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DDAS Accident Report

Accident details

Report date: 12/01/2008	Accident number: 468
Accident time: 06:30	Accident Date: 27/06/2007
Where it occurred: 1.5 km from Kirgochak, Rudaki District	Country: Tajikistan
Primary cause: Management/control inadequacy (?)	Secondary cause: Management/control inadequacy (?)
Class: Missed-mine accident	Date of main report: 04/07/2007
ID original source: TM07:01	Name of source: TMAC
Organisation: [Name removed]	
Mine/device: PMN AP blast	Ground condition: dry/dusty sandy
Date record created: 12/01/2008	Date last modified: 12/01/2008
No of victims: 1	No of documents: 2

Map details

Longitude:	Latitude:
Alt. coord. system:	Coordinates fixed by: GPS
Map east: E 068 29.101	Map north: N 38 13.505
Map scale:	Map series:
Map edition:	Map sheet:
Map name:	

Accident Notes

inadequate area marking (?)

inadequate training (?)

Accident report

The report of this accident was made available immediately after it occurred. The substance of the Bol report is reproduced below, edited for anonymity. The original files are held on record. The International demining NGO involved in the accident is referred to throughout as the "Demining group" because there was only one demining group operating in the country at the time. Text in [] is editorial change or comment.

REPORT OF BOARD OF INQUIRY INTO DEMINING ACCIDENT AT KIRGOCHAK ON 27
JUNE 2007

Dushanbe 04 July 2007

INTRODUCTION

A mine accident occurred approximately sixty kilometres south of Dushanbe, one-and-a-half kilometres from the village of Kirgochak, in Rudaki district, at approximately 06:30hrs on Wednesday 27th June 2007.

One person was killed in the accident; twenty-two years of age [the Victim], from Rudaki district died shortly after two unplanned detonations of Russian manufactured PMN antipersonnel landmines within the area where he was working as a deminer for [Demining group], at a demining task site. After the accident he was immediately evacuated to the Russian Military Hospital in Dushanbe, but was dead on arrival. See Initial Report Of Mine Accident, at Annex A and Landmine Accident Information Bulletin at Annex B.

A Board of Inquiry appointed by the Tajikistan Mine Action Centre (TMAC) interviewed all team members, medic, section leaders and team leader as well as [Demining group] managers. The Board also inspected all equipment involved in the accident and visited the task site three times to assess the causes of the accident. See Terms of Reference for Board of Inquiry at Annex C.

SEQUENCE, DOCUMENTATION AND PROCEDURES OF TASKING

The task was selected after a tasking from TMAC to [Demining group] and a subsequent deployment by [Demining group] mine action teams from Dushanbe. [The Demining group] first arrived at this task site on 7th November 2006. The team's work in the minefield actually started on 13th Nov 2006. After a break of some weeks due to poor weather conditions during the 2006-2007 winter season, the teams restarted works at the site on 23 May 2007. [The Demining group] teams have cleared some 1,500 square metres of land so far at this site and destroyed some 700 PMN anti-personnel mines there. One hundred and thirty Russian manufactured PMN antipersonnel mines had been destroyed by explosive demolition on the site on the day before the accident.

Works on the site were regulated by [Demining group]'s Implementation Plan, TS IS #425, which provides methodology and a schematic illustration of a clearance method, but which does not mention clearing up debris and fragmentation or re-marking of areas after demolition shots in the minefield.

Wednesday 27 June was a national holiday, but exactly who instructed the team to work on this day remains unclear. [Demining group] HQ Dushanbe is unable to state who gave the instruction and personnel in the field can state nothing more accurate than 'the order was given by HQ'. Some of the deminers at work on that day said they worked the same as they worked every other day and some, including the Team Leader, stated that they had been instructed to check cleared area and collect fragmentation and debris caused by the demolition of mines on the area on Tuesday 26 June.

GEOGRAPHY

The accident occurred near to the village of Kirgochak in the Rudaki District, approximately 60 kilometres south of Dushanbe, at a Tajik Border Force ammunition storage depot, close to the headquarters of the Russian 201st Motor Rifle Division. Lat/Lon N 38 13.505 E 068 29.101

Elevation is approximately 981 metres above sea level. See maps and satellite images of site and general area at Annex D. [These large files have been removed.]

The general area where the accident occurred is grassy pastureland, wheat fields and rolling hills. The point of detonation was on an area of ground on a slight incline, within a row of mines inside the working area of a deminer involved in the clearance of the ground as part of his normal duties at that location.



Accident site, [showing marking placed after the accident.]

Soil in this region is mostly sandy loam or clay, with few stones or other schist.

An unsurfaced track/road onto the area is an extension of a metalled road from the main Dushanbe-Kurghonteppa road and the task site is easily accessible along this road.

Other than the garrison of the Russian Motor Rifle Division, (mostly unknown to [Demining group] or the Board of Inquiry), the nearest inhabited buildings are at the village of Kirgochak, approximately one-and-a-half kilometres away to the northwest from the accident site.

Weather conditions at the site on the day of the accident and during the inquiry were dry, and hot (around 30° Celsius) and there had been no rain or cold weather during the preceding week. The ground was dry at the time of the accident and there had been no significant wind during the morning of the accident.

[Other site pictures have been removed.]

PRIORITY OF TASK

The mines at Kirgochak were placed to protect a weapons storage site, and that "protection" is no longer required. The fencing protecting the minefield has aged and broken in places. The surrounding land is used by local people and there have been accidents involving livestock when they enter the mined area through holes in the fencing. There is a concomitant risk of people entering the area in pursuit of valuable livestock. Although a rural area, Kirgochak is at low altitude, close to populated areas and only an hour from the city of Dushanbe.

The priority of the minefield is "low", but its relatively low altitude and proximity to Dushanbe makes it possible to work there during the months before the weather in the mountains allows deminers to deploy to high altitude sites. For this reason, the site is worked on when there is spare capacity due to difficulty accessing higher priority sites.

