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The U.S. Approach: Deminer Personal Protective Equipment Development

by Col. George Zahaczewsky, U.S. Army Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict

The deminer and his partner began work at 0730. By 0850, they had cleared 50 square meters. Both men wore frag-jackets, helmets and visors. The victim was clearing by using his prodder. He was calling to help his section leader remove grass from a large pothole in the road. As he returned at 0850, he stepped on a mine he had previously missed. (Extracted from the Database of Demining Incident Victims, 1999, Incident #53.)

At around 1116, the deminer got a detector reading and began prodding and excavating the ground using a bayonet held in his left hand. A PPM-2 mine detonated. The victim was knocked backward about two meters by the blast and was lying partly buried in an uncleared area. He stood up quickly, leaving his visor that had been blown away and broken by the blast. The victim received first aid and arrived at the field hospital at 1120. The victim’s visor was described as riddled by fragments and broken at the weakest points of the articulation on both sides of the head frame. His frag jacket stopped all projections, limiting injuries to the most exposed parts. (Extracted from the Database of Demining Victims, 1999, Incident #63.)

The Supervisor was a highly experienced supervisor who had an extremely useful insight and perspective on deminer injuries. Due primarily to his significant interest in PPE as well as his access to and knowledge of several demining theatres, it was felt that Smith had an extremely useful insight and perspective on deminer injuries.

Introduction

In 1998, the United States placed increasing emphasis on developing Personal Protective Equipment (PPE) for the individual operator engaged in humanitarian demining. It was believed that development of improved PPE suitable for humanitarian demining was well within the bounds of currently available technology. During the previous year, several conferences had highlighted the need for better protection of deminers. In March 1998, the U.S. Department of Defense—through the Night Vision and Electronic Sensors Directorate—hosted a Mine Action Center Workshop to specifically focus on individual deminer needs. Foremost among the requirements of workshop participants was the need to develop (PPE) that was specifically designed and developed with the deminer in mind. The characteristics of deminer “body armor” that were discussed at this workshop included: affordability, lightweight and modularity allowing flexibility to tailor the PPE to the specific needs of individual deminers and environments.

Research

To better focus the development of deminer PPE, NVESD was requested to conduct a marker survey of existing body armor as well as undertake research to better understand the nature of deminer injuries. Additionally, the U.S. Army’s Surgical Research Institute in Fort Sam Houston, Texas, was contracted to conduct extensive research into landmine injuries of the lower extremities. Its research efforts in the Lower Extremity Assessment Program are discussed further in this journal.

Additionally, NVESD partnered with the Army’s Night Vision and Electronic Sensors Directorate-hosted a Mine Action Center Workshop to specifically focus on existing PPE. NVESD also embarked on a program to develop demining PPE that could be made commercially available within a short period of time. To this end, NVESD contracted with Med-Eng Systems of Canada to develop the Humanitarian Demining Ensemble, which is currently available and has already been purchased for use in South America and the Middle East.

Furthermore, NVESD worked with Andy Smith to develop PPE that could be locally produced in a mine-affected country. The U.S. demining technology development program endorses both approaches, i.e., development of commercially available PPE for demining organizations and donors who can afford to buy it as well as locally manufactured body armor for countries wishing to establish an indigenous capability. The caveat in this endorsement, of course, is that both meet minimally acceptable standards of protection. Finally, the further services of Andy Smith were retained to gather field data pertaining to deminer injuries. Due primarily to his significant interest in PPE as well as his access to and knowledge of several demining theatres, it was felt that Smith had an extremely useful insight and perspective on deminer injuries.
the U.S. military’s Casualty Care Research Center in Bethesda, Maryland, produced a study entitled “Landmine Casualty Data Report: Deminer Injuries,” which is possibly the first of its kind. This analysis revealed some particularly useful information pertaining to deminer injuries and their causes. It was found, for example, that the most common landmines causing injuries and, in some instances, deaths, were AP blast mines. The most commonly encountered mines in this category were the PMN, PMN-2 and the Type 72. The activity that deminers were most often engaged in when an incident occurred was probing, which accounted for 29 percent of the incidents. Although some deminer practitioners claim that missing mines should not occur, it does, accounting for 20 percent of the incidents.

