visible through the plastic front side of the shield.

Remove the scratches. With the other hand, use a heat gun set to a high setting with its outlet directed toward the five-centimeter (one to two inches) from the surface of the shield (see Figure 2). Move the tip of the heat gun in a成a circular motion so that heat does not build up in any one location. As soon as the scratches disappear from one location, move to a new location and continue until all small- to medium-sized scratches are removed (see Figure 3a).

Dusting the visor in one location for 10 seconds or more on undisturbed plastic will...
caused to bubble (see Figure 3b). Dried plastic will not bubble, but it will get soft enough to distort and create a wavy surface. Waves create an undesirable lens effect that significantly distorts the image seen through a shield.

This process was used successfully in an environment with temperatures ranging from 15 to 27°C (60 to 80°F) and 50 to 60 percent relative humidity. Heat guns rated for 1,000 to 1,500 watts were used successfully, as were conventional and auto-circulating ovens. It may be difficult to find ovens in some areas large enough to hold shields without putting a drying oven to clear medium to heavy scratches. As were conventional and air-circulating ovens. It may be possible to use an oven in a central ground clearance of three centimeters (1.2 inches). Demining equipment blast, so the roll bar was blast-tested on a dummy using a 240-gram (half-pound) charge of 50 percent TNT and 50 percent PETN to simulate a blast mine. As a result of the explosion, the roll bar was pushed up to the top of the visor, but did not deform or distort, which shows that anchoring it firmly to the helmet helps to prevent the face shield from coming into contact with the helmet's brim.

The roll bar has advantages over some other methods for protecting polycarbonate visors from scratches. For instance, a thin sacrificial layer can be placed over the basic visor shield. Once this layer becomes scratched, it is easily replaced, doubling the life of the visor. However, this method introduces an extra material through which the deminer has to see. Sacrificial layers are especially problematic if dirt or moisture becomes trapped between the layers. Also, as the sacrificial layer gets scratched, visibility gradually degrades until the layer is removed. The roll bar reduces scratching on any optical surface, whereas the sacrificial layer collects the scratches on a disposable surface. Legs protruding from the sides of the visor also have been implemented in the past. However, the roll bar offers a protective geometry for a wider range of surfaces and situations than legs.

MIT "Design for Demining"
The research on this project was conducted in the "Design for Demining" class taught at the Massachusetts Institute of Technology. The primary goals of the course are to teach students about product design, increase their knowledge of the complex topic of demining and have them create and deploy products that are appropriate for the demining community. When the course was first introduced, the students develop a product or process that addresses the needs of the community by examining the details in the public domain so that the idea can be used on a wide scale as possible. Giving away intellectual property is a fast and effective alternative to the more conventional route of patenting and selling an invention.

We would like to thank the National Collegiate Inventors and Innovators Alliance, the MIT Public Service Center and MIT Edgerton Center for funding the class. Terrie Thomas of Security Devices Ltd. supplied the visors, Andy Smith for technical advice, and several MIT students who worked on visors—Harrett Gill, Anna Runia, Bev Jones, Jeremy Wallach and Amy Smith. See Endnotes, page 112.
Throwing Out Mines: The Effects of a Flail

by Ian McLean, Barbara Sargisson, Johannes Dirschel and Havard Bach [Geneva International Centre for Humanitarian Demining]

The authors discuss a study conducted on flail machines to prove the effectiveness of this technology in destroying anti-personnel mines.

Recent tests and trials on the clearance capability of flail machines have shown that if machines are adequately operated and the operating environment is favorable, flails are able to achieve clearance rates approaching 100 percent. However, some field operations have experienced clearance rates as low as 50–60 percent. The main reason for the discrepancy is that a proportion of aged mines have faulty detonation mechanisms. Having failed to detonate, some remain apparently intact after flailing. When found by quality assurance teams, these mines are reported as missed because examining their firing mechanism is time-consuming and dangerous. The resulting under-representation of clearance rates suggests that flail machines should only be used as ground preparation for subsequent denuding, a conclusion that we believe to be inappropriate.

To satisfy the requirements of statistical analyses, tests on clearance capability of flail machines require a large number of mines. Real mines are scarce and dangerous, mine mimics are expensive, and testing may be constrained to using too few mines to support statistical analysis. Despite such resource constraints, a continued effort to test machines is desirable and should be prioritized. Clearly, any study designed to explore the proportion of mines that are initiated or broken up by a machine will need to use real mines. However, some research questions allow testing without using real mines (or real mine-mimics).