SITE LAYOUT AND MARKING

The minefield is situated within a strip of ground, approximately ten metres wide and lined on each side by ten strands of barbed wire fence, suspended on angle-iron pickets, which are spaced at ten metre intervals around the minefield. It consists of three rows, each about two metres apart, of PMN antipersonnel landmines. Mines are spaced approximately 50cm to one metre apart, and the rows continue all around the entire perimeter of the ammunition storage depot.



Perimeter Minefield Around an Ammunition Depot

Although the minefield is well marked, it was noted during the Board of Inquiry's investigations at the site, that the mine clearance site was not well marked. In particular, it was observed that insufficient marker pickets and marking tape had been deployed to show the line between cleared and uncleared areas. The area where [the Victim] was working was clearly the most potentially dangerous area on this part of the minefield, because he had a line of uncleared mines to his left, a line of craters created by recently destroyed mines to his right and a similar line behind him. In front of him there was a point where the line of craters stopped and continued as a line of uncleared, undiscovered mines. Despite this, there was no significant difference in marking here than at any other place on the minefield and marking to show where the line of cleared mines ended and where the uncleared area started was minimal.

At the time of the Board of Inquiry's investigation, two red marking pickets were emplaced into the ground next to the craters where the PMNs detonated. These two pickets are apparently undamaged by smoke or blast and there is some speculation that they may have been emplaced after the accident; it is very unlikely that they could have remained in place and undamaged during two close-proximity detonations.

A short (0.5m long) marker picket, broken approximately in half, was found near the point of detonation. There were no visually apparent signs of smoke or blast damage to the picket and the break could not definitely be attributed to the PMN detonation which is the subject of this report. The red-painted top of the picket was found approximately nine metres from the point of detonation, the base part of the picket, which should normally be shaped or sharpened to a point, but in this case was neatly sawn at 90°, was found next to the barbed wire fence about three metres from the point of detonation. There were some faint markings around the break

on both parts of the picket to indicate that it had been broken by a stone. This might have occurred during an explosive blast, such as that caused by the detonation of a PMN mine.

[Demining group] Deminers normally mark the start point of their day's work by driving a short (0.5m length) picket, with a blue-painted top, into the ground. In the case of [the Victim], no such *blue picket* was found, either on site or amongst his toolkit, which was left close by the scene of the accident.

There was confusion among the deminers about whether the day's work was to be search and clearance of ground contaminated by landmines or simply collection of fragments and debris from areas already cleared. Probably because of this confusion, some deminers used their blue peg to show where the day's work had started, some did not. Some deminers used a base-stick on that day, some did not.

The [Demining group] demining team at Kirghochak are living in a tented camp approximately seven hundred and fifty metres from the minefield. The team have set up their living area in a field camp with accommodation tents and two field kitchens. Although it is separated by a barbed wire fence and raised earthworks, the [Demining group] camp is located adjacent to the Border Force detachment which guards the ammunition depot. [Demining group] teams at this location are supported by [Demining group] with sufficient primary health care, shelter and food. Water is delivered on a daily basis by [Demining group] in containers and by the Border Force who refill the team's static water tanks on a repayment basis.

SUPERVISION AND DISCIPLINE ON SITE

A planned visit by OSCE VIPs was expected on the site on this day and arrangements were being made to receive the delegation, which meant that the Team Leader was busy with preparations for the visit and so not available to be present on the demining work site that day.

[Demining group] have a total of twenty-seven personnel working on this project task site and these are managed and monitored by Team Leader [Name removed].

A demining team site logbook was available to record visitors and routine daily events at the site. See Annex G for example pages [not included].

[Demining group] report that their managers routinely visit their teams and work sites on an occasional basis, usually more than once each week. This includes visits either by the expatriate Project Adviser, the local national Project Manager or the expatriate Operations Officer or his local national Operations Officer as well as oversight from expatriate EOD Technical Advisers. Recorded visits from [Demining group] senior managers and expatriate advisers to this task site prior to 27 June were as follows.

- 04 June: [National] OPS officer
- 04 June: [National] PM
- 05 June: [National] Ops officer
- 12 June: [National] Ops officer
- 13 June: [1st International] EOD TA
- 14 June: [International PM and] Project Adviser, [who wrote] Field visit – excellent, neat and safe work. Congratulations to whole team.
- 14 June: [National] Ops officer

- 20 June: [National] Ops officer
- 22 June: [2nd International] EOD TA

[Demining group]'s expatriate Project Adviser states that other visits were made by [Demining group] managers and advisers, but these are not recorded in the site log book. [Demining group] EOD Technical Adviser states that he was on the site almost every day, but this also is not recorded in the log book. [Demining group] also report that they do not have enough expatriate advisers to visit sites as often as they would prefer. [At the time there were five expatriates and three working areas.]

No managers, advisers or senior supervisors were at the task site at the time of the accident. The most senior persons on site that day were two Section Leaders, one, who had been promoted only that day, was responsible for four deminers, and one was responsible for two deminers.

QUALITY ASSURANCE

On-site management, supervision and Quality Assurance (QA) of works at the task site are the responsibility of the [Demining group] Team Leader. In support of this on-site supervisor there is normally a formal regime of internal supervision and inspection for the work of all of [Demining group]'s Mine Action Teams. Their work is also regulated by UN International Mine Action Standards (IMAS), Tajikistan National Mine Action Standards (NMAS) and the organisation's own Standing Operational Procedures (SOP).

As part of internal Quality Control (QC) procedures, the Supervisor, Team Leader or Section Leader at the task site is required to check each area cleared to ensure that no signals are received from a metal detector when it is passed over areas which have been cleared by a deminer. Such procedures should be recorded on specific Quality Control reporting forms, which should be part of the on site logbook. In the May and June Logbooks there are no pages for Quality Control, though [Demining group] stated that these would be provided separately by [Demining group] to the Board of Inquiry. At the time of writing, no QC reporting forms have been delivered.

