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Reducing Accidents in Demining:
Achievements in Afghanistan

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Introduction

As an expatriate military adviser in Bosnia inspired me to write this paper when he explained his opinion that demining accidents were "a statistical certainty." I had just arrived in Bosnia after visiting Pakistan where I had conducted extensive interviews with deminers and their advisers to learn how they had managed to reduce demining accidents. I realized that some of the techniques that the Afghan deminers had devised for themselves were widely applicable.

Two days before, I attended a meeting of demining managers in Bosnia, at which Mine Action Center Director Mr. Filipovic demanded that all demining procedures be followed rigorously. His remark was prompted by a run of fatal accidents involving the feared PROM-1 fragmentation mine in which deminers were not following the Standing Operating Procedures (SOP). His words barely faded when yet another accident occurred for the same reason.

By 1997, demining operations in Afghanistan had acquired a reputation for fanaticism and risk-taking. With 50 to 60 accidents each year among 2,000 deminers, the Mine Action Program of Afghanistan (MAPA) was seen by many in the industry as intrinsically dangerous and, perhaps, out of control. Bill van Rees, the program manager at the time, explained later that Afghan deminers would ask him after a run of accidents, "Mr. Bill, what are you going to do about these accidents?" Yet by 1995, he realized that the accident rate could only be reduced once the deminers accepted partial responsibility for accidents.

It is easy to accept the stereotypical view of the Afghan deminer as a fatalist: "It is the will of Allah that today I will have an accident, then today I will have an accident." However, Bill van Rees realized that stereotypes can be incorrect and started a complete overhaul of attitudes in the demining program. His successor, Ian Bullpitt, continued this extraordinary and successful effort. In 1998, accidents were reduced by 50 percent from 1997. In the first half of 1999, there were only 10 demining accidents in the entire program. The trend was continuing in 1999, until the third quarter when there was a significant increase in the accident rate—prompting further review of the program. In spite of this increase, the Afghan demining program has achieved an enviable safety improvement that could provide a useful example for other demining programs.

A comparison of accident rates between Afghanistan and Cambodia, which have similar manual demining programs, shows that the accident rate in Afghanistan, before 1997, was much greater than that for Cambodia. However, close analysis reveals that most of the accidents in Afghanistan occurred while deminers were digging and investigating PMN-1 mines. These mines are intrinsically more dangerous than the common PMN-2 mine in Cambodia. Furthermore, the ground conditions in Afghanistan are more likely to lead to probing accidents.
demining organizations in response to their safety and quality problems.

**Initial investigations**

By 1997, MAPA collected a large database on demining accidents. Each accident is investigated by an independent monitoring agency, and a detailed report is submitted to the mine action program manager. This 30 to 40 page report includes a summary report by the investigators; interviews with the deminer involved; interviews with the supervisor and team leader; a report of an accident at the site with photographs; medical reports from the hospital receiving injured personnel; post-recovery reports on injured personnel; details of injuries with photographs of injured personnel immediately after the accident; and recommendations for procedural changes or protective equipment.

One of the first steps toward reducing accidents was a statistical analysis to discover common factors in the majority of accidents. As a result, it was possible to describe the "typical demining accident." Such typical accidents could occur at 8:30 a.m. in summer while a deminer was probing a PAM-I mine or when the deminer was working in a difficult area, such as an irrigation channel, a steep slope, in thick vegetation or in run-in houses. Some factors were false leads. While one might have suspected that deminers would become fatigued in the heat of summer, most accidents occurred before the hottest part of the day.

We became involved on the periphery of this effort, as we worked to devise cost-effective protective equipment for deminers (Trevelyan 1999). We focused on prepping accidents and produced prototypes of improved head and face protection visors and helmets, provders with safety guards to protect hands and an apron to protect the body. We focused on the reasons why most deminers worked in the squatting position, contrary to SOP's that require that deminers lie on the ground while investigating targets. We devised effective protection to enable them to work in the squatting position. We concluded that the squatting position is far more comfortable and probably more effective from an ergonomic standpoint. We also discovered that deminers are reluctant to lie on the ground because it is so difficult to keep their uniforms looking clean. Deminers are widely regarded in Afghanistan as a high status group; they believe that wearing dirty clothes detracts from their status. However, the main priority for mine action program management was avoiding accidents.