Here, we investigate the pattern of throw-out for mines that are not broken up or destroyed by a flail. The study used unbreakable “mine-mimics,” so it explored issues of throw-out only. The results address issues about the direction and distance mines are likely to be thrown and their visibility after flailing, in relation to standard treatment factors in mine clearance (soil type and mine depth).

Methods

The study was conducted at the Swedish Explosive Ordnance Disposal and Demining Centre test site in Esko, Sweden, in December 2005. All test fields were laid out in the same way: a strip 5 metres long and 80 centimetres wide within a soil platform 3 metres wide (see Figure 1 on next page). The “mines” used were made of a hard plastic material and similar in dimensions to hockey pucks or a small round can of nuts. The 60-mm puck had a height of 35 mm, the 90-mm a height of 50 mm and the 110-mm a height of 80 mm. A metal washer had been screwed into the puck to make it measurable. Twenty were laid in a standard array in each strip, giving a sample size for each treatment combination of 20 (or slightly fewer in a few cases of missing data).

The treatment variables were:

- Three soil (sand, gravel, topsoil)
- Four depths (0, 5, 10 and 15 centimetres)
- Three sizes of mines (60-, 90-, 110-mm diameters)
- Sand and gravel were tested with all mine sizes and depths. Topsoil was tested with 60-mm mines only, although at all treatment depths.

The machine, a DOKING MV-4, is described in detail in the Mechanical Demining Equipment Catalogue and is shown in the picture above. It was run once only along the strip in one direction, which is treated as “north” for analyses of the throw angle. The machine has a clearance width of 1.725 metres, thus the test clearance strip of 80 centimetres gave a margin of error of about 45 centimetres on each side. Flail depth was set at 10 centimetres.

Parameters measured were:

- Distance the mine was thrown
- Directions the mine was thrown
- Visibility of the mine after flailing

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Parameters measured were:

- Distance the mine was thrown
- Directions the mine was thrown
- Visibility of the mine after flailing

The angle (direction) of throw required some adjustment for statistical analysis and visual representation for the following reasons:

- The mean of several angles might not portray a sensible conceptual pattern. For example, if one mine is thrown forward (20 degrees) and another is thrown backwards (160 degrees), the average throw direction for these two mines (90 degrees) does not portray a meaningful direction in absolute terms. The data given in Table 1 are means and are useful for statistical comparison between treatments, but they should not be used to represent typical throw angles.
- A similar problem applies to mines thrown to the left or right. Mines thrown at 20 degrees and 340 degrees are thrown at equivalent angles (20 degrees) and another is thrown backwards (160 degrees), (180 degrees) is clearly inappropriate. To address this problem, the data were adjusted for analysis so that all mines were considered on one side only.
- The throw angle is therefore presented as frequencies rather than as means, calculated from equal-sized (45 degrees) sectors of one side of a compass.

The throw angle is therefore presented as frequencies rather than as means, calculated from equal-sized (45 degrees) sectors of one side of a compass.

Results Summary

A typical throw-out result, seen in Figure 2 (see page 102), is for 60-mm mines buried at 15 centimetres in the three soil types. In this figure, the (0,0) point is the original site at which the mine was laid, and the datum points indicate where the mine was thrown after flailing. Most mines remained close to and slightly behind where they were laid. If these were real mines, they would likely be compressed into the soil (although they might be exposed due to soil disruption).

Table 1: Summary of data for throw direction (adjusted data for one side of the compass only). The Flail moved north; thus $0º = N$, $180º = S$.

<table>
<thead>
<tr>
<th>Soil</th>
<th>Depth (cm)</th>
<th>Size (mm)</th>
<th>Mean Dist (m)</th>
<th>S.E.</th>
<th>N</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>0</td>
<td>60</td>
<td>2.0</td>
<td>0.49</td>
<td>7</td>
<td>0.3–3</td>
</tr>
<tr>
<td>Sand</td>
<td>5</td>
<td>60</td>
<td>2.6</td>
<td>0.55</td>
<td>7</td>
<td>0.3–3</td>
</tr>
<tr>
<td>Sand</td>
<td>10</td>
<td>60</td>
<td>3.2</td>
<td>0.60</td>
<td>7</td>
<td>0.3–3</td>
</tr>
<tr>
<td>Sand</td>
<td>15</td>
<td>60</td>
<td>3.7</td>
<td>0.65</td>
<td>7</td>
<td>0.3–3</td>
</tr>
</tbody>
</table>

Table 2: Summary of data for throw distance (in metres, S.E. = standard error).

