

DDAS Accident Report

Accident details

Report date: 22/05/2004	Accident number: 406
Accident time: 05:55	Accident Date: 23/11/02
Where it occurred: Task No.116, Kamchewai, Northern Red Sea Zone	Country: Eritrea
Primary cause: Inadequate training (?)	Secondary cause: Management/control inadequacy (?)
Class: Missed-mine accident	Date of main report: 07/12/2002
ID original source: AM HT	Name of source: MACC Eritrea
Organisation: Name removed	
Mine/device: AT (unrecorded)	Ground condition: dry/dusty grass/grazing area
Date record created: 01/04/04	Date last modified: 22/05/04
No of victims: 8	No of documents: 2

Map details

Longitude: 38° 38' 52" E	Latitude: 16° 28' 04" N
Alt. coord. system: UTM	Coordinates fixed by:
Map east: 37462402	Map north: 1820876
Map scale:	Map series:
Map edition:	Map sheet:
Map name:	

Accident Notes

dog missed mine (?)
inadequate medical provision (?)
inadequate training (?)
no independent investigation available (?)
inadequate communications (?)
inadequate investigation (?)

Accident report

An accident report was apparently compiled jointly by the demining group involved and the Country MACC. Documents provided had only the demining group logo on them, so it was first assumed that the investigation was effectively “internal” and witnessed by MACC personnel. It later became clear that the following report was not written with the collaboration of the Country MACC, although it is worded to sound as if it were. See *Other documents* and *Related papers* for the MAC's report on the accident and its investigation. Other papers made available are also reproduced under *Related papers* at the *Other documents* tab.

The political situation between MACC and government was unfortunate, and the MACC did not have the desired level of authority over demining groups working in the country. The internal report that follows is not comprehensive, concentrating on how the mine was missed rather than the fatal problems of casualty evacuation that ensued.

The following papers have been edited for anonymity.

Minefield history (from IMSMA report)

“The mines were laid by EPLF in 1978 in order to protect their defensive position from Ethiopian tank penetration. Although EPLF combat engineers cleared the area, anti-tank mines such as the TMN-46 and PRB-M3 (also PRB-3) are still visible in the area. Although people use the area for grazing, still no accident happen.

The land will be used for agriculture as well as for grazing.”

[One civilian accident had happened within metres of this incident, as shown by a frag on the maps and is referenced in one of the IMSMA reports as “In January 2003 there was mine accident on a child.”]

Physical description (from IMSMA report)

“The danger area is flat surrounded by mountains. There are few trees and vegetation on the area. It has sand type of soil. There is a big seasonal river near the danger area. The ground is flat at the bottom of a big mountain. It is suitable for all types of demining.”

“Cultivated area had been ploughed by hand not by machine (only 1 year). When the locals found mines they stopped.”

An Eritrean Mine Action Programme tasking order stated that “manual clearance depth (where required) is 20cm.”

FATAL INCIDENT REPORT, DEMINING INCIDENT AT KAMCHEWAY 23 NOVEMBER 2002 - AN ANTI TANK (AT) MINE MISSED BY THE MINE DETECTION DOG (MDD) TEAM

The [Demining group] Demining Incident, 23 November 2002

Demining Incident Preliminary Investigation Report for Submission to the Director of the [Demining group] and the Eritrean Demining Authority

Executive Summary

The incident occurred after the rear right wheel of the [Demining group] Land Rover 110 travelled over the top of an anti-tank mine, possibly a Belgian PRB-M3 minimum metal anti-tank mine buried at depth of less than 10cm, causing it to detonate. The mine had been missed by two mine detection dogs who had previously searched the lane in both directions.

Clearance had been conducted as per [Demining group] manual and mine detection dog standard operating procedures. The marking and mapping of the minefield had been correct and although, the administration / parking area had been re-located within an area where there had been anti-tank mines laid in a identified pattern, the area had been cleared and therefore, there was no reason for the Team Leader to suspect the presence of further mines.

A contributing factor to the mine incident was confidence in the mine detection dogs in their ability to find anti-tank mines after they had already located six mines in Kumchewai. This led [Demining group] to believe that the dogs would not miss mines. In addition to this, manual quality assurance had been conducted on ground cleared by dogs, an area was excavated in the vicinity of the PRB-M3 which had been removed during the survey and manual clearance had been carried out between the dog lanes in Area 2. No further mines were located by the manual deminers in these areas and therefore, there was no reason to believe that any additional mines were there.

Although, mine detection dogs proved that they could locate mines in Kumchewai, this incident has highlighted the fact that dogs do miss mines and therefore, the only way to avoid a mine accident in a dog cleared area is to conduct full clearance of the dog cleared area. This would therefore, seem to defeat the purpose of using dogs to locate mines as it would mean that the area would have to be cleared with another asset prior to the handler walking forward. Although, the dogs could be used for area reduction, for example, deployed from a road or trench-line [sic] into a suspect area in order to establish the mine pattern, with the current methods of deploying dogs, this would inevitably mean that the handler would have to walk forward into a dog cleared area.

Although, there were regular site visits and numerous planning meetings, there is a possibility that, had there been more permanent supervision at the task that certain aspects of the planning process may have been reviewed. The fluency of the dog clearance and climate restraints on deploying the dogs meant that quite often when the site was visited by senior [Demining group] staff, the dogs were not working or they had completed a particular area and the markings had been removed. Although, there was complete understanding of the clearance plan and process, there is a possibility that if an expatriate or experienced senior national staff member was at the site for lengthy periods of time, bearing in mind that there had been mixed assets deployed (manual and dogs) that a decision may have been taken to manually clear the dog cleared areas, particularly in Area 2 or even conduct additional manual excavation.

Summary, Conclusions, Further Actions and Recommendations

Introduction

The following summary, conclusions, further actions and recommendations have been compiled based on the evidence gathered during the [Demining group] Initial Investigation and Follow-up Investigations carried out for the demining incident at the [Demining group] mine clearance Task 116 in Kumchewai, northern Eritrea on 23 November 2002.

1. Summary

On 23 December 2002 at 05:50, a [Demining group] Land Rover 110 ambulance transporting eight [Demining group] personnel, initiated an anti-tank mine with its rear right wheel in Kumchewai minefield Task number 116. This resulted in the death of four [Demining group] personnel and injuries to two others. The vehicle had driven into an area previously cleared by manual deminers using Ebinger GC detectors and by mine detection dogs (MDD). An administration / parking area had been established on 11 November 2002 by the Debub Demining Supervisor and the manual team had been parking the Land Rover 110 there since. The administration / parking area fell within a cleared and subsequently identified AT laid mine line.

In the immediate area of the incident, three TM-46 and one PRB-M3 anti-tank mine had been removed during a [Demining group] survey, one mine had been located by the MDD during clearance and an AT incident had reportedly occurred in December 2001. An additional TM-46 had been recovered during the survey at 50 metres to the west of the others and all five mines removed during the survey had been found partially buried with the pressure plates visible. The TM-46 located by the MDDs in Area 1 was at a depth of less than 10 cm and the 12 subsequent TM-46 mines cleared by manual deminers in the same area were at a depth of less than 10 cm. All these mines are believed to form part of the same mine line linking up to mines located with the Large Loop Detectors in Area 3.

Prior to working in Kumchewai, the mine detection dogs had been used on a number of tasks for verification after manual clearance had been conducted, verification of suspect areas where there was no evidence of mines being laid and for quality assurance of areas cleared

by mechanical assets. This was therefore, the first time that the dogs had been used to locate mines in a confirmed mined area. There are numerous contributing factors to consider when deploying mine detection dogs such as soil moisture content and the temperature.