**Demining Organizations in Afghanistan**

The United Nations Office for Coordinating Humanitarian Assistance in Afghanistan (UNOCHA) oversees the mine action center at its head office in Islamabad, Pakistan. The program manager, deputy manager, logistics officer and a technical advisor (expatriates) are based in the office with an operations manager and Afghan support staff. The UNOCHA office provides communications. The responsibilities of these organizations include:

- A director checks in with the director of his receiving office on a daily basis.
- His colleague does the same.
- The director checks in with the director of his next receiving office on a daily basis.
- The director checks in with the director of his final receiving office and then reports to the director of the head office.
- The director of the head office reports to the UNOCHA office in Kabul.

**Organizational Changes**

Work procedures

Kefayatullah Eblagh, director of ATC, explained to the "sleep" step of reducing accidents was to accept responsibility. ATC is a paramilitary organization modeled in a uniquely Afghan style. The director is not only an authoritative figure but also the main point of contact for the families of injured or killed deminers. Deminers take their personal problems to the director at any time—it’s a demanding job for anyone. ATC has undergone many changes in the effort to reduce accidents and improve quality and safety.

ATC deminers work in teams of 30 men. Each team has 12 deminers, two of whom are trained in the use of a PAM-I mine detector. While one might have suspected that deminers would become fatigued in the heat of summer, most accidents occurred before the hottest part of the day.

We became involved on the periphery of this NGO in Afghanistan. Present director Kefayatullah Eblagh established the organization in October 1989. ATC started demining operations in early 1990, with an initial staff of 35. Since then, it has undergone significant change and expansion. ATC has developed into a highly organized and effective NGO employing about 1,300 personnel. The head office is in Peshawar, Pakistan. The Mine Dog Center (MDC) was formed early in the program to train and operate the mine detection dogs program, which was also started in 1990. Originally based in Pakistan, MDC has now moved to Kabul.

Two other Afghan NGOs carry out demining operations: the Demining Agency for Afghanistan (DAFA) in Kandahar and the Organization for Mine Clearance and Afghan Rehabilitation (OMAR) in Heart (Maley 1998). HALO Trust is the only foreign demining NGO and operates in Kabul and the northern area, where the fighting continues.

Mine clearance operations rely primarily on manual demining and use dogs on suitable tasks and mechanical support (backhoes) in residential areas and mined irrigation channels. For more details, refer to Trevelyan (2000).

**Safety Awareness**

Accident investigation reports typically emphasized the need to follow SOP's at the main contributing cause. While deminers often did not follow the correct procedures, this disregard was usually due to

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*Journal of Conventional Weapons Destruction, Vol. 4, Iss. 2 [2000], Art. 3*
circumstances at the particular site rather than negli-
gence. This fact does not include the widespread
practice of squatting during demining. Other vari-
ations on the SOPs are widely practiced, such as
reducing the number of marking stones when mark-
ing the location of a metal detector indication.
According to deminers, when they are aware of the
presence of site managers, staff of higher status or visi-
tors, they revert to SOPs.

ATC recognized that if there was to be any vari-
tion in the standard procedures, the implications
to be examined first. Therefore, they decided to
implement a daily meeting among the deminers to
discuss safety and the need for special procedures at
the particular site. The daily safety briefing was used
to review and discuss safety hazards or technical
problems at the site. Deminers could voice their
own opinions to their team leader and also report “near
mishaps.”

Another move to increase rest breaks and reduce
fatigue was to place restrictions on weekend leave for
deminers. Deminers are normally based at camps
close to the work site. Three teams and a resident site
manager are normally based together at the same
camp called a “project site.” ATC decided that
deminers would not be allowed to travel home on
the weekend.

Other problems prior to this decision included the
following:

- Transport difficulties, such as traffic accidents
  and traveling times, caused deminers to return
to work camp late on Sunday night.
- A loss of sleep due to social activities with fami-
  ilies over the weekend.
- Security problems, such as deminers who were
  arrested and detained by authorities for resis-
ting.
- While at home, the deminers unintentionally
  informed their friends and families of incorrect
  information which then was reported to the
  Taliban authorities, causing problems for the
  mine clearance agencies.

Leave schedule

Deminers have 30 days of paid annual leave. Eight
days are set aside for the Eid holiday, leaving
22 other days. Each team is given eight days paid
leave after two months. ATC allows two days for
travel to reach family homes and two days to return.
Many deminers take four extra days from their annual
leave to increase these breaks to 12 days.

Responsibility in Supervision

ATC also recognized that when deminers failed to
follow agreed procedures, supervisors had to share
the responsibility. Section leaders often have a pro-
blem when a deminer persistently refuses to follow their
directions. It is not uncommon for the section leader
simply to give up and let the deminer take responsi-
bility for his own safety.