No quality control monitoring or checks had been made on the day of the accident. Despite the lack of formal records, [Demining group] state that routine Quality Control checks are made on a daily basis by the Team Leader and the Section Leaders at every task site, including at Kirgochak on every day of operations prior to the day of the accident.

As well as [Demining group]'s internal Quality Control, TMAC normally inspects all task sites through the national Quality Assurance Officer. The most recent inspections by the TMAC QA Officer were on 6th and 15th June 2007. See TMAC QA Reports at Annex H [not included].

Internal Quality Reporting. [Demining group] provided a data stick and a quantity of paper reports in an [Demining group] envelope, delivered to the Board of Inquiry. Between these two sources there were five Reports of Demolitions of Landmines, and seven Daily Demining Reports. There was also one QA report on Medical Support and one QA report on Minefield Marking. As well as this, there were three TMAC QA reports, one of which is a QA evaluation of Training. There were no [Demining group] routine QA Reports in the envelope or on the data stick.

COMMUNICATIONS

[Demining group]'s on-site communications network is based on handheld VHF radios for internal contact within the task site area and on mobile telephones and satellite telephone for external contact. On site vehicles, normally parked at the camp site are equipped with CODAN High Frequency radios and are therefore able to communicate with [Demining group]'s Dushanbe office from Kirgochak camp site.

Routine twice-daily reports are made to [Demining group]'s Dushanbe HQ office from the Kirgochak task site by mobile telephone or Satellite telephone.

On the day of the accident, Team Leader [Name removed] called the Russian Military Hospital at Dushanbe to inform that a casualty would soon be on the way to them.

Routine twice-daily reports are made to [Demining group]'s Dushanbe HQ office from the Kirgochak task site by mobile telephone.

MEDICAL AND EMERGENCY SUPPORT

All [Demining group] operations normally deploy with a qualified medic as part of the team; a comprehensive trauma and first aid pack and a fully equipped ambulance vehicle appropriate to demining operations is provided at every task site. All demining personnel receive twenty-four hours of first aid instruction as part of basic deminer training and a further 16 hours as part of annual refresher training. Medical and emergency support provided to the team involved in this accident was adequate for the circumstances.

The medic was routinely stationed away from her ambulance and normally under the shade of a tree near to the entrance of the ammunition storage depot which the minefield surrounds. The ambulance was inconveniently placed, outside the perimeter of the ammunition depot and about five hundred metres away from where the deminers were working. [Demining group] do not have permission from the Border Force to take vehicles into the ammunition storage depot on a routine basis. [Demining group] also state that the ambulance is parked at the same 'Medical Point' which was appointed when this task site was first opened, in November 2006, but it has not been moved in line with the progress of local demining operations. When the accident occurred, the ambulance was allowed to drive into the depot and the driver moved it as close as he could get to the accident site, a point about one hundred metres away from the point of detonation. See satellite image at Annex D. [Not included]

National Mine Action Standards require that a casualty evacuation exercise should be carried out *immediately on first arrival at any task site* and routinely at least once each month. This task started on 23 May. The on-site log book records that exercises were carried out on Tuesday 22 and Saturday 26 May and on Saturdays 2, 9, 16 and 23 June.

Immediate treatment. Medic and team members report that procedures and drills that were implemented to evacuate the casualty from the minefield to a safe area and then on to the Russian Military Hospital went well and in accordance with training received by them from [Demining group]. [Demining group]'s qualified, professional medical assistance was available to assist and treat [the Victim] within a few minutes immediately after the accident, before he was evacuated by [Demining group] ambulance towards the Russian Military Hospital in Dushanbe approximately ten minutes later.

Among others, deminers [Deminer 1] and [Deminer 2] were working close to the victim and, after the mine detonated, arrived at the scene of the accident first. Section Leader [name removed] arrived immediately after. The casualty was then carried by fellow deminers to a point immediately outside the marked minefield barbed-wire perimeter, where the medic

arrived a few moments later, having run there from her post, approximately one hundred metres away, when she heard the initial explosion.

[Demining group]'s on-site medic, [name removed], said in interview that although she was ready to administer immediate emergency treatment to [the Victim] she thought it most likely that [the Victim] was dead even before he was placed inside the ambulance, a few minutes after the detonation of the PMN mines. She examined [the Victim] as soon as he had been carried the few metres from the point of detonation to a safe area outside the minefield and remarked that she was unable to detect any pulse, his Blood Pressure was extremely low (40/0) and that he exhaled what appeared to be his final breath at that point.

At 06:51 hours the casualty was removed from the area in the team's ambulance vehicle, driven by [name removed], and taken to the Russian Military Hospital in Dushanbe, approximately sixty-five kilometres from the site. Immediately on arrival at the hospital, the ambulance carrying the victim, medic and team members was met by a doctor and hospital staff members but [the Victim] was pronounced dead on arrival.

As a result of standing on one PMN mine and falling forward onto a second mine, [the Victim] was killed. A report from the Russian Military Hospital states that the casualty sustained the following injuries:

Explosion trauma. Neck - injury of blood vessels and nerves in the throat and oesophagus. Serious bleeding. Open fracture of the lower left jaw. Closed fracture of the left shin. Large fracture and trauma of external and internal surfaces of left thigh, covering upper part of leg, up to testicles. Partial amputation of the left foot, open fragmentation fracture of the left foot, foot bones I-II-III. Fragmentation injuries in chest and stomach. See initial post mortem examination report. [See Medical report.]

[An IMSMA report with its imprecise labelling has been removed.]

There were no apparent injuries to the victim's arms or to his head. Further autopsy reports may disagree with this statement, but such reports will not be available for at least one week after the publication of this report.