<table>
<thead>
<tr>
<th>Soil</th>
<th>Depth (cm)</th>
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<th>S.E.</th>
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<td>7</td>
<td>0.3–3</td>
</tr>
</tbody>
</table>
The proportion of 60-mm mines visible after flailing did not vary significantly in relation to depth (X²=2.6, d.f.=3, P=0.45; see Figure 5).

**Results for All Mine Sizes**

**Distance thrown.** No significant effects were found on distance of either mineral size (F₁,₂₅⁾= 0.37; NS) or mine depth (F₁,₂₅⁾= 1.19; NS). The interaction between size and depth was not significant (F₁,₂₅⁾= 1.07; NS). Thus mines of all sizes and depths were thrown similar distances in sand and gravel.

**Angle of throw.** As already reported for 60-mm mines in all three soil types (Figure 3), mines of all sizes were thrown more to the right than to the left in sand (L>R, 65:148, X²=16.8, P=0.00) and in gravel (L>R, 85:136, X²=5.8, P=0.016).

**Results for All Soil Types, 60-mm Mines Only**

**Distance thrown.** No significant effects were found for distance of either soil type (F₆,₁₄₉⁾= 0.37; NS) or mine depth (F₁,₁₄₉⁾= 1.19; NS). The interaction between soil type and depth was not significant (F₁,₁₄₉⁾= 1.07; NS). Thus mines of all sizes and depths were thrown similar distances in sand and gravel.

**Angle of throw.** As already reported for 60-mm mines in all three soil types (Figure 3), mines were thrown more to the right than to the left in sand and gravel. There was no significant difference between sand and gravel.

**Results for 60-mm Mines Only**

**Distance thrown.** Significant variation was found for distance thrown in different soils, with mines thrown greater distances in topsoil relative to sand and gravel (Figure 3, F₁,₁₄₉⁾= 10.7; P=0.001). There was no significant difference between sand and gravel.

**Angle of throw.** Side (laterality) of throw was investigated across all soils and depths for the 60-mm mines. Mines thrown directly forward (0±9 degrees) or backward (180±9 degrees) were removed from this analysis. Ignoring soil type and depth, significantly more mines were thrown to the right (358) than to the left (79) (X²=7.6, P=0.001), indicating that the flail had an asymmetric action. No significant effects were found for angle of throw in relation to soil type or depth for the 60-mm mines. The data for each angle were therefore lumped across all soil and mine types, and are reported below.

**Viability of 60-mm mines after flailing.** About 40 percent of the 60-mm mines were visible after the flail had been through. After flailing, most mines were visible in topsoil and fewer were visible in sand (see Figure 4), although the pattern was not quite statistically significant (X²=5.3, P=0.07). One reason for the greater viability in topsoil is that mines were thrown farther from topsoil and were therefore more likely to be thrown outside the test strip, where they were less likely to be covered by the machine. This effect is less likely in a minefield, where a large area is cleared. The greater viability of mines in gravel is likely due to the coarse texture of gravel relative to sand.

The angle of throw for all mines is summarised in Figure 6. Included in sand and gravel are mines of three sizes (60, 90, and 110 mm), whereas only 60-mm mines were included with topsoil. Additional data (all mines thrown to one side) were used for this analysis.

In general, most mines were thrown either directly forward (0±45 degrees) or directly backward (136±180 degrees), with a higher proportion of mines thrown backward overall. Very few mines were thrown linearly forward (46±90 degrees). The highest proportion of mines thrown forward was from topsoil.

No relationship between angle of throw and soil type was found for 60-mm mines (as mentioned above). However, when data for all mine sizes were used (sand and gravel only), mines were thrown behind significantly more in sand than in gravel (F₆,₁₄₉⁾= 4.21, P=0.04; data in Table 1—see page 165).

**Visibility of all mines after flailing.** Figure 6 shows the proportion of mines visible in sand and gravel after the flail had completed its run for three mine sizes. Mines were increasingly likely to be visible with increasing size, with small mines being mostly buried and large mines being mostly visible. The pattern was highly significant using data lumped by original burial depth (X²=31.3, 2 d.f., P<0.001).

Figure 7 suggests that original depth of burial affected visibility, with deeper buried mines being more visible after the flail. The effect was not significant using data lumped across mine size (X²=3.9, 3 d.f., P=0.27).