To reduce the chance of this occurrence, ATC
decided to demote and decrease the pay of section
and team leaders one level immediately after an ac-
cident, which could only be restored following an in-
vestigation clearing them of wrongdoing. To imple-
ment this procedure, ATC required prompt feedback
on the causes of an accident. META required several
weeks and even months to complete its accident re-
port. Thus, ATC had to have its own investigation
capability. ATC staff is delegated for accident inves-
tigation whenever the need arises. Typically, the site
manager and two section leaders from other teams are
assigned to an investigation.

Changing the culture

Just as experience in Western industries has
demonstrated, it is necessary to change the culture of an
organization, so that everyone keeps significant safety
and quality improvements. Responsibility has to be
deluged and shared appropriately at different levels
in the organization. Deminers need a level of dis-

cussion in deciding how to approach each task. It is
not possible to devise foolproof procedures for every
controllable mine field situation.

Afghan culture tends to resent centralized au-

thority; so, it is remarkable that organizations as large
as ATC can operate with such high levels of reliabil-
ity. This activity is more remarkable when one real-
izes that the demining organizations are practically
the only sign of a large-scale, disciplined organiza-
tion in the entire country. They operate in a vacuum
surrounded by chaos, disintegration, extreme poverty
and deprivation. The social institutions we take for
granted in Western countries simply do not exist in
Afghanistan. There is usually no electric power, po-
lice force, coherently organized systems of justice, so-
cial security, poor office or any telephones.

Starting responsibility could be regarded as fool-

hardy in these circumstances. Yet the experiences of
ATC show that it is possible and has led to signifi-
cant safety improvements. The other demining or-

ganizations adopted many of the changes pioneered
by ATC.

The Views of Deminers

As part of research on the technological needs
of deminers, we interviewed several deminers and
staff in different organizations. Some of their opin-
ions and quotes make interesting and informative
reading.

An operations manager based in Peshawar said,
"The only time I experience a bad day in my job is
when I receive a report of an accident in a mine field.
That is a very depressing experience. Fortunately, we
are making big improvements. In the first six months
of 1997, we had 17 accidents. In the same period of
1988, we had seven accidents. This year [1999], we
have had only one accident in the same period. I am
still concerned about July—it is the hottest month of
the year and a bad time for accidents.

One deminer said, "One of the teams at our site
had two accidents last month. One of the deminers
had several arguments with his partner. His original
partner had fallen sick and had gone home for sev-
eral weeks leave. The new partner did not get on with
him well at all. Then there was an accident. I do not
know what the cause was, but I am sure that if they
had not been arguing the accident would not have
happened. In my team, if a deminer is upset or an-

gry, he is not allowed to work that day. Even though
it is harder to keep up with the schedule, we feel safer
that way. Also, deminers are less likely to be angry or
upset if they know that all the rest of the team has to
make up for their work."

Another deminer said, "One of our problems is
that we are always being asked to work faster. We have
heard that teams which work too slowly may not get
any work contracts. It is difficult when you work to
a mine field with many fragments and you can only
work slowly in this kind of mine field."

A third deminer remarked, "The safety meetings
are a good idea. We discuss mistakes to make sure the
work is done correctly. People forget the correct pro-
cedures, and when the problem is discussed, we
member our training. Sometimes, I mention mistakes
I have made myself. Often, I only tell them to my
friends in my tent, and I give thanks to God that I
am safe, and I try and tell them not to do it again.
Sometimes I also tell the team leader but not always.
The team leader says, 'please be careful and don't do
that again.'"

Training

The Afghan demining program has a highly
organized system of training deminers and provides
them with refresher courses every six months. META
runs separate training courses for supervisors, team
leaders, UXO specialists and communications. ATC
also runs many internal training courses for its staff.

English classes are provided both for administration
and demining personnel. Nearly all of the adminis-
tration staff is computer trained. Many other special-
Focus
Acknowledgements and Principal Sources

Most of the material for this paper was obtained through interviews with Ebigh between June 1997 and January 2000. Other material was gathered from interviews with deminers, senior staff of demining agencies and expert technical advisers and program managers of MAPA. Their assistance is gratefully acknowledged. For further details, readers are asked to contact the author or the MAPA head office in Islamabad, Pakistan.

Some additional material was obtained from interviews with staff and deminers in Bosnia, Herzegovina and Croatia in August 1999. Their assistance is also gratefully acknowledged.

Most of our work is supported financially by the Night Vision and Electronic Sensors Directorate of the U.S. Army at Fort Belvoir, Virginia. The authors would like to acknowledge contributions from colleagues Hamed and Ali Research Center, the demining personnel who have helped with this research, Sabbir Tili and Sumita Yamenez and her family.