Upon further review of the data, it was determined that the legs were the most common location of deminer injuries with 63 percent suffering injuries to their lower extremities. Injuries to the head were the next most common occurrence (36 percent), the arms (55 percent), the torso (53 percent) and the eyes (30 percent). In those suffering eye injuries, 10.5 percent sustained permanent blindness. Thirty-seven of the deminers involved in incidents became amputees (12.5 percent). The majority of these were killed while clearing vegetation.

The study draws several conclusions that can be implemented today to help reduce deminer injuries. Among these are that deminers should wear facial and eye protection. Additionally, deminer injuries and deaths could be reduced through improvements in PPE, procedures and medical response. Finally, the study draws the potentially contentious conclusion that the accumulated data presented in the research was insufficient to show any effect of the wearing of an armort vest, jacket or apron for either minor or severe injuries and therefore does not prove or disprove the effectiveness of this type of protective equipment.

The study goes on to recommend that a standardized format be developed and adopted for reporting mine incidents and injuries. The data in the study also supports the need to develop and establish rest and evaluation protocols for measuring the effectiveness of protective equipment (i.e., minimum standards) against mines that are likely to be found in demining operation environments. Additionally, the study recommends that additional data be obtained validating the effectiveness of protective vests, jackets or aprons. Finally, analysis of the data suggests that research and development into more effective footwear has the potential to mitigate the most common form of lower extremity injury—amputations, which occurred in 42 percent of the cases of leg injuries.

Conclusion

Although the United States anticipates concluding the majority of its research and development into deminer protective clothing during fiscal 2000, modifications and testing of existing PPE will continue throughout the duration of the program. Additionally, development and testing of visors, helmets and deminer hand tools will also continue. The rationale for this is that PPE should be considered as an integral part of a deminer’s “tool box,” not just as a nice-to-have accessory.

As such, future development as well as testing of PPE should use a systems-oriented approach. For example, visors should not be tested separately but should be evaluated in conjunction with the helmet they will be attached to or the protective vest that will interface with them. It is only in this manner that their full strengths and weaknesses will be identified.


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PERSONAL PROTECTIVE EQUIPMENT:

To never-ending story

Introduction

Now, as always, there is a huge debate about what protection is required and what Personal Protective Equipment (PPE) should be provided for personnel engaged in demining operations. Current opinion varies drastically between individual demining organizations, countries in which they operate and between governing bodies, which are coordinating the demining efforts.

Each organization within the demining community has a different view of what is required and what should be provided. These views are, in most cases, based on a variety of factors, such as experience, legal customs, donor policy, a possible lack of understanding due to the absence of independent information and cost.

Very few independent and objective studies about the requirements and possible solutions have been carried out and widely circulated. A good start was made last year by the establishment of a focus group during a meeting in Washington D.C., and the results, which were due to be promulgated in 1999, are eagerly awaited.

Overall, given the multitude of other types of studies carried out each year, many of which tell us what we already know, the general lack of funding designated for research on PPE is disturbing.

Aim

My goal is to highlight the current standard and type of PPE in use with Handicap International (HI) deminers in the Balkans and to explain why this standard and type of PPE was chosen. It’s success in contributing to a bit of controversy, so much the better, for this subject deserves a more important place on the agenda. Ultimately, this emphasis should lead to appropriate PPE being supplied to all deminers worldwide as a right. Donors and funding agencies should then be encouraged to enforce this practice by understanding the requirements and insisting that their operators conform to an acceptable and recognized standard.

Our Own Experiences: 1991–1995

All of us involved in mine clearance are, to some extent, victims of our past. My own perceptions were formed as an Ammunition Technical Officer (ATO) for a number of years in the British Army. "Demining is not a sport for ATOs!" my colleagues from the Royal Engineers often reminded me. Nevertheless, the concept of PPE is not new to me, both from the perspective of an ordinary soldier and as a Bomb Disposal Technician. I have worn the best equipment the British Army had to offer in a variety of circumstances, and I count myself as one of the lucky ones not to have had it tested by an explosion.

by Lance J. Malin, MBE Program Manager, HI Demining and FOD Operations, Kosovo, May 2000