Reducing Accidents in Demining: Achievements in Afghanistan

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Introduction

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 advisors 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 fatalism 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 statistically dangerous and, perhaps, out of control. Bill van Ree, 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: "If it is the will of Allah that today I will have an accident, then today I will have an accident." However, Bill van Ree realized that stereotypes can be incorrect and started a complete overhaul of attitudes in the demining program. His successor, Ian Bullpitt, continued this extraordinary successful effort. In 1996, 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 probing and investigating PMN-1 mines. These mines are intrinsically more dangerous than the common PMN-2 mine in Cambodia. This hypothesis remains to be formally tested, but it could explain most of the difference in accident rates between the two programs before 1997.

Also, the construction industry in Pakistan accepts an accident rate of three percent. Only serious accidents, those requiring hospital stays or death, are included in this number. Based on this percentage, with 2,000 deminers, one could expect 60 accidents per year. While this accident rate would be entirely unacceptable in a Western country, it serves as a useful comparison.

Western Industrial Practice

Industrial practices in the West have led to immense improvements in safety in many industries, including aviation, the chemical industry, the nuclear industry, construction, mining and offshore oil and gas production. All of these industries have devised strategies to minimize accidents. Many lessons have been learned from them.

One of the main lessons is that there is an intrinsic link between safety and quality. The practices leading to high quality work most often lead to safe working conditions. The methods of quality improvement pioneered by Deming and applied successfully by Japanese companies can also lead to significant safety improvements. "Kaizen," the practice of continuous improvement by small changes, has been widely applied in all these industries.

Another widely applied practice is the distribution of responsibility within teams. Authoritarian models of organizations proved to be inappropriate for achieving high quality and high safety. Industries learned that high quality results could only be achieved through high quality work practices. This goal could not be achieved through rules, regulations and close supervision without the active cooperation of the workforce. By placing more responsibility in the hands of individuals, even to the extent that they could choose their tools and equipment, companies found improved quality, safety and productivity.

Many of these techniques are well documented in industrial literature. They are part of the normal curriculum for industrial engineering students in most Western universities. What surprised me most about this research was the discovery that many of these techniques had been reinvented by Afghan...
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; report of an inspection of the accident 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. Such typical accidents could occur at 8:30 a.m. in summer while a deminer was probing a 5AM-1 mine or when the deminer was working in a difficult area, such as an irrigation channel, a steep slope, in thick vegetation or in ruined 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, providers 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 SOI’s that require that deminers lie on the ground while investigating targets. We devised protective equipment to enable them to work in the squatting position, which was also started in 1990.

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NGO in Afghanistan. Present director Kefayatullah Ebrahim 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 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 dog 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 (DASA) in Kandahar and the Organization for Mine Clearance and Afghan Rehabilitation (OMAR) in Heart (Malley 1998). HALO Trust is the only foreign demining NGO and operates in Kabul and the northern areas where 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).

Organizational Changes

Work procedures

Kefayatullah Ebrahim, director of ATC, explained that ATC's early efforts reducing accidents was to accept responsibility. ATC is a paramilitary organization modeled in a uniquely Afghan style. The director is not only an authoritarian figure but also a caring parent to his entire workforce. He has to assume responsibility for the families of injured or killed deminers. Deminers take their personal problems to the director at any time—it is 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 breaching parties of two men each. In demining's early stages, each breaching party consisted of three men. The first man would investigate targets with the metal detector and the second deminer operated the metal detector and investigated targets. The third man would investigate with a prodder while the second man monitored. After 20 to 30 minutes, they would exchange roles. All personnel would take a rest break after a two-hour period.

Four sections leaders monitor the actions of the breaching parties and record their work. A team leader monitors the entire team, coordinates transport and handles communications, record keeping and other administrative functions. Each team also has a driver and a paramedic on standby.

One of the first changes made to improve safety was to change the two-man drill. ATC suspected that the deminers needed more rest, so they decided to test a new arrangement in which one man would work for 20 minutes with a metal detector and prodder while his partner rested some distance away. The rest break for supervision was placed with the section leader. With the deminers resting every 20 minutes and the section leaders sharing each other's supervision, the rest breaks every two hours were eliminated. The result was a reduced risk of debilitation in the summer heat and greater working efficiency.

Sleep

Lack of sleep was also a suspected cause of fatigue among deminers. The Afghan deminers woke as early as 3:30 a.m. in the summer for dawn prayers, yet they retire at 9:30 p.m. While there was an opportunity to rest between prayers and breakfast, ATC decided that more rest was required. The daily schedule was changed so that the afternoon sun was accordingly rearranged. The original 8-hour work time schedule is shown in Table 1. Times are approximate—prayer times depend on sunrise and sunset and other activities are scheduled around prayer times.

Safety Awareness

Accident investigation reports typically emphasized a failure to follow SOPs as the main contributing cause. While deminers often did not follow the correct procedures, this disregard was usually due to
circumstances at the particular site rather than negligence. This fact does not include the widespread practice of squatting during demining. Some other variations on the SOPs are widely practiced, such as reducing the number of marking stones when marking the location of a metal detector indication. To implement a daily meeting among the deminers to discuss and discuss safety hazards or technical problems, they revert to a daily meeting among the deminers to discuss safety hazards or technical problems prior to this decision included

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 camp late on Saturday night.
- A loss of sleep due to social activities with family over the weekend.
- Security problems, such as deminers who were arrested and detained by authorities for trespassing and drugs.
- 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.

Leaves 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 traveling 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 problem 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 responsibility 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 accident, which could only be restored following an investigation clearing them of wrongdoing. To implement this procedure, ATC required prompt feedback on the causes of an accident. META required several weeks and even months to complete its accident report. Thus, ATC had to have its own investigation capability. ATC staff is delegated for accident investigation 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 shown, it is necessary to change the culture of an authorized body so that it obtains significant safety and quality improvements. Responsibility has to be delegated and shared appropriately at different levels in the organization. Deminers need a level of discretion in deciding how to approach each task. It is not possible to devise foolproof procedures for every conceivable minefield situation.

Afghan culture tends to resent centralized authority; so, it is remarkable that organizations as large as ATC can operate with such high levels of reliability. This activity is more remarkable when one realizes that the demining organizations are practically the only sign of a large-scale, disciplined organization 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, police force, coherent system of justice, social security, poor office or any telephone.

Starting responsibility could be regarded as foolhardy in these circumstances. Yet the experiences of ATC show that it is possible and has led to significant safety improvements. The other demining organizations 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 opinions and quotes make interesting and informative reading.
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 supervised 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 minefield problems. Team leaders and supervisors carry significant responsibility and pay the penalty if an accident occurs in their team.

Safety and cautiousness 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 fatalist 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 when an object 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.