PERSONALITIES INVOLVED

[Demining group] expatriate management and advisory team in Dushanbe consists of four persons;

Programme Adviser/[manager]

Operations Manager

2 x EOD Technical Advisers

National management team consists of:

Project Manager

Operations Officer

Level of training and experience of supervisory and managerial staff. The expatriate Programme Adviser has experience from two-and-a-half years as a mine action manager with [Demining group] in Sudan, where he was employed initially as Survey Team Supervisor, then Operations Officer and then as Operations Manager. The EOD specialists are well qualified and experienced enough to be employed as Technical Advisers in any mine action programme. No CV was received from [Demining group] for the expatriate Operations Officer.

Both national managers have worked for [Demining group] Dushanbe for more than four years and are consequently very knowledgeable and experienced about the programme. National Project Manager [name removed] is qualified from an International Mine Action middle managers' course in Bangkok, 2005.

All team members are trained and qualified deminers and all are long-term, experienced employees of [Demining group]. All personnel have completed and passed at least one [Demining group] basic deminer training course. Deminers' Job Description is shown at Annex J. [Not included.] The level of training and experience of the demining personnel involved in the incident was adequate. Last deminer refresher training, which was completed just prior to this team deploying to this work site, was from 07 May to 18 May 2007. Dates and subjects covered during last refresher training are shown at Annex K. [Not included.]

Leave periods and days off work. The team personnel involved in the incident had been working at the area for one month and their last days of rest were from after duties on Monday 18 June to starting work on Monday 25 June (Team Leader worked during this period), and from 28 to 30 June. See attendance record at Annex L. [Scanned document not included] From January to May the team were at home, on standby during Tajikistan's winter season, when no demining takes place.

[The Victim]'s whereabouts on Thu 28, Fri 29, Sat 30 June are not recorded in the on site log book attendance sheet. [Demining group] report that he was on leave, together with the remainder of the team, at this time.

EQUIPMENT AND TOOLS

The deminer involved in this accident was deployed with a standard-issue [Demining group] deminer's toolkit. The items mentioned below were found at the scene of the accident.

Metal detector - An electronic metal detector is normally used by deminers to help locate metallic landmines which are buried in the ground. Judging from the position and condition of the instrument issued to [the Victim], which was left at the scene of the accident, it is clear that, although ready for deployment, this tool was not in immediate use at the time when the mines detonated. [The Victim] was not using his metal detector at the time of the accident. The detector was an Ebinger model 421GC, it was not damaged in either of the two detonations which occurred close by where it lay on the ground. When the detector was recovered from the scene of the accident and tested, it appeared to be 100% effective. It was found to be in good working order and on-site testing showed that the detector was capable of locating PMN anti-personnel mines to the required depth in the type of soil encountered at this task site. Ebinger metal detector was tested by [Name removed], QA Officer at TMAC.

Trowel – A small hand trowel is normally issued to deminers as part of their standard toolkit, to assist with the excavation of earth when searching for landmines. Judging from the position and condition of the implement left behind at the scene of the accident, it is clear that [the Victim] was not using his hand trowel at the time of the accident.

Hammer – A small hammer, normally used for driving wooden marker pickets into the ground. Although there are no blast or powder smoke marks on it to provide firm evidence of usage, [the Victim] may have been using his hammer, at the time of the first detonation. The hammer was found approximately nine metres in front of where [the Victim] was working and it is possible that the tool was thrown there, perhaps torn from [the Victim]'s hand, by the blast effects which occurred during the detonation.

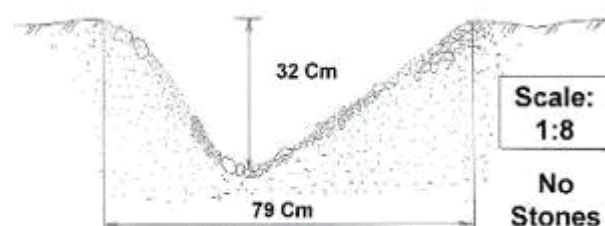
Base-stick - Base sticks are used by deminers to mark the boundary between the cleared and uncleared area during work at the forward edge of a minefield clearance lane. The rule is that the area behind the stick is safe (cleared of mines). The area in front of the stick is unsafe (not cleared of mines). A Base Stick is a 1.2-metre long, approximately 25mm X 25mm wooden rod. The middle one-metre part of the stick marks the correct lane width. It is unclear whether or not [the Victim] was using his base stick at the time of the accident. During the Board of Inquiry's investigation of the accident site there was a base stick on the ground, between the two craters left by the PMN mines involved in this accident. Although it would normally be expected [to be marked or damaged] after being in such close proximity to two antipersonnel mine detonations, there was no smoke marking or blast damage to the base stick. There has been some speculation that this base-stick was placed on the area after the accident, in an attempt to demonstrate to the Board of Inquiry that it was being used prior to the accident. If this speculation is correct, this action is of course obviously entirely unacceptable and should the perpetrators be discovered, it is anticipated that disciplinary action will be taken against them.

DETAILS OF MINE INVOLVED

Bakelite, metal and rubber fragments recovered from one of the craters created by the blast of the explosions indicate that the mines involved were Russian PMN anti-personnel blast mines. The craters left by the detonations are as would be expected from such devices. For technical details on PMN antipersonnel mines, see Annex M. [Not included.]

PMN anti-personnel mines are among the biggest and most powerful antipersonnel mines deployed anywhere in the world. A PMN is loaded with 240 grams of high explosive and a 9 gram booster charge. It is designed to be operated by 8 to 25Kg of pressure from above.

Analysis of the craters caused by the detonations shows that both of the mines involved in this accident were buried at a depth of approximately 12 centimetres in the ground and less than one metre apart. All PMN mines found by [Demining group] at Kirgochak so far have been buried at depths of less than 15 centimetres. Further evidence that mines at this task site are laid in shallow excavations may be deduced from the many uncleared mines which can be seen protruding from the surface of the ground. The mines were laid in the middle row of three rows. Mines were originally laid at this site by Russian armed forces in C1973 and the location was handed over to Tajikistan's Border Force in 2005.



Crater A [the crater he stepped in.]

