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## Body Protection Systems for Use in Humanitarian Demining: Applying Hard Science and End-User Feedback to Improve Personal Protection for Deminers

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## Profiles

### **Body Protection Systems for Use in Humanitarian Demining: Applying Hard Science and End-User Feedback to Improve Personal Protection for Deminers**

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### **INVESTIGATING THE STANDARDS OF BODY PROTECTION IN HUMANITARIAN DEMINING**

Somewhere between the tightening budgets of program managers, myriad of demining activities, and fatigue among donors, lies a life-threatening issue which receives limited attention within the hierarchy of themes defining humanitarian demining. According to a large cross-section of deminers around the world, personal protection for deminers is considered a poor second cousin to such themes as mine awareness and victim assistance. They say the issue of improving personal protection needs to be pushed higher up the demining agenda.

Many deminers argue that the issue should not be taken lightly because of the live threats they face daily from anti-personnel mines and unexploded ordnance during mine clearance operations. Their primary concern goes beyond standard operating procedures and the lack of consensus among technical experts on what is an acceptable safety standard for deminers. There is an underlying belief that this lack of consensus, stagnating budgets for protective equipment, and an uncoordinated approach to international humanitarian demining activities suppresses the need to improve personal protection and make more effective equipment available to the deminers.

A recently-held focus group meeting on humanitarian demining at the Canadian Embassy in Washington, D.C. sought to cut through the lack of consensus on personal protection standards and generate concrete ideas on building the next generation of enhanced protection systems to improve deminer safety. This focus group meeting assembled several key U.S. donor decision-makers, program managers, technical

evaluators, and equipment procurers. Participants included the U.S. Army, State Department, RONCO Consulting, Naeva Geophysics, Marshall Legacy Institute, the Organization of American States, and the Night Vision Directorate of Fort Belvoir. The meeting was sponsored by Med-Eng Systems Inc. of Ottawa, Canada, a private industry leader in the scientific research, design, and manufacture of personal protection systems in explosive ordnance disposal and to provide protection against explosive devices and anti-personnel mines.

The focus group approach was adopted to help some of these key players look at safety issues from the perspective of deminers. Similarly, it provided an atmosphere where evaluators and end users could have a significant say in the level of protection which should be included in properly designed and manufactured equipment. Some of the recent test and evaluation activities undertaken by Med-Eng in Central America were also briefly reviewed and shared with the participants. Human factor trials were conducted on different concepts of body; hand, and head protection systems, and these systems were then exposed to blast testing using live anti-personnel mines.

### **ISSUES AFFECTING IMPROVED SAFETY**

The focus group identified several problems, which affect agreement on the establishment of a set of realistic and enforceable international safety standards:

- UN safety standards are too loose, allowing SOPs to be vastly different from one demining theatre to another.
- Prodding, and prodding methods are a big safety concern since the type of prodding technique adopted by deminers could determine which body areas are most exposed to serious injury.
- There seems to be a feeling that demining programs around the world are not properly coordinated at an international level.
- Information on operator/deminer safety is unavailable to most decision-makers and the vast majority of deminers, often leading to myths and/or the supply of inappropriate demining equipment.
- Deminers are asking for protection of the groin, face, and eyes, and the hands and arms in design priorities.

Several participants, including Dan Layton, executive director of the Marshall Legacy Institute in Virginia, argued that the lack of effective coordination of demining activities and failure by demining stakeholders to move more urgently to improve coordination and collaboration are two pressing issues which must be resolved in order to improve safety standards and make international demining activities more efficient. The focus group participants also agreed that the following issues hamper efforts to improve personal protection for deminers:

- Inadequate documentation available on the relative safety of various SOPs.
- Little or no information is provided by industry or donors on the protective capability and limitations of personal protective systems against the various threats or categories of mines (blast versus fragmentation). This leads to a lack of confidence in the field regarding the effectiveness of protection systems in

general.

- There are no standards to differentiate between good and poor products.
- The equipment that has been historically available is not necessarily appropriate for the humanitarian demining function, nor has it been adequately tested against the various mine threats. The results of such tests have not been properly documented.
- Local authorities requesting the equipment are not fully informed about the appropriate equipment required and/or available to them.
- Decision-makers in donor communities do not always have the technical information available to allow them to make an optimal choice customized to the needs or threats of the given theaters.
- Politics also cause problems when countries direct monies towards the donation of specific equipment that cannot be supported by the local infrastructure or equipment that is not compatible with the local needs and culture.

What lessons did participants learn from these experiences and what solutions were offered? Colonel George Zahaczewsky of the U.S. Department of Defense pointed to the need for an acceptable, established set of safety standards that are adhered to by deminers. A qualified, manageable consortium of stakeholders including users and reputable members from private industry should establish this set of safety standards. In addition, Col. Zahaczewsky called for the standardization of personal protection equipment based on a modular design, (e.g. arm protectors, enhanced ballistics, rear protection, etc.) This modularity should offer technical evaluators, procurers, donors, and deminers the benefit of customizing their personal protective systems to respond to varying levels of actual threats existing in their respective demining theatre.