Clearance Plan and Process: Prior to commencing mine clearance in Kumchewai discussions and site visits by senior [Demining group] staff had taken place. Prior to the mine incident there had been a number of detector evaluations performed in order to assess the performance of in-country [Demining group] detectors and confirm the maximum depth mines could be located in various soil conditions. During the clearance process there had been regular site visits by senior [Demining group] staff and further discussions regarding the current and future clearance plans. Based on previous detector evaluations, evidence found during the survey and subsequent clearance by the MDD and manual teams, [Demining group] concluded that the anti-tank mines buried in Kumchewai were at a depth of less than 10 cm and within the range of the Ebinger GC detector. The mine detection dogs had cleared 325 metres towards the known mined area (Area 2), located a TM-46 on the fourth day of clearance (22 April 2002) and subsequently located four more TM-46 in the same area (Area 1). This increased the confidence of the dog handler and the team in the dogs ability to find mines. Although, the dog handler had reported that a mine had been located by the dogs at a depth of 28cm, this had been destroyed in situation without visual confirmation from a senior member of [Demining group] staff, the information on the depth had only been received by the Operations Cell in Asmara at a later date and no member of the MDD team could subsequently confirm the depth. In Area 2, it was decided to manually excavate an area around the PRB-M3 which had been located during the survey. This process was continued until enough evidence had been gathered (mines located on survey & further mines located) that the process was stopped.

The clearance plan prior to the mine incident in Kumchewai were based on the following:

- (1) The belief that the mine detection dogs could locate anti-tank mines in Kumchewai minefield.
- (2) Anti-tank mines laid in Kumchewai were at a depth of less than 10 cm. The report of a mine located by the MDDs at a depth of 28 cm was unconfirmed and all other mines located by the MDDs and manual deminers had all been at depths of less than 10 cm.
- (3) A possibility that further PRB-M3 mines were laid in Kumchewai minefield.
- (4) The detectors deployed were capable of locating PRB-M3 mines to a depth of 10 cm (based on previous tests performed).
- (5) The detectors deployed were capable of locating TM-46 mines to a depth of 50+ cm.
- (6) At least two mine lines were laid within the area cleared. One line of TM-46 in Area 1 had been located. In Area 2 and a line of TM-46 and one PRB-M3 had been located which may have been part of the line of TM-46 located in Area 3.
- (7) The areas between the MDD lanes in Area 2 had been cleared by manual deminers and no further mines had been located. A 10% manual quality assurance had been conducted in MDD cleared areas which resulted in no mines being located. This information fuelled further confidence in the dogs ability to clear mines.

Communications

In Eritrea, the [Demining group] uses Codan HP (vehicle mounted and base station) radios. This ensures communication between the headquarters, the remote locations, the remote camps and teams. Radio checks are performed prior, during and at the end of each working day in the minefield and all vehicle movements are coordinated through the radio operators. Each demining team is backed up by at least 1 Land Rover ambulance which is fitted with a HF Codan radio. No mine clearance task will take place without communications. In addition the Team Leader, section commanders and ambulance driver is equipped with a VHF radio which enables them to communicate with each other and other sites depending on the range.

In Kumchewai, the team was equipped with 1 Codan vehicle mounted radio, and two VHF radios (Team Leader and ambulance).

Vehicles

Each mine clearance team is supported by a Land Rover ambulance and a DAF or Bedford truck. In Kumchewai the team consisted of 1 Team Leader, 1 section commander and 7 deminers. The DAF truck was often required for administration duties during the working day, for example, to collect fuel and water, therefore, once the team had deployed to the minefield the truck would depart Kumchewai and return at the end of the working day. In order to operate effectively and work within the Eritrean Labour Law, non-essential vehicle movements are restricted to normal working hours.

Medical support

In Kumchewai there were two dedicated medic/deminers with the section. One of the medics had been in the Land Rover when it struck the mine and died. Although, that left only one dedicated medic, all other personnel had received some medical training during their time with [Demining group] and were able to assist. The casualty evacuation process was conducted in a professional manner with the additional Team Leader taking command of the whole process.

2. Conclusions

Conclusions have been made only after extensive discussions took place between key [Demining group] personnel involved in the planning and clearance process and after examining the following information:

- (1) [Demining group] Survey, re-survey and clearance reports.
- (2) Mine detection dog assessments.
- (3) Initial investigation report -physical evidence and statements.
- (4) 1st Follow-up investigation report.
- (5) 2nd Follow-up investigation report.
- (6) Task 116 minefield map.

Location

The incident occurred in Area 2, Kumchewai minefield, within a 2 metre wide lane which had been searched by mine detection dogs twice.

Mine Type

The only mines located in Kumchewai have been 1 x PRB-M3 and 30 x TM-46 anti-tank mines. Although, only one PRB-M3 has been located, during the re-survey, there is a possibility that the mine detonated by the [Demining group] Land Rover was a PRB-M3 which had been missed by the mine detection dogs. No recognisable mine fragments or components have yet been found inside the crater or at the incident site, which would suggest that the mine was a non-metallic PRB-M3. However, the possibility of a TM-46 cannot be totally ruled out.

Mine Depth

It is not possible to conclude the depth of the mine. The crater size would seem to be consistent with controlled minefield demolitions where mines have been located at various depths. Although, it is not possible to establish the depth, the fact that all other mines located in the area were less than 10 cm deep, would suggest that the mine was no deeper than this.

3. Further Actions and Recommendations

1. Recommend that the [Demining group] Global use of dogs is put under review.
2. The task has been suspended pending the outcome of the investigation. The Kumchewai administration and local people have been informed about the mine incident and asked not to enter the minefield.
3. No vehicles will be allowed to drive into Task 116 before additional verification and clearance has been conducted in order to confirm that there is no further threat from AT mines.
4. The access routes will be verified / cleared using one or more of the following methods : Manual probing, manual excavation, mechanical excavation, mechanical rollers, 'chubby' system, detectors capable of detecting PRB-M3 mines at a greater depth.

5. The immediate area of the incident should be investigated in order to verify the presence of additional mines in [Demining group] cleared areas. A probing or manual excavation process will be adopted to determine the mine type and depth.
6. The large loop detector will be deployed to continue investigation and locate metallic AT mines in order to identify additional mined areas before deploying manual or mechanical assets for clearance.
7. A review of [Demining group] clearance procedures for areas where the presence of minimum metal mines is suspected / confirmed.
8. Anti-tank rollers are expected to arrive in Eritrea by February 2002. They will be deployed to Task 116 in order to conduct verification in cleared and uncleared areas.
9. Review the procedures for driving into areas cleared of AT mines and the siting of control points / administration areas. There is a requirement to determine at what depth of clearance is it declared safe to drive vehicles into the cleared area.
10. Threat depth - Before any clearance can begin, the mine threat depth must be established in order to determine the clearance method to be adopted. It may not be possible to get this information during the Level 1 survey, therefore, a Technical survey must be conducted prior to commencing full clearance. Prior to commencing any mine clearance, detectors must be tested in order to establish whether the detectors are capable of locating mines at the required depth.
11. Communications - Although, there are adequate Codan vehicle mounted radios and all operational/administration Land Rovers and some trucks are fitted with Codan radios, it would certainly be more beneficial to have additional Codan radios fitted into the remaining trucks in the programme. The 2003 budget for the [Demining group] program in Eritrea includes Codan radios for all trucks.
12. Where teams are working 5 hours + from Base Locations, every effort should be made to supply two support vehicles fitted with Codan radios.
13. Minefield administration - Ensure that adequate on-ground time is given for handovers between Team Leaders/ different clearance assets. A tighter control is needed by senior operations staff to ensure that task documents such as maps and visitors/comments books are updated, accurate and handed over when Team Leaders change.
14. Supervision - Increased on-site supervision particularly when working in difficult minefields (ie, minimum metal mines, AP/AT mines, minimal/no mine information) and when deploying mixed assets (ie, manual and mine detection dogs). If we have got to have expatriate supervisors in areas where dogs are working, it raises the question as to whether dogs are a viable tool.
15. Further medical training with the emphasis on major trauma, casualty handling - recovery from vehicle.
16. Ensure that there area a minimum of 2 x major trauma bags at each mine clearance site.