Visibility of mines increased with distance thrown (see Figure 8). This effect was expected for mines thrown longer distances, as those mines were thrown outside the clearance strip. Many of the mines that moved less than one metre were only compressed into the soil, whereas mines that moved several metres were more likely to have been lifted out of the ground before being deflected back downwards by components of the flail, and therefore ended up stringed on the surface.

**Discussion**

The flail is designed to prevent mines from being thrown large distances, and the effectiveness of that design can be seen in the high proportion of mines left close to their original laying site. A proportion of those mines would likely be compressed into the soil without being initiated or broken up. However, repeated passes with the flail should ensure that the mines are visible for inspection, because they are lifted out of the ground rather than being sent into it. Mines that are pulled out of the ground are less likely to be broken up or initiated, might therefore be in better condition after flailing, and are potentially still live.

A small proportion of mines were thrown big distances, presumably because the chains hooked the mine past the deflectors plate. Clearly, the flail design is not entirely effective at preventing long-distance throws. There are safety implications for the operators whether the machine is throwing mines or rocks, as this machine is routinely operated using a safety distance of 30 metres. Mines were more likely to be thrown forward, presumably due to the forward rotation of the chains and the protection behind the chains. Such mines could be thrown into previously cleared strips, or outside the minefield. Repeated passes are less likely to re-process such mines, particularly if the field is flailed in sectors. The MV-4 is...
a small machine. Whether larger machines could throw mines even greater distances than the maximum seen here of 65 meters remains to be tested, as throw distance is a function of length of chain, design of chain head, speed of rotation, and amount of protection around the flail head. Larger machines have longer chains but may use a slower rotation speed.

This flail tended to throw mines to the right. Given that it is impossible to prevent throw completely, it might be possible to adjust the action of the chains and design of the deflector plate to force an even higher proportion of throws to one side. Whether the lacerality of throw known, the machine can be deployed to ensure that the main direction of throw is into areas that are not yet processed. For example, this machine would best be deployed either in a clockwise direction from the perimeters of the minefield, or an anti-clockwise direction from the centre. With respect to mine throw, working back and forth along parallel lines would not be a good way to use this machine.

Soil type was the primary factor determining throw patterns. Mine size and depth were relatively unimportant. The depth setting of the flail is likely to affect some values in the data, but the overall trends found for mine size and depth should be similar.

Clearly, more tests of this sort on different makes and sizes of flails are desirable. The Geneva International Centre for Humanitarian Demining plans to continue these tests, but the manufacturers can also conduct tests so they can give advice to purchasers on lacerality of throw, proportion of mines thrown beyond the flail, and likely maximum throw distance under different operating conditions. Consideration should be given to including information about throw patterns in the Mechanical Demining Equipment Catalogue, and eventually to developing a standard test to be incorporated into the International Mine Action Standards.

We thank the Swedish EOD and Demining Centre for supplying equipment, resources and the field site to support the study. Funding was provided by the governments of Germany, Norway and Sweden. See Endnotes, page 112.

MineWolf Flail and Tiller Machines: Testing the Differences between two Demining Technologies

MineWolf is the first demining concept, manufactured in Germany by Arthur Willibald Maschinenbau GmbH (AWH), that overcomes the limitations of flail and tiller machines by combining the advantages of both systems. Extensive tests with live anti-tank and fragmentation mines were carried out at the German Army proving ground to determine whether the MineWolf meets the operational requirements for humanitarian demining. The aim was to discover the effects of detonations on the operator, MineWolf, clearing tools and cabin, and to work out instructions for reparability.

The MineWolf is a mine-clearing device developed especially for humanitarian mine-cleaning. It is used for area clearing and clean up to 2,800 square meters per hour (1,349 square yards/hour), allowing for fast quality control on a demined area. The MineWolf system consists of a fragment-proof AHWI crawler tractor, a protected driver’s cab and a mechanically driven mine-clearing device. Both a flail device and a tiller are available.

The flail is likely to identify or destroy anti-tank mines. With the tiler, the remains of AT mines, the fuzes and all AP mines left are crushed or rendered obsolete. Clearance depths of up to 30 centimetres (11.8 inches) in the soil are achieved with the tiler. Live AT mines, including DM 21, TM 57 and TM 62 mines, have been cleared.

The MineWolf was subject to extensive tests with live anti-tank mines, undertaken in Mepynos, Lower Saxony, Germany, at the Army proving ground. The tests were conducted with a fully-operational MineWolf using both types of mine-clearing devices (i.e., flail and tiler). The vehicle was operated by both remote- and operator-control. During four tests an instrumented Anthropometric Test Device (fully instrumented test dummy) was placed on the driver’s seat. The measured values had to be evaluated in view possible risks to the operator during mine clearance.