The concept of modularity was considered to be an important one among participants because it responded to the demand for flexibility, user-friendliness, enhanced protection, expandability, and cost-effectiveness, particularly in a climate of declining program budgets. More importantly, modularity together with effective international coordination could set the stage for the establishment of more realistic and credible safety standards.

## **DEFINING THE FUTURE FOR DEMINER SAFETY**

It was evident that the design of any protective ensemble is always a compromise between protection, cost, weight, comfort and flexibility, user friendliness, and heat stress concerns. It was also observed that many military and civilian deminers, though relatively proficient in mine clearance methods, were not well versed in blast injury. By extension, they may not possess intimate knowledge of the actual protection levels offered by the array of donated flak jackets and visors, among a variety of other equipment concepts.

In order to stimulate concerted action on improving demining safety standards and personal protection for deminers, the focus group recommended the following:

- The need for increased education on safety issues and mine awareness.
- The importance of properly documenting and reporting on injuries sustained by

deminers.

- The need for a modular body protection system to permit maximum user versatility and allow for protection against a wide range of threats.
- All protective ensembles should be designed to allow easy removal from an injured wearer.
- SOP standardization is a priority.
- Test generated data on protection system performance should be disseminated through properly organized educational packages from the scientific/military community to deminers in the field worldwide.

In addition, it was suggested that a more scientific approach should be adopted to methodically evaluate personal protective equipment under different threat conditions. The information may be gathered under the auspices of the various international efforts to assess the effectiveness of current or prospective technologies to be employed in demining. Finally, there should be open collaboration among the research, donor, and end user communities to permit an efficient dissemination of technical equipment assessments and feedback. This will permit the introduction of the most suitable and capable protective equipment to deminers and enhance their personal safety.

The focus group also saw the need for qualified private industry companies to collaborate with donors, the United Nations, and mine-affected countries to create solutions. It is an approach which focus group participants believe can maximize the expertise and resources of private industry to improve the design and manufacture of personal protection equipment and assist with the establishment of improved safety standards.

The group also made note of the positive impact which end user feedback can have on the design of better equipment and establishment of more effective safety standards. At present, deminers usually receive equipment through bilateral assistance programs from donor countries. Often, they have little or no input into the type of appropriate equipment they need and instead settle for the equipment that has been donated. Although this equipment is given in good faith by donors, field research and end user feedback suggest that the equipment is often inappropriate and does not respond to environmental conditions and threat levels in the various demining theatres.

A strategy to improve deminer safety and introduce a more deminer-centered focus to safety is being employed by Med-Eng Systems Inc., which hosted the Washington focus group meeting. The company, based in Ottawa, Canada, has an internationally reputable background and experience in the scientific research, design, and manufacture of personal protection equipment for bomb disposal technicians. A few years ago the company transferred its scientific capabilities in live blast effects testing, biomechanics, and design, into the humanitarian demining sector to see if it could offer solutions to deminers. Over the past twelve months, the company has visited twenty mine-affected countries to conduct field assessments and live blast trials on a range of protective equipment. It has also conducted user trials and focus group meetings with deminers.

The empirical information gathered from user trials and focus group meetings stretching from Nicaragua to Mozambique have been added to the company's extensive data base.

gathered earlier from the Explosive Ordnance Disposal sector. This combined data is rich in pertinent information that can be packaged and used to educate deminers on blast effects, actual threats, and technical equipment training. This wealth of knowledge can be used to help establish improved safety standards as well as in the design prioritization and manufacture of improved protection for deminers. Colonel Zahaczewsky informed the participants that the U.S. Department of Defense has gathered substantial post-accident injury data from several demining theatres. The data will be analyzed and processed by qualified reviewers prior to being released to the demining community later in 1999.

The focus group agreed that this approach to deminer safety could be used to achieve the following objectives:

- Widely available mine awareness and information on the various types of mine threats based on objective evidence from field tests conducted by credible sources such as the internationally recognized Mine Action Technology Evaluation Centers.
- The UN refining its safety standards, based on user considerations, materials technology, and technically sound threat assessments, leading to a safer formulation of more standardized SOPs around the world.
- Close supervision, education, and follow-up in all demining theatres by the UN or other appropriate organizations through bilateral assistance, to ensure that safety standards and their rationale are being understood and adhered to.
- Standards should be written for protective equipment that are realistic and supported by hard scientific test results.
- Establishment of an information feedback system to update the donor community and decision makers on technological developments and emerging challenges on a real time basis.
- Production of equipment that is durable, and can be maintained, or ideally produced or assembled within mine-affected country.

## **TOWARDS A LASTING SOLUTION**

The next twelve months could see a turning point in the approach to deminer safety. Major organizations responsible for humanitarian demining, such as the United Nations, have the opportunity to work more closely with private industry to come up with solutions to improve deminer safety and demining safety standards. The focus group participants agreed that the United Nations could not pursue this task alone since it does not have all of the required financial and technical resources. Participants also agreed that the deminer-centered approach to improving safety standards offered chances of significant success. They also accepted that the combined strategy of scientific testing and evaluation, human factor trials, focus groups, and end user input into the design and manufacture of improved, modular protective equipment provides a much more effective means of improving deminer safety and demining activities.