Date: 07 December 2002

2. Demining Incident Preliminary Investigation Report

For submission to the Director of the [Demining group] and the Eritrean Demining Authority

PART 1 - Initial Investigation

Part 1 Initial Investigation: 24 November 2002

Part 2 Follow-up Investigation: 26 November 2002

Part 3 Follow-up Investigation: 03 December 2002

Annexes:

1. Sketch map of Task 116
2. Sketch of mine incident site

3. Sketch of seating plan Land Rover 110 ambulance
4. Photographs

Introduction

In accordance with [Demining group] Standard Operating Procedures, an initial investigation was conducted into a demining incident involving a [Demining group] 110 Land Rover ambulance on 23 November 2002 in Kumchewai, northern Eritrea.

The incident occurred prior to the commencement of [Demining group] mine clearance operations and resulted in the death of four [Demining group] personnel and injuries to a further two [Demining group] personnel.

Location of Incident:

The [Demining group] Minefield Area B, Task No.116, Kan1chewai, Northern Red Sea Zone, Eritrea.

Lat: 16°28'04 N Long: 38°38'52 E UTM: 37462402 E 1820876 N

Date/Time of incident: 23 November 2002, 05:50

Reported By: ([Demining group] Manual Team Leader), Ins. No. ER120

Reported To: Radio Operator [Demining group] Headquarters Asmara

Person(s) Involved:

[Victim no.1] (ER720 110 Driver)

[Victim no.2] (ER120 Team Leader)

[Victim no.3] (ER408 Team Leader)

[Victim no.4] (ER 172 Deminer)

[Victim no.5] (ER 601 Deminer)

[Victim no.6] (ER 684 Deminer)

[Victim no.7] ER 423 D/Medic

[Victim no.8] ER 461 S/Commander

[Deminor/Medic] ER 413 D/Medic

[Deminor] ER 259 Deminer)

[Name excised truck driver] (ER 728 DAF Driver)

Vehicle(s) Involved: Land Rover 110 Ambulance ER 4 01355

Initial Investigation Team:

[Demining group Location Manager] Gash Barka zone

[Demining group Location Manager 2] Debub zone

[Demining group superintendent, Debub zone]

[Demining group medic/deminor]

1. Initial Investigation

Approach

The Investigation team, carrying a major trauma bag, departed from [Demining group]'s Kamchewi camp on foot. [Name excised], the driver, remained in the camp with the Ambulance and the second D/Medic. Contact between the camp and the Investigation team was maintained by VHF radio and between the camp and Asmara by a Codan HP Radio. Using a footpath in regular use by locals the team walked cross-country eventually joining the main access track before entering the minefield. Regular GPS readings of the route were passed via the camp to Asmara.

Before entering the minefield the general position of the 110 involved in the accident was established by binoculars from a distance of approximately 1.5 kilometres to the East.

The team then entered the minefield from the access route and along the main breach lane passing Administration/parking areas 1 and 2. It was evident from area 1 that the accident had occurred in a cleared area.



Physical evidence

Parts of tyre and other fragmentation from the vehicle were visible 100 metres to the north of the vehicle and spread in an arc sweeping west to south.

The immediate area around the vehicle and crater was littered with vehicle parts/fragmentation, the crater itself contained visible fragmentation from the vehicle, no mine fragmentation was apparent. The ground on the right hand side of the vehicle was soaked in diesel/oil. The area to the rear and left of the vehicle contained remnants of medical equipment used to treat the casualties.

Team equipment (from both the Large Loop Detector - LLD section and additional equipment carried on or in the vehicle at the time of the accident) had been piled up 20 metres to the east of the vehicle and covered in plastic sheeting.

After studying the minefield maps which had been carried to, and retrieved from the scene it was possible to identify that the detonation had taken place within an area cleared by Manual deminers and Mine Detection Dogs (MDDs).



The following marking was located; 1.5 metre metal picket (with yellow sign attached) indicating the position of an AT detonation that occurred in December 2001 killing a child, perimeter turning point 101 marked during remapping in November 2002, black and white stones indicating the location of three (2 metre x 2 metre) boxes of Manual Quality Assurance performed on a lane of MDD clearance (QA No's 64, 65 & 66). The following measurements were then recorded:

Depth of crater: - 0.65 metres
 Diameter of crater: 2.40 metres

FROM (metres)	TO	BEARING (degrees)	DISTANCE
Turning point 101 39.5	Centre of crater	322	
Yellow metal sign (Dec 01 Accident)	Centre of crater	44	21

Centre of QA box 65	Centre of crater	320	12
Centre of QA box 66	Centre of crater	140	4.8
Centre of front right wheel	Centre of crater	210	5.1
Centre of rear right wheel (approximation)	Centre of crater	210	7.9

This information was later used to position the crater on the available minefield maps (indicating that the mine lay inside a dog lane); in addition mine marking tape was used to create a two metre wide rectangle running from three outer edges of QA box 64, two edges of box 65 and three outer edges of box 66. The majority of the crater was clearly inside the tape (see attached photographs). [Only poor photocopies made available.]

Damage to Vehicle and Equipment

The rear right wheel of the Landrover 110 Ambulance detonated the AT mine. The vehicle was thrown through 180° coming to rest facing back in the direction it had come. The rear right wheel was completely destroyed, the axle had been forced upwards through an angle of more than 45°, the floor of the rear of the vehicle had been forced through a similar angle. The entire right hand side of the vehicle from the back door to the cab had been destroyed. The vehicle had buckled approx. midway along the chassis causing the roof above the cab to fold up and back. Team equipment such as detectors, tool bags, and marking rope reels that were being carried on the roof of the vehicle were thrown clear. The trauma bag (used by the medic at the scene) was recovered intact from the rear of the vehicle. Vests and visors removed from the interior of the vehicle were covered in a mixture of diesel and mud, some of the visors had broken headbands and fogged fronts. The demolition exploder case had been partially damaged and the exploder itself had shattered. The detonator boxes carried inside the detonator compartment built into the rear left frame of the vehicle (situated under the rear most seat on the left) were undamaged as was the compartment itself. The explosives box carried inside the rear of the vehicle was dented but otherwise intact. The second stretcher (orange, vinyl) also carried inside the vehicle was badly damaged and coated in the same diesel, mud mixture present on most of the equipment recovered from inside the vehicle.



Casualty Information

Eight people were travelling in the vehicle at the time of the accident. Three passengers died at the scene, one died on route to hospital, two were admitted to hospitals in Keren the remaining passengers were x-rayed at Keren Hospital and then sent to Asmara.

[Victim no.1] - Driver (Front left seat)

Suffered no obvious injuries, complained of chest pain, was x-rayed at Keren hospital, no broken ribs was bandaged and later sent to Asmara.

[Victim no.2] - Team Leader (Front Middle seat)

Suffered no obvious injuries, complained of chest and lower back pain, was x-rayed at Keren hospital, no broken bones, was bandaged and later sent to Asmara.

[Victim no.3] - Team Leader (Front Right seat)

Suffered a small laceration to his right shoulder and a deformed lumber, was still alive after accident. Died on route between Kamchewi and Afabet. Presumed cause of death blast injury/rupture of internal organs (probably heart).