DRESS & PERSONAL PROTECTIVE EQUIPMENT

The Personal Protective Equipment (PPE) issued by [Demining group] to their deminers is manufactured by the ROFI company, of Norway <http://www.rofi.com/>. All personal protective equipment (PPE) at the site conformed to Paragraph 4 of UN International Mine Action

Standard 10.30, in that it was capable of protecting against the effects of an explosive blast as follows:

Frontal protection. Appropriate to the activity, capable of protecting against the blast effects of 240g of TNT at 30cm from the closest part of the body.

Eye protection. Capable of retaining integrity against the blast effects of 240g of TNT at 60cm, providing full frontal coverage of face and throat as part of the specified frontal protection ensemble. Facial visors used by [Demining group] in Tajikistan are manufactured by Security Devices of Zimbabwe. <http://www.secdevinc.com/>

Visor. [The Victim]'s visor is severely deformed, broken and damaged by heat and blast. See images at Annex N [not included]. Close inspection of the largest piece of visor recovered after the accident showed enough side edges to determine its orientation. It is the lower part of the visor with the top edge entirely removed. The polycarbonate material was heat distorted, rippled and bubbled. It had been extensively thinned by stretching (from an original thickness of 5mm to 2mm) and heated to well above its forming temperature (at least 180 degrees Centigrade) throughout its thickness. A bottom corner had split and twisted inward, forming a sharp shard approximately 5cm long that pointed in towards the wearer's throat. The visor head-frame, made of ballistic aramid with a washable cover, had been shredded at the front. Visor damage is consistent with it receiving an extreme shattering force near the top centre and an extreme temperature for a microsecond. Fragments of the dark blue ballistic-aramid material used in the manufacture of the visor's head-frame were later found in the crater, (along with a small piece of burnt Bakelite, originally from the outer casing of the PMN mine and the remains of its striker-pin and spring).

It seems probable that a mine was initiated by the wearer falling forward and striking the ground above a mine with the top part of the visor. The damage to the victim's throat is consistent with the sharp shard of visor on the lower edge being torn sideways as the visor was thrown away by the expanding blast wave.

On inspecting the body armour, the damage was found to be concentrated on the left side, with panels torn away. This is consistent with the victim having stepped with his left foot on a mine while leaning forward. The front of the victim's left boot was missing and his shin (above if leaning forward) had been shattered. When reconstructing this position, the groin and genitals are directly above the seat of initiation and so inside the fragment cone associated with the detonation of a buried mine. The groin injuries are taken to confirm the victim's position.

What is inconsistent with the left-side frontal damage to the armour apron is the fact that the apron straps were torn from the apron (breaking nylon stitching), plastic buckles had snapped, and the apron was thrown 12 metres from the victim's body. The inner armour panel of the throat protection was also thrown aside, although its Velcro-fastened cover was undamaged. In the absence of other explanations it seems likely that the straps were broken and the collar emptied by a blast from above that entered behind the armour and sought to expand between the body and the armour, forcing the armour to break at its weakest points. When it broke, pressure behind it had built to the point that the armour was thrown aside and landed a distance away. A blast from above the armour neck-hole is consistent with the visor damage.

There is no obvious surface damage to the victim's head or torso (although light damage may not have shown in the photographs). If the head sustained the shock associated with the mine detonating closer than ten centimetres (even with 5mm polycarbonate in front of it), internal cranial damage and a broken neck might be anticipated. Whether or not these occurred, the

absence of obvious skin abrasions on the forehead make it probable that the visor fell off as the victim was pitched forward by the first blast and he landed with his face inside the visor but not inside the head-frame. The top of the visor and head frame were then shattered and torn by the blast which lifted the victim's body, with blast entering between the top of the body armour and his torso, expanding to break the armour sharply away. At the same time the remains of the visor were thrown aside by the expanding blast wave, with the sharp inward shard slicing through the victim's throat. The victim fell back to rest with his head inside the first crater where he bled extensively, probably from a severed carotid artery.

DETAILED ACCOUNT OF ACTIVITIES ON DAY OF ACCIDENT

The Board of Inquiry noted that almost no one, from senior managers to deminers at [Demining group] was in possession of a wristwatch. Some deminers said they relied on their mobile telephones for the time, but as mobile phones are not allowed onto the work site, this seems unsatisfactory.

Activities on the night before the accident followed a normal routine pattern and after eating dinner at between seven o'clock and eight o'clock, team members, including [the Victim], watched a DVD movie on the camp portable television and then went to their beds between nine o'clock and ten-thirty, the same time as usual.

No evidence was found that any person at this task site was suffering from illness or sickness or had any reason to behave in any way that would be considered as particularly unusual or out of the ordinary. No alcohol or drugs are permitted on the task site area and deminers are forbidden to consume alcohol during their tours of duty on operational tasks.

On the day of the accident, team members awoke and arose, as usual, at between four and four-thirty in the morning. After morning prayers, for the more devout members of the team, breakfast of bread and tea was taken by all and, after time to visit the latrine and ablutions, a routine morning safety briefing was delivered by the Team Leader and all team members were at work in the minefield by 05:15hrs.

During questioning of the team, the Board of Inquiry attempted to find out what subjects the Team Leader had briefed the deminers about during his morning safety briefing. But answers were inaccurate, inconsistent and/or contradicted each other or were not concomitant with known facts or observations. When pressed on this subject, some deminers stated that the briefing had covered 'safety', but were unable to further elucidate about exactly which safety subjects they had been briefed upon. Other deminers agreed with every subject suggested by interviewers. E.g., were you briefed about Metal detectors? – Yes. Working distances? – Yes. Casevac drills? – Yes. Use of [Demining group] vehicles? – Yes. PMN mines? – Yes. Excavation drills? – Yes. Minefield Survey? – Yes. Etc.

For the following reasons, the day of the accident, 27 June 2007 was not a normal working day.

1. It was a national holiday, the Day of National Unity for Tajikistan.
2. A demolition of 130 PMN antipersonnel mines had been carried out on the day before and the fragments and debris left behind after the detonation had to be cleared up on this day.
3. A visit was expected by a delegation of OSCE VIPs to the site. OSCE is [Demining group]'s major donor in Tajikistan, so this was an important visit.