A total of six remote clearance tests were conducted against live anti-tank mines. Four of these tests led to the detonation of the cleared AT mines and thus to measurable results that could be used to analyze the damage to the demining tool and the MineWolf. Two tests each with the two mine-clearing devices (flail and tiller) were conducted against one DM 21 and TM 57 AT mine each. In order to be able to rule out uncontrolled movements of the MineWolf, it was secured to a recovery tank during the tests by a steel rope. The mines to be cleared were laid one by one centrally and offset in front of the clearing device. After a detonation, the vehicle was stopped immediately and the effects were documented. If required, the clearing device was repaired prior to the next test run.

Test schedule. The testing of the method and timing were conducted in the following order:

1. MineWolf remote-control tests with flail and tiler and a fully instrumented test dummy (ATD)
2. AT mine tests (DM 21, TM 57 and TM 62)
3. Biomechanical tests with an ATD
4. MineWolf manned tests with flail and tiler using three different operators
5. Fragmentation mine tests (DM 31)
6. Tests with these detonations without repair to investigate quality of demining operations

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Remote-control Tests

Tests performed remotely using the flail and tiller apparatuses were conducted with AT mines TM 57 (6.5 kg TNT), TM 62 P3 (6.5 kg TNT) and DM 21 (5 kg TNT). The remote-control tests were necessary to record the physical effects and potential risks for the operator and MineWolf. These effects were measured by means of an instrumented test dummy, in order to be able to perform a human-related biomechanical assessment. To record the measured values, an ATD was placed on the driver’s seat and was fitted with various sensors to measure human-relevant impact information.

A total of six remote clearing tests were conducted against live AT mines. Four of these tests led to the detonation; two of the mines were crushed. Little to no flail repair work was necessary after the unmanned test. Damage to the tiller device is shown in Figures 4 and 5. The repairs shown in Figure 6 are mainly welding work, which could be performed on-site the same day.

Biomechanical Results

The remote-control tests were a necessary prerequisite to performing the manned tests. The results of the biomechanical assessment and the blast-pressure measurement had to rule out any hazard to the operator when clearing live anti-tank mines.

The results of the biomechanical measurements with the fully instrumented dummy were within a very acceptable range. This statement applies to the examined AT mine types DM 21, TM 57 and TM 62 and refer to mine detonations that occurred in the area of the clearing device.

The assessment of the blast pressure load in the driver’s cab showed that the blast pressure load is very low in the cabin and damage to the ears is not expected if adequate ear protection is worn.

In summary, it can be stated that the operator in the driver’s cab of the MineWolf is not subjected to an intolerable risk of injury by the explosion of a DM 21 or TM 57 anti-tank mine if the mine detonates in the area of the mine-clearing device (both types were successfully detonated during the test). The risk of injury is very low and far below the allowed limits for mine-protected vehicles of the German Army, which are based on international standards. Even in the case of repeated successive loads, no serious consequences are expected. Temporary light disturbances like headaches or muscular pain, however, cannot be excluded.

During the four tests, all human-related criteria were tested to the extent that they could be evaluated.

Due to the principle of operation of the MineWolf, the detonation of a mine underneath the vehicle hull or a track during mine-clearing is not very likely but cannot be ruled out. Based on the available measured data, the effects that an explosion underneath the hull or a track would have on the vehicle and the mounted operator cannot be assessed. It is definitely possible, however, that this would lead to critical loads. It is therefore recommended that these cases be investigated, e.g., detonation underneath the vehicle hull or a track—by static contact detonation tests to ensure the highest degree of safety for the MineWolf operator.

Manned Tests

Tests performed conducted the manned tests with the AT mines TM 57 (6.5 kg TNT) and TM 62 P3 (6.5 kg TNT).

As the biomechanical measurements with the fully instrumented dummy did not show any risk, manned tests were approved by the firing controller.

Tests were tightened by clearing mines off-centre—detonation occurred on the left- or right-hand side of the demining tool with both flail and tiller—to find out whether the drive train would suffer irreparable damage and whether the detonating quality would be affected.

The three consecutive manned tests, using the tiller to clear live AT mines, were carried out, without repair after each detonation. To find out whether tiller, drive train and the quality of demining were still acceptable. Two typical examples of consecutive tests, taken from the German Federal Armed Forces Technical Center for Weapons and Ammunition’s Final Report: MineWolf Clearing of Live Mines, are described below.