[Victim no.4] - Deminer (Rear front row left)

Suffered minor fragmentation injuries to both lower legs, broken nose, cuts, bruising and concussion to head. Was admitted to Keren hospital. Stable.

[Victim no.5] - Deminer (Rear front row right)

Died at scene, 10 minutes after detonation. Suffered major gash to left trunk between upper thigh and chest, Maxillofacial damage, fracture to lower arm and obstructed airway. Cause of death blood loss/ damage to major organ.

[Victim no.6] - Deminer (Rear middle row left)

Suffered fractures to right side of pelvis and shoulder, dislocation of right femur. Small unconfirmed fracture to top of skull. Was admitted to Keren Military hospital and later moved to Glass Military base where there are orthopaedic facilities.

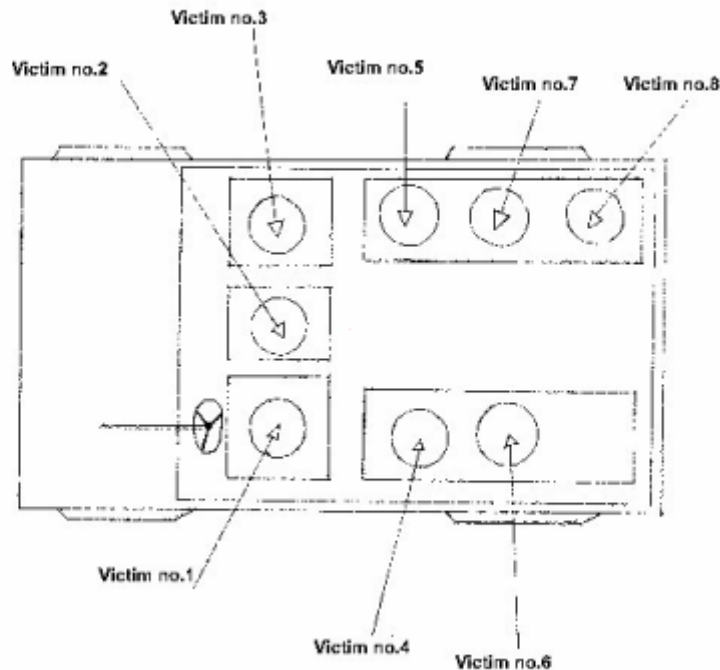
[Victim no.7] - Deminer Medic (D/Medic) (Rear middle row right)

Died at scene. Suffered severe fracture to occipital region of skull. Bone fragments visible and brain matter discharging through nose. Fracture to left femur. Cause of death -Head injury.

[Victim no.8] - S/Commander (Rear back row right)

Died at scene. Suffered fracture to occipital region of skull with evidence of bleeding. Deep laceration to right flank containing faecal matter. Small laceration on right buttock. Cause of death Head Injury and/or rupture of major organ.

Annex 3 to Part 1



[Seating plan of vehicle – from an annex]

2. Incident details:

The team prepared equipment and departed from the camp at 05:30 all ten team members travelled in the 110 Ambulance. The DAF and driver remained in the camp with the intention of travelling to Afabet later to collect water. The team travelled the 10 kilometres to the minefield arriving at administration/parking area 2 at 05:50. [Deminer/Medic] and [name excised Deminer] (Deminer) exited the vehicle and retrieved their equipment from the vehicle. They then proceeded to the LLD area. The 110 then continued on to Administration point 3.

At some time between 05:50 and 05:55 whilst travelling south, the rear right wheel of the 110 detonated an AT mine. The vehicle was thrown forward and through an arc of 180° coming to rest facing approximately north 5 metres from the point of impact. The driver [Victim no.1] exited the vehicle by the drivers side door. [Victim no.2] exited through the windscreen area (the entire window and rubber surround having been blown out).

[The deminer/medic and deminer] now at the LLD area heard but did not see the explosion. Both ran to the area of the incident. [Victim no.4] and [Victim no.6] had both partially crawled from the vehicle and were moved clear by Samson and [Victim no.1] they then removed [Victim no.8], who was already dead and [Victim no.7] from the vehicle. [The Deminer/medic] entered the rear of the vehicle to check [Victim no.5] and removed her from the vehicle, He then retrieved the major trauma bag intact from the back of the vehicle. [The uninvolved Deminer] then left the minefield at 06:05 and ran across country to collect the DAF from the camp. [The Deminer/medic] began treating the casualties with [Victim no.1]'s assistance. [Victim no.7] and shortly afterwards [Victim no.5] died of their injuries. [Victim no.6] was placed on the undamaged stretcher. [Victim no.3] was still in the front right seat of the vehicle (the door was jammed shut), he was conscious, talking and complaining of back pain but insisted that others were dealt with first. 15 to 20 local people arrived in the minefield to assist. Some of the locals forced the front right door open and removed [Victim no.3] from the vehicle and placed him on the damaged stretcher .

The DAF arrived at the minefield at 07:00 and stopped at administration/parking point 2. The unharmed team members and locals began ferrying the wounded and dead to the DAF. [Victim no.3] was moved by locals first, then [Victim no.6] who was moved off the stretcher in the back of the DAF, the stretcher was then used to move [Victim no.4], Finally the three dead were carried to the DAF using plastic sheeting.

The DAF then moved to Kamchewi medical facility, arriving at 07:45, [Victim no.6]'s knee was sutured, [Victim no.4] was re-banded and [Victim no.3] was rechecked, he was assumed to have a broken back. Two Toyota Land cruisers driven by locals arrived to assist with transportation of the injured. The DAF left at 08:00 carrying [Victim no.2] and the three dead to Afabet. The two Toyotas carrying the injured and the rest of the team as well as a nurse from the medical facility departed from Kamchewi for Afabet at 08:30. [Victim no.3] died shortly after leaving Kamchewi. At 08:45 the DAF stopped at Kub-kub and [Victim no.2] transferred to the second land cruiser with his Motorola radio so the two Land cruisers could communicate (a Motorola was already being carried in the first). All vehicles then continued on to Mabet.

At 10:15 the Land cruisers arrived at Afabet. [Victim no.4] and [Victim no.6] were again checked and given pain relief (Nubain), [Victim no.2] and [Victim no.1] were given paracetamol. [Victim no.3]'s body was removed from the land cruiser. [Victim no.2] then used the hospital telephone to call the Asmara office and inform them of the accident. The DAF arrived at Afabet at 10:45 and [Victim no.3]'s body was loaded in the back. At 11:00 the DAF departed from Afabet carrying the four dead and [Victim no.2] and [Victim no.1]. The two Land cruisers return to Kamchewi. An ambulance from Afabet hospital was fuelled and departed for Keren at 11:30 carrying the wounded, [the uninvolved Deminer] and [the Deminer/medic].

At 13:35 the DAF arrived at Keren civilian hospital. [Victim no.5]'s body was moved to the morgue, death confirmed and the body wrapped for burial. The three remaining bodies were moved to the military hospital about 500 metres away and confirmation of death and burial preparation was performed.

All three were placed in coffins, a fourth coffin was provided by the military for [Victim no.5]. At 14:10 the Afabet ambulance arrived at the civilian hospital. The casualties and walking

wounded were again treated, [Victim no.4] was admitted and [Victim no.6] was later moved and admitted to the Military hospital.

Medical assistance:

At the scene:

[Victim no.8] - No treatment died instantly.

[Victim no.7] - Head bandaged. Died 5 minutes after detonation.

[Victim no.5] - Airway cleared. Inflatable splint on arm. Trunk injury bandaged. Died 10 minutes after detonation.

[Victim no.3] - Suspected internal injuries. Died a little under 2 hours after detonation.