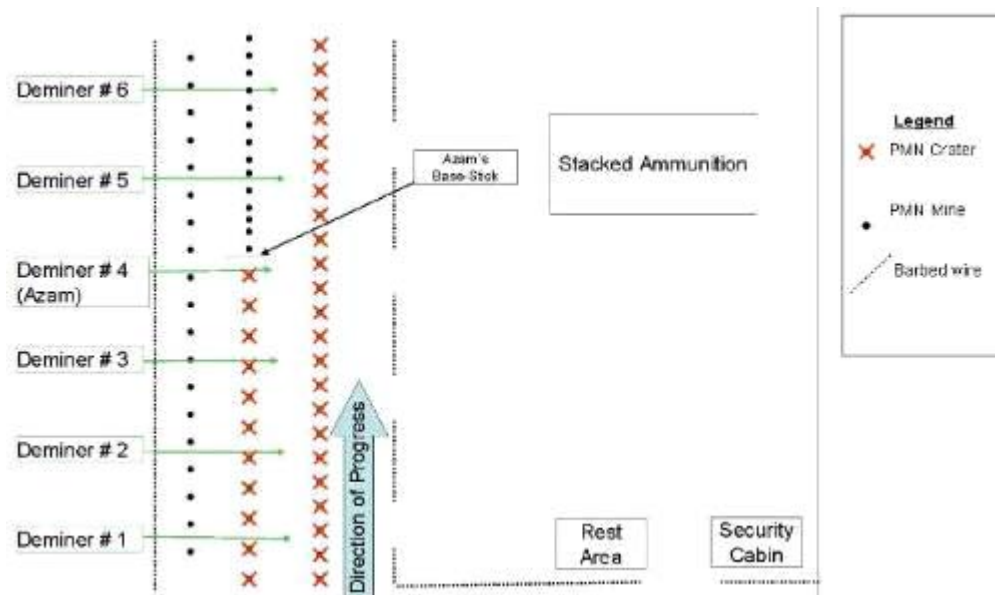
4. A demolition of 71 PMN antipersonnel mines, which had been found within the same minefield, but on the other side of the ammunition depot, were to be destroyed by explosive demolition on that day.

For these reasons, the Team Leader did not personally deploy to the work site on the day of the accident. Instead, he was involved in the preparation for the visit and the demolition of the PMN mines on the other side of the depot.

The members of Section One were deployed, without direct supervision, to the area where the demolition had been carried out on the day before. The Section Leader followed a few minutes later.

The line of mine clearance was along an axis which followed the line of the barbed wire fence, which enclosed the minefield in a southeast to northwest direction of progress, on this side of the minefield, following along the line of the rows of landmines laid in the ground.

Each deminer was separated from his nearest co-worker by a distance of approximately twenty-five metres, as shown in the diagram below. Each deminer was responsible for the clearance of the ground between his own position and the position where the next deminer was working in front of him.



[The Victim] deployed to the middle part of this line of workers, with three deminers in front of him, each spaced at twenty-five metre intervals apart from the next, and three deminers behind him at similar spacing.

Because no other untoward events have been reported, the assumption must be that [the Victim] started work and carried out his duties of searching for debris and fragments of destroyed landmines. He was working along the clearance lane towards a north westerly direction and had with him approved tools and equipment, in accordance with normal working practices and [Demining group]'s published [outdated] Standing Operational Procedures.

Although he was not formally tasked or shown where to work and there are no direct witnesses who saw exactly what [the Victim] did on that day, it seems likely that the procedures of his work prior to the accident were not fully in accordance with normal working practices and [Demining group]'s published Standing Operational Procedures because some aspects of the work he was doing (clearing debris and fragmentation from a demolition shot inside a minefield) is not regulated by [Demining group]'s SOP.

He was working in a confusing place, where the marking system was not entirely clear. Organisation, effectiveness and accuracy of site marking observed by the Board of Inquiry at the site on the day of the accident was questionable and may have contributed to his confusion.

During interviews at the task site after the accident, there was no general agreement between the members of number One Section on several issues. They seemed unsure, but it seems that the team had been told one of three things. This was either to:

- a) Using a general sweep with metal detectors, hand-held magnets and visual observations, search for and remove debris and fragmentation, left behind after the previous day's demolition of PMNs.
- b) Clear lanes whilst searching for landmines, in the same manner as they had been used to doing on most other working days.
- c) A combination of both points a and b.

[The Victim] and all other members of the team at work that day continued working until 06:00hrs, at which time they took a scheduled routine break to rest and drink water. They rested for fifteen minutes and were back at work in the minefield at 06:15hrs.

Section Leader [Name removed] states that he supervised Deminer Number One from a few minutes after 05:15hrs up to the time the team stopped work for their routine rest break, at 05:45. At 06:00hrs, after the break, he supervised Deminer Number Two, for approximately thirty minutes and then started to move towards Deminer Number Three. At that time, the unplanned detonations which killed [the Victim] (Deminer Number Four) occurred.

No one knows what actions were carried out in the minefield by [the Victim] that morning because he worked unobserved, unsupervised and alone. Informed conjecture based upon observations at the site and interviews with team members, supervisors and managers suggests that this is what happened:

- a) Up to the time of the rest break and on return to the works area, [the Victim] worked the same as everyone else, clearing up pieces of fragmentation and debris from the previous day's demolitions task, when 130 PMN antipersonnel mines had been destroyed in situ by explosive demolition.
- b) At approximately 06:15hrs [the Victim] went back to work in the clearance lane he had marked with his base-stick and the marking tapes which were attached to it.
- c) Either he stepped over his base-stick, out of the cleared area and into the uncleared area. His first step was onto the first of the two PMN landmines which eventually killed him.
- d) Or he was either crouching or kneeling down on one knee, possibly about to drive a wooden marker picket into the ground, using the hammer which was issued to him as part of his tool kit for such tasks. The pressure of his foot caused the detonation of the first PMN landmine.
- e) During the explosive blast caused by the detonation of the first PMN landmine, [the Victim] was thrown forwards and his visor struck the ground in front of him. Maybe he was wearing the visor at this time, maybe he was not, but the visor shows undeniable evidence of being in very close proximity with heat such as that associated with an explosive detonation.