Current training courses have been run, using both internal and external instructors. The level of training has reached the point where a significant number of ATC staff are being recruited by international demining agencies for work in other countries. ATC deminers, supervisors and administration staff are now working in Iraq, Somalia and elsewhere.

Comparison with Western Practice

We can see several significant parallels between the changes introduced to ATC to improve safety and what would be regarded as "best practice" in western industries. ATC devotes significant resources to improving its workforce. Apart from support for deminers’ families and help with personal crises, the organization provides practical training and career development opportunities for its staff.

Responsibility is delegated across the organization, rather than being concentrated at the top. Team leaders, supervisors and deminers all contribute to discussions on safety and the techniques that should be used to deal with particular mine field problems. Team leaders and supervisors carry significant responsibility and pay the penalty if an accident occurs in their team.

Safety and cautionness are reinforced daily at the safety briefings. Deminers are not allowed to forget the need to constantly be careful to avoid accidents. The organization pays careful attention to the health and well being of deminers. While recognizing the importance of home leave, discipline is imposed to ensure that deminers are in top physical condition for the required job. In contrast to the stereotypical fascist image of an Afghan deminer, all employees accept that accidents have human causes and can be prevented. An accident represents organizational failure as much as human failure.

Further Improvements

There are generally three classes of accidents in demining. One class occurs while a mine is being investigated or destroyed. Another class occurs because deminers walk on a mine that has been overlooked. The third class occurs when deminers walk in areas that have not yet been cleared.

Understanding these classes leads to the close link between safety and quality in demining, as in any other industry. If a deminer steps on an overlooked mine, he is the victim of poor quality work by other deminers or possibly his own poor work. It is this link that is currently being targeted in MAPA in a major overhaul of quality assurance procedures.

Currently, deminers check their work in an informal manner. As one deminer walks forward to resume work at the end of a lane, he sweeps his detector from side-to-side to check for overlooked metal targets. From our observations of deminers working in a simulated mine field in Islamabad, Pakistan, this checking is not very thorough, but it does reveal missed targets. After completing the clearance of a significant area, deminers may check the area once again with a metal detector.

In a carefully documented test, we observed an instance of a serious error which could lead to accidents. When one deminer had finished working at the end of a lane, he usually marks the last position cleared with a painted stone or by leaving his detector lying across the lane at the end of the safe area. We observed how one deminer located a metal target forward of his position and on the left-hand side of the lane. After he had located the metal fragment, he marked the target location with a stone. His partner thought that the stone marked the end of the safe area. As the diagram shows, it did not—it marked the location of the last target removed. The area to the right of the stone had not been cleared, but the second deminer missed this area, which happened to contain two targets that could have been easily discovered with a metal detector. The targets were missed again when they carried out a final check of the area.

In an effort to overcome errors such as these examples, Afghan demining NGOs are working on a system of comprehensive quality checking. It has been proposed that each deminer thoroughly check the ground cleared by his partner in the most recent spell. The partner will continuously check at points which he last worked and work forward until he reaches the end of the area his partner cleared. Each section leader will also conduct a comprehensive check of the area cleared by the deminers working under him. Finally, the team leader will check 25 percent of the area cleared by the team. This procedure will add significant costs to clearance operations. It is clearly impractical for a supervisor to check ground adjacent to where deminers are currently working. Further, the supervisor cannot do the checking while he is expected to supervise deminers at the same time. Approximate calculations suggest that the extra work involved would add perhaps 15 percent to the cost of clearance. However, this reflects a significant emphasis on safety and quality and will reduce the amount of reworking required. Another important issue is the quality of work the initial deminer performs.

The comprehensive checking procedure described above may not improve the quality of the initial demining without significant incentives. If deminers know that the area they have cleared is going to be checked again, they may think that it is likely to leave a target unchecked every now and again. On the other hand, especially if there is some degree of embarrassment or penalty associated with the discovery of a target missed by a deminer, working standards could improve.

Finally, it is necessary to remember that this proposal has been stimulated by a significant rise in the accident rate after a long period of decline. It is possible that this increase reflects a common industrial problem. Major changes to work practices that impose safety have a limited lifetime. After a while, workers develop a false sense of security and stop paying as much attention to their work practices. It is necessary to introduce further changes to avoid this risk. Constant vigilance is necessary to maintain standards, and experience in Western industries suggests that constant change is also required.

Other Sources


Trevlyn J. P. (2000) Demining Research at University of Western Australia. CD-ROM and web site. Department of Mechanical and Materials Engineering, The University of Western Australia.

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