[Victim no.6] - First field dressing to head injury. Shoulder bandaged.

[Victim no.4] - Head and legs bandaged.

The following [Demining group] medical equipment was used both at the scene and at various stages of the extraction to Keren.

2 x Ringers lactate (used to clean wounds)

5 x Sterile gloves (pair)

6 x Sterile gauze swab

3 x First field dressing

5 x elastic bandage

2 x Water ampules were destroyed by the detonation.

3. Chronology

21/11/02

Team redeploy to Kamchewi after 7 days stand-down.

22/11/02

Team start work at minefield. 110 Ambulance uses Control point 3

23/11/02

05:15 Team wakes and prepares equipment.

05:30 Team departs camp for minefield in 110 Ambulance.

05:50 Team arrive at admin/parking area 2, Large Loop Detector (LLD) section ([Deminer/Medic] D/Medic and [name excised Deminer] Deminer) are dropped off and proceed to LLD area. 110 Ambulance and 8 remaining members of team continue to admin/parking area 3.

05:50 - 55 Rear right wheel of 110 Ambulance detonates AT mine.

05:55 [Deminer/Medic] and [name excised Deminer] (upon hearing the explosion) run to the scene. [Victim no.1] (110 Driver) and [Victim no.2] (LLD Team leader) got out of the vehicle.

05 :58 - 06:05 [The Deminer/medic] retrieves major trauma bag from the rear of the 110 and attends to the casualties. [The uninvolved Deminer] and [Victim no.1] assist. [Victim no.2] assembles a 420 GC thrown from the roof of the vehicle and attempts to sweep the immediate area. [Victim no.8] (S/Commander) and [Victim no.7] (D/Medic) are both dead.

06:05 [The uninvolved Deminer] departs scene and using a safe path identified by locals and ran across country to collect DAF truck from camp.

06:05 - 07:00 [The Deminer/medic] continues to treat casualties. [Victim no.5] (Deminer) dies. Between 15 and 20 local people arrive to assist. [Victim no.3] (Team Leader) is moved from vehicle by locals and laid on ground (he is conscious, talking and complaining of severe pain).

06:30 [The uninvolved Deminer] arrives at camp and alerts DAF driver.

07 :00 DAF with driver and [the uninvolved Deminer] arrives at minefield and stops at admin/parking area 2.

07:00-20 Casualties and bodies loaded on to back of DAF. Rest of team and several locals also get onboard.

07:20 DAF departs minefield for Kamchewi medical facility.

07:45 DAF arrives at Kamchewi medical facility.

07:45 - 08:30 [Victim no.6], [Victim no.4] (Deminer) and [Victim no.3] (Team leader) are treated by Kamchewi medical staff and [the Deminer/medic]. Clean bandages applied. 2 local Toyota Land cruisers arrive to assist with transportation.

08:00 DAF departs from Kamchewi for Afabet carrying [the uninvolved Deminer] (with Motorola radio) and 3 bodies.

08:30 2 Toyotas leave Kamchewi for Afabet. First land cruiser driven by unnamed local carries [Victim no.2] (with Motorola radio), an unnamed local nurse and [Victim no.3]. Second vehicle again driven by an unnamed local carries [Victim no.1], [Victim no.4], [Victim no.6], [the Deminer/medic] and an unnamed local.

08:30 - 45 [Victim no.3] dies shortly after leaving Kamchewi.

08:45 DAF stops at Kubko and [the uninvolved Deminer] transfers to second land cruiser with Motorola radio.

08:46 All vehicles continue on to Afabet.

10:15 Land Cruisers arrive at Afabet.

10:15 -11:00 Casualties in Land cruisers are treated by hospital staff and re-banded.

10:20 [Victim no.2] uses hospital telephone to call [Demining group] Asmara office and informs radio operator of the accident.

10:35 Asmara radio operator calls expat house and informs expats of accident.

10:45 DAF arrives Afabet.

10:45 -11:00 [Victim no.3]'s body is moved to the DAF.

10:50 Work halted at all tasks.

11 :00 DAF carrying four bodies, [Victim no.1] and [Victim no.2] leaves for Keren.

11 :20 [Name excised] (Debut Demining supervisor) departs Tserona for Asmara

11 :30 Ambulance from Afabet Hospital leaves carrying injured, [the Deminer/medic] and [the uninvolved Deminer]. Delay caused by Ambulance being fuelled. Two local vehicles used from Kamchewai return to Kamchewai. [Name excised] (Team leader) instructed by Asmara to take medic and RV with Afabet ambulance.

12:40 The [Demining group] Programme Manager informs SOT [name excised] at the UNMEE Headquarters in Asmara, of the incident, giving the location, grid reference (UTM, Latitude and longitude), deaths and casualties. The message was subsequently passed to the UNMEE Duty Officer.

13:00 [Name excised] (UNMACC) calls the [Demining group] Programme Manager. Confirmation of incident details.

13:05 Investigation group consisting of [Name excised], [two names excised] and driver/translator depart Asmara for Keren in two belly armoured 110's.

13:35 DAF arrives at Keren civilian hospital. [Victim no.5]'s body moved to morgue. Cause of death confirmed. DAF then moves to Military hospital Keren with [Victim no.3], [Victim no.7] and [Victim no.8]'s corpses. Cause of death confirmed by doctor. Bodies wrapped and placed in coffins.

14:10 Afabet ambulance arrives Keren civilian hospital.

14: 10 The [Demining group] Programme Manager informs Dutch Embassy First Secretary of incident.

14:15 [Name excised] (Team leader in Balwa) arrives Keren civilian hospital.

14:20 Investigation group passes Balwa.

15:05 Investigation group arrive Keren civilian hospital.

15 :05 [Name excised] and [name excised] check condition of casualties, talk with doctors at both hospitals to confirm condition of casualties, cause of death of fatalities and requirements if any. Informal interviews with [Victim no.2] and [Victim no.1] conducted.

15:43 110 Ambulance departs from Asmara to collect [Victim no.5]' body from Keren civilian hospital.

16:00 [Name excised] updates [name excised] on situation. Confirms both casualties are stable.

17:05 110 Ambulance from Asmara arrives Keren civilian hospital.

17:47 110 Ambulance departs Keren carrying [Victim no.5]'s body, [Victim no.2] and [Victim no.1]. [Name excised] leaves Keren for Balwa.

18:25 [Name excised] arrives Balwa.

20:08 110 Ambulance arrives at [Demining group] compound Asmara with [Victim no.5]' s body.

Date: 02 November 2002

Victim Report

Victim number: 525	Name: Name removed
Age:	Gender: Male
Status: driver	Fit for work: presumed
Compensation: not made available	Time to hospital: 8 hours and 20 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

minor Chest

COMMENT

See medical report.

Medical report

The investigation reported that the Victim "Suffered no obvious injuries, complained of chest pain, was x-rayed at Keren hospital, no broken ribs was bandaged and later sent to Asmara". If he was not injured, one wonders what required bandaging? No record of any field treatment was made.

At 10:15 the Land cruisers arrived at Afabet. [Victim no.1] was given paracetamol.

At 14:10 the Afabet ambulance arrived at the civilian hospital.

Victim Report

Victim number: 526	Name: Name removed
Age:	Gender: Male
Status: supervisory	Fit for work: presumed
Compensation: not made available	Time to hospital: 8 hours and 20 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

minor Back

minor Chest

COMMENT

See medical report.

Medical report

The investigation reported that the Victim “Suffered no obvious injuries, complained of chest and lower back pain, was x-rayed at Keren hospital, no broken bones, was bandaged and later sent to Asmara”. If he was not injured, one wonders what required bandaging? No record of any field treatment was made.