- f) A large part of the visor became a very fast moving projectile and cut through [the Victim]'s neck at extremely high speed. This injury quickly caused the loss of a considerable amount of blood from the front and right side of [the Victim]'s neck.

Note: The kinetic energy and heat that is released during the combustion of the explosive affects the surrounding area as follows:

- Blast effects
- Effects of air displacement waves (direct and reflected)
- Ground shock
- Effects of fireball and heat radiation
- Fragmentation originating from the casing of the mine
- Secondary fragmentation from the foundation and surroundings.

The direct and reflected blast and effects of air displacement created by the detonation shock wave of the second PMN caused [the Victim]'s Personal Protective Equipment apron to be torn entirely from his body and it was later recovered 12 metres from the point of detonation. For distances at which other items of Personal Protective Equipment were found, see sketch at Annex O.

SUMMARY

[The Victim] was part of an [Demining group] Mine Clearance Team was clearing an area of ground that they knew was definitely mined with PMN anti-personnel mines, laid very close together, at intervals of less than one metre between one mine and the next. The day was not a normal working day but nothing untoward had happened during the previous twenty-four hours that might affect operations at the site. [The Victim] was working unsupervised in the middle part of the site; the drills and procedures he was using were probably not in accordance with SOP and the site was inadequately marked.

Injuries sustained by [The Victim] and damage to his PPE, as well as evidence from the craters and surrounding area indicate very clearly he was killed by two PMN landmines.

CONCLUSIONS

1. **Field control inadequacy.** There was weakness in command and control, probably because the Team Leader was not on site. The Section Leader had not personally deployed each deminer specifically and individually.
2. **Management inadequacy.** [Demining group] Dushanbe's interpersonal communications and briefings as well as their administration and organization were not fully effective. During interviews there was no consensus from team members about a number of issues. The demining team members did not know if it was a holiday or not and were not fully briefed about the work they were expected to do. Although [Demining group] state that many unrecorded visits had been made to the task site by managers and supervisors, these were not recorded in the site logbook.
3. Although there was no deliberate or demonstrable neglect, carelessness or misconduct by any of the personnel involved, the deminer killed in this incident was

not supervised correctly and it is likely that he was unsure of what he was supposed to be doing and was further unsure about where he was supposed to be doing it.

4. Procedures and drills used on this site are not regulated by or articulated in Standing Operational Procedures and therefore are subject to local interpretation or even disregard. Although [Demining group] Dushanbe issued an Implementation Plan, more detailed descriptions of drills and procedures are required in the document.
5. Personnel were given unclear or inappropriate briefing by supervisory staff. Deminers were unsure whether it was a working day or a holiday and were not certain about what work they should have been doing.
6. Because the area was inadequately marked, there is a strong possibility that [the Victim] was confused about exactly where he was in terms of safe/unsafe and clear/cleared/uncleared areas.
7. [Demining group]'s administration after a demining accident was unsatisfactory. Requested documentation provided to the Board of Inquiry team by [Demining group] Dushanbe was delayed, undelivered, confused and disorganized, though this situation improved towards the finalisation of the inquiry, when requests from the Board of Inquiry to [Demining group] were dealt with well.
 - Timeline was very disorganised. Originally stated that casualty was 'stabilized' by medic; casualty was dead. See Annex P for updated and corrected Timeline. [Not included.]
 - Team nominal roll and organigram were both inaccurate, showed two personnel ID numbers as the same and showed team appointments incorrectly.
 - Training programmes requested by the board were incomplete.
 - QA/QC monitoring records were not received by the board.

RECOMMENDATIONS

1. All members of the team involved in this accident should undergo at least three eight-hour days of refresher training and psychological counselling before being re-deployed to any demining task.
2. More national managers should be trained, mentored and deployed to inspect mine action task sites and to manage and supervise teams in the field, particularly in places where expatriate staff members are not available.
3. The team's ambulance should have been closer to the task site. A negotiation should be made with the Border Force to allow the ambulance to be brought inside the ammunition storage compound whenever necessary and the ambulance should be moved as close as possible to whichever part of the site it is meant to be supporting.
4. On site briefings need to be improved; Deminers don't listen and/or can't remember routine briefings. Briefings should be graphic; use of models, maps and other training aids should be considered. Interpersonal communications between Dushanbe HQ and field operations should also be improved, so that when decisions are made, it is clear who has made them.
5. [Demining group] should provide wrist watches to staff members or encourage employees to buy their own.