The AT mine TM 62 P3 detonated on-site upon contact with the mine-clearing device. The hit occurred approximately 0.5 metres (1.6 feet) off the left-hand side of the device.
Damage to the clearance machine included one worn chisel and two bent cross-spars (the cross-spars, or star bracings), were deflected by an area of 30 by 130 centimeters (11.8 by 51.2 inches). The damage seemed to be more than compared to the previous tests with the TM 57. The mine crater in the ground was of normal size. The outcome of the clearance operation was not affected by the damage suffered.

The TM 57 also determined on-site up-to-date contact with the mine-clearance device. The distance between the outer side of the tiller.

The mines were placed on solid ground (51.2 inches). The damage seemed to be minimal. The fact that the RPM 357 was a working definition (as opposed to a legal one) of ERW is a blanket term that includes both.

The rise of ERW as a threat to civilians, Nema [from page 10]


2. The mines were placed on solid ground (51.2 inches). The damage seemed to be minimal. The fact that the RPM 357 was a working definition (as opposed to a legal one) of ERW is a blanket term that includes both.

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9. The mines were placed on solid ground (51.2 inches). The damage seemed to be minimal. The fact that the RPM 357 was a working definition (as opposed to a legal one) of ERW is a blanket term that includes both.

10. “Working definition” (as opposed to a legal one) of ERW in which it is a blanket term that includes both.

11. “Working definition” (as opposed to a legal one) of ERW in which it is a blanket term that includes both.


15. “DM 7.0: Landmine Clearance (Status) Report.” CNR Research Centre.


27. “DM 7.0: Landmine Clearance (Status) Report.” CNR Research Centre.


34. “DM 7.0: Landmine Clearance (Status) Report.” CNR Research Centre.

The Aftermath of War, FitzGerald [from page 34]


10. “Lebanon Update.”

15. “UNICEF Thanks Bahrain for Lebanon Donation.”


14. “Lebanon: Interview with David Shearer, UN Humanitarian Coordinator.”

From house training...). The others were only informed by indirect education (posters, leaflets, radio, TV). Before the accident. 41% of them received direct training (meetings, school training, in-school sessions by Lebanese engineers).


A Study of the Role of Survey in Mine Action

also ran two workshops in 1999 for the ICRC in Western Armenia.

9. For more information about the titanium in the cluster bombs, see the 2006 Landmine Monitor Report.”


1. The Information Management System for Mine Action is a software-based data-management tool that was established in 1997 as an initiative of the US State Department and was to be supported by a number of international organizations. It is now known as the “Global Mine Action Information System.”

2. From January to July 2005, an area of 97,000 square meters (24 acres) has been cleared and 350 mines have been removed.

2. People with first-degree disabilities are completely disabled and incapable of working. They require constant supervision and care by professional medical staff.

3. People with third-degree disabilities are partially disabled and cannot complete any kind of work.

3. People with second-degree disabilities are severely disabled and have difficulty in performing the daily requirements of their work. They require constant supervision and care by professional medical staff.

3. People with third-degree disabilities are partially disabled and cannot complete any kind of work.

3. People with second-degree disabilities are severely disabled and have difficulty in performing the daily requirements of their work. They require constant supervision and care by professional medical staff.

4. The disability degree is given for a period of time and subject to review by special medical-social commissions. It is determined by a medical-social commission that considers the individual’s medical condition and the impact of the landmines on him/her.

4. People with second-degree disabilities are severely disabled and have difficulty in performing the daily requirements of their work. They require constant supervision and care by professional medical staff.

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5.


14. The document was opened for signature in Ottawa, Canada, 3 December 1997, and entered into force on March 1, 2007.


Errata

The editorial staff of the Journal goes to great effort to make sure that what is printed in our magazine is accurate, properly documented and unbiased. However, in Issue 10.1, we expanded a short caption to fit the story and we should not have done so. In the editorial, "An Alternative Perspective on Landmines and Voluntary Organizations" by Dr. Shelley Weiss, the caption of the photo, which was used with ICRC’s permission without ICRC’s permission to state: “Minifields can be used to create barriers to defend vulnerable populations.” The original caption accompanying this photo reads “Champs de mines,” and means “minifields” in English. We also failed to properly credit the photo used on the cover of issue 10.1. The photo was provided by Vincent Souza and Maria Engelke Sr.

On page 54 of issue 10.1, we gave an incorrect URL for additional references pertaining to the article by Daniele Ressler. The proper URL should be http://snipurl.com/15lqm.