At 10:15 the Land cruisers arrived at Afabet. [Victim no.2] was given paracetamol.

At 14:10 the Afabet ambulance arrived at the civilian hospital.

Victim Report

Victim number: 527	Name: Name removed
Age:	Gender: Male
Status: supervisory	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 7 hours and 45 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

minor Back

minor Shoulder

severe Body

FATAL

COMMENT

Victim died more than 2 and a half hours after the accident. See medical report.

Medical report

The investigation reported that the Victim “Suffered a small laceration to his right shoulder and a deformed lumber, was still alive after accident. Died on route between Kamchewi and Afabet. Presumed cause of death blast injury/rupture of internal organs (probably heart)”.

[Victim no.3] – “Suspected internal injuries. Died a little under 2 hours after detonation.” [See below.]

At 07:45, [Victim no.3] “was rechecked, he was assumed to have a broken back.”

The improvised ambulances left Kamchewi for Afabet at 08:30 and [Victim no.3] died shortly after leaving Kamchewi – two and three quarter hours after the accident.

At 13:35 the transport arrived at a hospital and the victim's body was moved to the morgue.

Victim Report

Victim number: 528	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: not known
Compensation: not made available	Time to hospital: 8 hours and 20 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

minor Legs

severe Face

severe Head

COMMENT

See medical report.

Medical report

The investigation reported that the Victim "Suffered minor fragmentation injuries to both lower legs, broken nose, cuts, bruising and concussion to head. Was admitted to Keren hospital. Stable. "

[Victim no.4] - Head and legs bandaged at scene.

At 07:45, [Victim no.4] was re-bandaged.

At 10:15 the Land cruisers arrived at Afabet. [Victim no.4] was given pain relief (Nubain)

At 14:10 the Afabet ambulance arrived at the civilian hospital. [Victim no.4] was admitted.

Victim Report

Victim number: 529	Name: Name removed
Age:	Gender: Female
Status: deminer	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 7 hours and 45 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

severe Arm

severe Body

severe Chest

severe Face

severe Leg

FATAL

COMMENT

See medical report.

Medical report

The investigation reported that the Victim "Died at scene, 10 minutes after detonation. Suffered major gash to left trunk between upper thigh and chest, Maxillofacial damage, fracture to lower arm and obstructed airway. Cause of death blood loss/ damage to major organ. "

[Victim no.5] - Airway cleared. Inflatable splint on arm. Trunk injury bandaged. Died 10 minutes after detonation.

At 13:35 the transport arrived at a hospital and [Victim no.5]'s body was moved to the morgue.

Victim Report

Victim number: 530	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: not known
Compensation: not made available	Time to hospital: 8 hours and 20 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

severe Body

severe Head

severe Leg

severe Shoulder

COMMENT

See medical report.

Medical report

The investigation reported that the Victim "Suffered fractures to right side of pelvis and shoulder, dislocation of right femur. Small unconfirmed fracture to top of skull. Was admitted to Keren Military hospital and later moved to Glass Military base where there are orthopaedic facilities".

[Victim no.6] - First field dressing to head injury. Shoulder bandaged.

At 07:45, [Victim no.6]'s knee was sutured,

At 10:15 the Land cruisers arrived at Afabet. [Victim no.6] given pain relief (Nubain).

At 14:10 the Afabet ambulance arrived at the civilian hospital. [Victim no.6] was later moved and admitted to the Military hospital.

Victim Report

Victim number: 531	Name: Name removed
Age:	Gender: Male
Status: medic	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 7 hours and 45 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

severe Head

severe Leg

FATAL

COMMENT

See medical report.

Medical report

The investigation reported that the Victim "Died at scene. Suffered severe fracture to occipital region of skull. Bone fragments visible and brain matter discharging through nose. Fracture to left femur. Cause of death - Head injury".

[Victim no.7] - Head bandaged. Died 5 minutes after detonation.

At 13:35 the Victim's body arrived at a hospital and was moved to the morgue.

Victim Report

Victim number: 532	Name: Name removed
Age:	Gender: Male
Status: supervisory	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 7 hours and 45 minutes
Protection issued: None	Protection used: none

Summary of injuries:

INJURIES

severe Body

severe Head

severe Leg

FATAL

COMMENT

See medical report.

Medical report

The investigation reported that the Victim "Died at scene. Suffered fracture to occipital region of skull with evidence of bleeding. Deep laceration to right flank containing faecal matter. Small laceration on right buttock. Cause of death Head Injury and/or rupture of major organ".

[Victim no.8] - No treatment died instantly.

At 13:35 the Victim's body arrived at hospital and was moved to the morgue,

Analysis

The primary cause of this accident is listed as a "*Management control inadequacy*" because of the findings of the MACC report on the investigation (see *Related papers* under the *Other documents* tab). Significant failings in procedure and inadequacies in command lines and training had been identified prior to the accident and were not corrected (apparently they were not accepted as "failings"). The demining group were not working to the IMAS in several significant ways, and their failure to provide adequate medevac, communications and field-control mechanisms were highlighted.

The secondary cause is listed as "*Inadequate training*" because the demining group's own dog specialist investigation (see *Related papers*) identified that the dog training had not necessarily included training to find both of the mines known to be present in the area. It is also possible that the site supervisors and more senior expats (who conducted the investigation) did not react appropriately when the limitations of the dog assets became apparent. See Annex 6 to part 3 (in *Related papers*) where it is stated that:-

"Phase 3: Manual deminers cleared a minimum of 10 metres to the sides of the mines located by the MDDs in order to confirm the presence of additional mines. Three TM-46 mines were located by manual deminers at a depth of less than 10 cm."

The dogs had been run over these areas and not indicated the presence of these mines – perhaps showing that their ability to discriminate and pinpoint signals was suspect. The

finding of mines within this area should have raised doubts over the thoroughness of the clearance undertaken, especially as the accident occurred close to a previous accident site so in a place where mines may have been close together.

The demining group failed to provide appropriate medical facilities for use in the event of an accident. The use of the ambulance as a main transport vehicle for personnel, explosives and detonators, general equipment and medical kit is not unusual for this demining group, but does not reach the standard required in IMAS. It has been criticised in other theatres. Prior to the accident, ten people had been packed into the ambulance – which had a maximum seating capacity for nine. It seems likely that, as has occurred with this demining group in other theatres, the vehicle may not have been fully converted to serve as a long-distance ambulance. As it was, it took an hour and ten minutes for the uninvolved deminer to run back to camp and return with a DAF truck to serve as “ambulance”. Poor communications and poor equipment may have led to the death of Victim no.3 who was conscious and coherent at the accident scene but may have had a broken back. Transporting a casualty with a broken back over rough ground in a flat-bed truck in a journey that took more than 8 hours may have been the real cause of his death. The group’s failure to provide dedicated medics (rather than medics who also serve as deminers and so may themselves be accident victims) is also worthy of note.

The conduct of the pre-clearance Technical survey (described in Related papers, Annex 7 to Part 3), where an ex-pat went into the area swinging a detector without using approved markings, etc – and then found and destroyed surface mines – is also not unusual but does raise questions about the application of appropriate “Technical survey” standards.

Victim no.5’s body required the military to provide a coffin and was later returned to the demining camp – unlike the corpses of the other victims. This may have been because the victim was a woman.

Related papers

Other documents are reproduced after the MACC's investigation into the "internal" accident investigation.

The MACC's analysis of events

Dated 13th December 2002

The following are the MAC’s comments on this accident, edited for anonymity. The MAC did not have the authority to carry out a full Board of Inquiry. The term “name excised” is used to replace the name of the demining group’s MDD Programme Officer throughout what follows.