6. After any demolition of landmines on the minefield, the area should be properly re-marked, under the supervision of the Team Leader, Section Leaders and the demolitions supervisor.
7. Procedures for supervisors' observation and supervision of leading deminers should be improved. Deminers in particularly difficult or exposed areas should be the subject of closer observation and support from their supervisors.
8. Team Leaders should deploy to the works area together with their teams and should remain in the minefield whenever their team members are at work.
9. If preparations are to be made for VIP visits, either on-site works should be halted, or [Demining group] HQ Dushanbe should manage the situation to ensure that deminers do not work unsupervised by their Team Leader.
10. Supervisors should ensure that marking is checked before the start of each day's work to ensure that all areas are clearly identified.
11. Deminers should always be deployed to the start point of their daily work by a supervisor.
12. Marking between cleared and uncleared areas should be improved. This is particularly important in areas where long lines of antipersonnel mines are being cleared by hand and multiple detonations of mines has occurred; it is difficult for deminers to see exactly where the end of the demolitions shot(s) finish and the uncleared mines lay. Demolitions supervisors should be fully aware of exactly how many detonations have occurred after every shot and how many detonators or charges have failed. The only way to be quite certain of this is to physically visit each crater to inspect whether the charge detonated as planned; therefore demolitions supervisors should count craters immediately after any demolitions task is completed and mark the end point of the tasking. In the case of Kirgochak minefield, where there is almost no vegetation and the mine rows are only a few metres from the barbed wire perimeter fence, this procedure can be carried out easily and without entering the dangerous or uncleared area.
13. [Demining group] should train personnel to be able to deal with the administration required after an accident. E.g. Timeline should have been started by a nominated person on site immediately the unplanned detonation took place and this should be practised as part of CASEVAC drills.
14. As recommended in the Board of Inquiry report for the [Demining group] accident which occurred on 19 April 2006, and again for the Board of inquiry report for the [Demining group] accident which occurred on 21 August 2006, the Board of Inquiry recommends once again that, in order to better reflect good practices and recent developments in mine action, [Demining group] Standing Operational Procedures should be reviewed and updated urgently. As [Demining group] have not responded twice before to this same recommendation, we further recommend that TMAC requires [Demining group] to provide an updated and complete SOP by 30 August 2007.

SIGNED: UNDP Project Manager, BOMBAF; Chief of Engineering, Ministry of Defence;
Operations Officer, TMAC.

[All original Annex and support documents are held on file.]

Victim Report

Victim number: 628	Name: [Name removed]
Age: 22	Gender: Male
Status: deminer	Fit for work: DECEASED
Compensation: Not made available	Time to hospital: 45 minutes
Protection issued: Frontal apron Long visor	Protection used: Frontal apron, Long visor

Summary of injuries:

severe Abdomen

severe Chest

severe Face

severe Genitals

severe Head

severe Leg

severe Neck

AMPUTATION/LOSS: Leg Below knee

FATAL

COMMENT: See Medical report

Medical report



Throat injury



All lower body injuries.



Remains of foot



Upper inner thigh and genital injury.

Demining group initial medical report:

Loss of left foot; extensive damage to leg up to genital area; loss of testes; minor damage to right leg; blast injury to inner left forearm; blast burns to chest; partial decapitation including severing of both arteries.

Evacuation to known safe area; attempted to induce breathing and heartbeat, wounds bound, intravenous drip administered; transportation to Russian military hospital. Declared DOA.

Departure Time: 06:43 Kirgochak

ETA: 07:38 Russian Military Hospital

Initial Post-Mortem Examination Report [Translated from Russian]

Ministry of Health of Republic of Tajikistan

Republican Centre of court medical inspection

30 June, 2007

Diagnosis: Explosion trauma. Neck - injury of blood vessels and nerves, throat, gullet. Open fracture of the lower left jaw. Closed fracture of the left shin. Large fracture of trauma of external and internal surface of hip, covering top, eggs. Not complete amputation of the bones of a foot, open fragmentation fracture of the bones of a foot, nail bones I-II-III. Fragmentation injuries in chest and stomach. Serious bleeding.

[Name removed], Expert of Court medical inspection.

Medical examination report 2nd July 2007

Fundamental illness: explosive trauma: Avulsed (lacerated) wound of neck with damage of neurovascular fascicles, pharynx, larynx, esophagus, soft tissues of neck. Open (compound) fracture of lower jaw from left side with displacement of bone (fracture) fragments. Simple comminuted [Splintered] fracture of left shin with displacement of bone (fracture) fragments. Extensive avulsed [lacerated] wound of external and internal surface of thigh, starting with upper third with transfer of lower third left thigh, perineum of testicle. Incomplete amputation of foot bone, comminuted [splintered] fracture of foot bones and I-II-III foot phalanx. Non penetrating fragmentation blunt [non perforating] wound of thorax and abdomen.

Complication acute loss of blood.

No concomitant.

Medical Examiner.

Related papers

Damage to PPE and boot



The bottom of the visor is closest to the camera, heat bubbling and distortion is evident. The top of the visor is missing. Fragments of the head-frame material were found in the second crater.



Twisted spike at bottom of visor which injured the Victim's throat as it was torn aside.



The Victim's PPE showing blast damage down the left side and straps torn off.



The victim's left boot.

Analysis

This accident is classed as a "Missed mine" accident because the Victim almost certainly believed that he was stepping in a cleared area. Whether it had been "cleared" or not cannot be known because the group did not use internal minefield marking at the site

Unusually, both the primary and secondary causes of this accident are listed as “Management control inadequacies” because the demining group’s management had not taken note of the lessons of previous accidents and updated their SOPs. The Victim had no clear instructions, no supervision and the demining group National management was not even aware that the group was working that day despite the fact that the international staff planned to visit the site with donors later that day. There was no adequate marking inside the mined area and marking placed after the event was both inadequate and an attempt to mislead the investigators. The lack of internal minefield marking means that the Victim almost certainly moved out of the area where the detonations had taken place without realising that he was doing so.

A further management failing was the fact that the International Director of the demining group agreed with the findings of the Board of Inquiry and gave his personal word that the failings would be corrected immediately: adequate SOPs and working practices were still not in place five months later when the next accident at the site occurred.

From the injuries sustained, it is likely that the Victim was reaching forward to collect a piece of debris from the previous demolition when the accident occurred. The first mine pitched him forward and his head landed inside the visor on top of the second mine. The visor was vaporised near the top, flattened near the middle, and split on the bottom where it did not get hot enough to distort. The split visor then cut the victim’s throat. The autopsy did not include x-raying the corpse, but it is very likely that the Victim’s neck was broken by the shock of the second blast. He was thrown back and bled to death rapidly with his head in the crater of the mine he had stepped on. It is unlikely that he would have died from the injuries sustained in the first detonation.

The detailed accident report was conducted with great speed that did not allow it to include translation of the witness statements. The originals and all background information were made available and are held on file. The Bol report and associated documents and pictures constitute the best (most complete) investigation in the DDAS record.