Introduction

1. The Chief of Operations (COOPS) of the UNMEE MACC has reviewed the [Demining group] incident report of 13 Dec 2002 and the following comments have been produced.
2. The report describes itself as a preliminary investigation report however the report is based on Board Of Enquiry report handled by an internal [Demining group] team and not by an external board. The length of time between the incident and the publishing of the PIO results, as well as the disturbance of the accident site, reduces the value of any external enquiry at this late stage. The composition of the plo team and interested parties of [Demining group] ensures that this report cannot be considered to be an external and unbiased report but rather something less.

Analysis of Report

3. A first comment has to be on information presented regarding the relocation of the administration area in the executive summary at paragraph 2. The COOPS of MACC was told on the day of the accident by the PM [Demining group] that the team administration site was moved from its previous location in a safe area to the demined area without permission from supervisors. This point is not dealt with fully in the report. As is the fact that this move was undiscovered for 2 weeks until the accident meaning there was no external visit for at least this 2-week period. The Site map provided as Annex 1 to Part 3 is presumably a reproduction of the map held on site by the Team Leader. This map indicates the presence of at least two Control Points for the task sites. The Area 2 Control Point is clearly indicated. Nowhere in the report is one able to discern the location of 'Control Point 3' mentioned in Part 1, paragraph 3, 'Chronology'.

4. Photograph 3 at Annex 4 to Part 1 clearly shows the ambulance involved in the accident came to rest beside a small blue tarped structure. The small blue tarped structure shown in the photograph depicts a typical [Demining group] practice of constructing medical points inside minefields. This is where [Demining group] personnel normally place their sealed trauma packs and is a directed practice in the [Demining group] SOPs. Typical [Demining group] practice is the deminer who is also the Section medic is normally assigned a working lane close to these shelters. During work breaks, the deminers close to such areas choose whether to use these medical points as rest areas though more often than not the Team and Section Leaders prefer the deminers remain in their clearance lanes so that time is not lost when personnel withdraw to rest areas. [Demining group] management places continuous and focused attention on production rates achieved by Team Leaders. Additional photographs in this report clearly show the ambulance was driving in a minefield. This is also typical [Demining group] minefield routine. The established administration areas are normally manned and used only when scheduled guests visit the minefields. Day to day, [Demining group] personnel adopt one or more of the medical points inside the minefields as pseudo control points. Deminers bring all their equipment including equipment transport cases into the minefields and in some cases into their clearance lanes. External MACC QA inspectors have continually reported on these specific weaknesses in [Demining group] SOPs and practice in the past. [Demining group] managers in Asmara have been forwarded pictures of their personnel engaged in this practice. This is not new information for [Demining group] Management Staff. Examples of this same behavior can be found in any [Demining group] minefield in Eritrea.

5. The 4th paragraph of the executive summary states that dogs do miss mines. This is a generalized statement, which is true for any demining tool, be it manual, mechanical or MDD demining should the tool not be deployed, managed and supervised correctly. This typically shotgun statement is simply not true when one takes into account the excellent work being done by demining dogs globally as well as within Eritrea. [Demining group] also fails to fully acknowledge that the MACC, acting as the accreditation agency for EMAP, commented on the [Demining group] dog accreditation sheets (originals available for inspection) that the dogs had problems identifying AT mines but no problem with AP mines. It must also be noted the [Demining group] MDD Programme Officer [name excised] had in writing and verbally rejected the accreditation process that had brought these problems to light. This raises the question as to whether after the MACC were relieved of the responsibility for QA in Eritrea; unsafe MDD practices were allowed to develop especially with the MDD dog handlers being unsupervised in country. It also brings in to question especially in light of the comments by [name excised] in his report attached to the reviewed report whether he took any comments by the accreditation team seriously as he does not do so in his report. It is furthermore not surprising the dogs would miss mines when they had not trained on PRB-M3 mines for a year.

6. The 5th paragraph of the executive summary touches briefly on the issue of supervision. It has been the MACC's contention since the programs inception that [Demining group] demining activities are poorly supervised and SOPs in general are poorly written and applied and generally not to be found on a demining task site. It is of interest to note the PIO

does not cover whether the SOP was on site and secondly there is no scanned copy of the site visitor's log to determine frequency of visits to the site. The report contains no witness statements and does not examine relevant portions of [Demining group] SOPs vis-a-vis comprehension by national staff and applicability of written word (that might exist in a SOP) into minefields with a view to correcting practice by ensuring suitable instruction and guidance exist within the document. The [Demining group] SOPs remain a document whose audience seems to be the donor community and not the deminers. There is also no comment in this document that 2 dog handlers were allowed to remain unsupervised while demining for extended periods of time. It is common knowledge amongst the more experienced MDD dog fraternity that MDD handlers require a supervisory presence regularly on site.

7. The report fails to address the issue of [Demining group] rejection of IMAS and the rejection of external QA that undoubtedly contributed to this accident.

8. Under "Conclusions" on page 3 no mention is made of the site log, which could yield important information on whether adequate supervision was in place. It may be that these documents were lost during the events of August of 2002 and their absence was unknown to [Demining group] higher HQ.

9. "Location" on page 3 acknowledges a [Demining group] ambulance was driving inside a minefield, down a 2m wide lane with mined area to each side of it as is the normal [Demining group] practice explained above. Further, it is also normal [Demining group] practice to use the ambulance as a transportation and administration vehicle for a demining task site. [Demining group] deminers have in the past been routinely observed at work in a minefield with no ambulance on site. MACC QA inspectors were, in the past, criticized by [Demining group] management for suggesting to the Site Team Leaders they should not work without an ambulance on site. A single ambulance has been observed as being the only vehicle available to a single Team Leader operating even split tasking several kilometers apart. The HF communications on any [Demining group] site can only be found mounted in the ambulances, complicating a call for help when the ambulance is driven into a minefield and destroyed.

10. The conclusions are individually sound, however the issues of moving administration areas, doctrine and SOP are not raised in any meaningful way. One must conclude the hard questions of why the accident occurred, who is responsible for what aspects of each contributing factor and what can be done to prevent this on other sites and in the future have not been asked.

11. The value of this document as part of a corrective and preventative process is nil.

12. The initial investigation report part 1 is of interest for the following points:

a. The time of the accident until departure for a medical facility is one hour, this is not acceptable.

b. What specific treatment was given to the injured parties, morphine? Drips? This is unknown. The report makes no attempt to review adequacy of medical cover available, medical assistance provided or shortcomings in either capacity.

c. It appears that the medical evacuation process had not thought through the possibility of a vehicle mine accident and planned it into operations. Clearly the [Demining group] programme does not provide the training, equipment or contingency planning necessary to deal with a multiple victim accident in the remote locations [Demining group] routinely sends its demining teams.

- d. Why was there no backup communications system? [Demining group] communications systems and procedures have been routinely observed on in the past by MACC QA Inspectors and found lacking. It is conceivable that an UNMEE helicopter could have had a doctor on the ground within 60 minutes and the victims evacuated to a hospital offering the appropriate level of care within 100 minutes.
- e. [Demining group] headquarters only received the accident report 4 hours 35 minutes after the accident. This point is not really explored and could have contributed to the death of the team leader. According to the report, the Team Leader was conscious and alert for 2 and one half hours after the accident suggesting he either bled to death internally or died of shock, either of which conditions could have been treated at a higher-level medical facility.
- f. The minefield maps in this report show at least 31 AT mines lifted in the area and therefore it is reasonable to assume the level of internal QA should have been very high and driving through the area should have been forbidden until all QA requirements were met.

13 Parts 2 and 3 of the report have only one item of interest. The mines were all easily detectable by metal detectors at the suspected depth of the mines. This has nothing to do with the accident and is useful as filler for the report.

14 Annexes 5 to part 3 of the [Demining group] report by [name excised] has numerous areas of interest and distortions of the truth as follows:

- a. There was no discussion of the accreditation agency of the dogs i.e. the MACC who had relevant information, although the MACC willingly supplied all relevant accreditation information on file.
- b. Pam 4.4. This information however did not include the training records of April 2002 as [Demining group]'s [name excised] had neglected to return these records to the MACC and not kept a copy. This is of concern as the MACC has records, both original and digital copies, of all other demining agencies that have used the facility for dog training.
- c. Para 4.6 the comments regarding Ashagolgol being inaccurate and not being sure whether the dogs were exposed to this mine are a deliberate untruth. On file in the handwriting of the dog handler or [name excised] are the records of the training. Furthermore, these records were forwarded to [Demining group]. [Demining group] is also welcome to conduct a site visit to excavate these mines and determine their location in the test minefield if in doubt of these facts.
- d. The management of [name excised] has to be clearly criticized as the MF records clearly show TM57, 46 and PRB-M3 in the minefields. There is no excuse for not training thoroughly on these mines. Poor discipline, management and supervision can be the only reason that these MDD failed to be trained adequately on these mines
- e. There is no mention of the types and regularity of training of these dogs on an ongoing basis and what facilities they had at the MF that were being used for daily and weekly training.

15. Annex 7 has some really disturbing information.

- a. A total of 31 AT mines of various types have been lifted in this minefield with no heightened QA process when using dogs.
- b. The dismissal of original team leader by Eritrean government actions resulted in the loss of the critical site records.
- c. The fact the MF map was not updated in 3 months indicates the level of management and supervision on site was substandard.

Conclusions

16. The cause of the accident at Kumchewai are clear when the accident reports are thoroughly read although these are not clearly presented in the report. The reasons for this lack of clarity may be the fact the report is written by the responsible parties and is not an independent report.

17. The primary cause of this accident is clearly the lack of attention paid by [name excised] the [Demining group] MDD Programme Officer in what the handlers were doing. The MF records included in this PIR clearly state there were PRB-M3 mines in this MF but no recorded training apart from the training done in the MACC training MF a year previously was ever done on PRB-M3 mines. For some reason [name excised] wishes to say this never happened either, further demonstrating his negligence.

18. Coupled with the problems associated with the [Demining group] MDD Programme is routine [Demining group] management, command and control shortcomings. These latter problems have been formally addressed many times to the [Demining group] Management element in Asmara. Obviously no effort has been made to correct these problems because normal [Demining group] daily minefield routines have now led to the death of four people.

19. The fact the [Demining group] programme was severely disrupted and critical information was lost undoubtedly could have contributed to the accident. It is generally accepted that a QA process is a series of layers of processes and actions to produce a level of quality. The fact documentation was lost then not replaced or updated demonstrates this was surely a contributing factor.

20. Through hundreds of QA inspections conducted by UMMEE MACC prior to August 2002 it has been clearly demonstrated that the [Demining group] has areas where internal QA adherence to SOP, appropriate SOPs and sufficient experienced site management (national and international staff) are lacking. A clearly demonstrated corporate disdain for any external QA and for IMAS has probably filtered to the lowest levels of the organization. The conclusion can be made that any systems [Demining group] may list as being in place to identify problems (alleged moving admin areas, identifying mine types in MF and ensuring tools are trained on them) and then follow through with corrective actions are definitely not being implemented. [Demining group] internal QA methods are clearly inadequate.

21. It is disturbing that the author of the report alludes to culpability of [Demining group] national staff by briefly mentioned alleged actions (movement of a CP) though does not recognize or address the shortcomings or negligence of the International management staff. The [Demining group] practice of establishing and using medical points inside minefields as pseudo control points is management condoned. The danger of this practice has been observed upon many times by external MACC QA in many [Demining group] minefields. One can therefore only conclude International staff either do not have the training and experience necessary to recognize the danger of this practice, or are complicit in facilitating the death of four deminers because they did nothing to correct a known dangerous practice.

Recommendations

22. The management and control of demining operations in Eritrea must be thoroughly reviewed by [Demining group] and its donors in a calm objective manner to ensure negligence on this level is not repeated.

Signed: Chief Operations Officer, UNMEE MACC

Other papers

1. Letter covering the preliminary investigation
2. Demining Incident Preliminary Investigation Report Part 2
3. Demining Incident follow-up investigation 3 – including metal-detector test report
3. Annex 5 to Part 3, Mine Detection Dog (MDD) Factors
4. Annex 6 to Part 3, Proposed clearance plan and Conduct of Clearance
6. Annex 7 to Part 3, Background Information To Mine Clearance Operations at Task No. 116

Letter to: General [Name excised], Chairman, Eritrean Demining Authority

13 December 2002

Preliminary investigation report - Demining incident 23 November 2002

Please find enclosed a copy of the [Demining group] preliminary investigation report into the demining incident at Kamchewai on 23 November 2002. A [Demining group] Land Rover detonated an Anti Tank (AT) mine whilst [Demining group] personnel were driving to their administration area on the work site. Regrettably the incident resulted in the death of four [Demining group] personnel and the injury of two others.

Our preliminary report concludes that the Land Rover detonated an AT mine missed by mine detection dogs (MDD) during clearance on the site.

The [Demining group] will of course fully cooperate with any further board of enquiry into the incident that is set up by The Eritrean Demining Authority (EDA). If any further clarification is required concerning the detail of the preliminary report The [Demining group] will of course provide it.

A copy of this preliminary report has also been sent to the addressees on the distribution list below.

Signed: Programme Manager The [Demining group]
Distribution: Chairman Eritrean Demining Authority (EDA)
The Royal Netherlands Embassy
The Swiss Consulate
UNMEE MACC
UNDP CTA to EDA
The [Demining group] -Headquarters United Kingdom

Demining Incident Preliminary Investigation Report for Submission to the Director of the [Demining group] and the Eritrean Demining Authority

PART 2 - Follow-up Investigation Report

Part 2 Follow-up Investigation: 26 November 2002

Introduction

After examining the findings from the Initial Investigation carried out on 23 November 2002, a follow-up investigation at the mine incident site in Kumchewai was arranged between the [Demining group] and the Eritrean Demining Authority (EDA).

Aim

For the [Demining group] Programme Manager and Operations Manager to visit the incident site and evaluate the findings from the Initial Investigation.

To allow representative(s) from the Eritrean Demining Authority (EDA) to visit the incident site and carry out an independent analysis of the demining incident.

To conduct a ground brief at the incident site relating to the clearance plan, clearance methods and incident details.

Location: The [Demining group] Minefield, Task No.116, Kamchewai, Northern Red Sea Zone, Eritrea,

Lat: 16°28'04 N Long: 38°38'52 E UTM: 37462402 E 1820876N

Follow-up Investigation Team:

([Demining group] Programme Manager

([Demining group] Operations Manager

([Demining group] Desk Officer

[Demining group Location Manager] ([Demining group] Location Mgr Gash Barka

([Demining group] Location Manager Debub)

UNDP Technical Advisor to the Eritrean Demining Authority -EDA

Eritrean Demining Authority

1. Chronology

26/11/02

07:30 Investigation team departed Asmara

12:00 Investigation team arrived at the [Demining group] remote demining camp in Kumchewai

12:15 Briefing conducted by the [Demining group] Operations Manager (Doug Ware) - Minefield history, map brief, task planning, clearance process.

12:40 Briefing by [Demining group] Location Manager ([Demining group Location Manager]) - Demining Incident Initial Investigation

13:00 Vehicles parked 1 Km south from Task 116. Investigation Team walked to incident site.

13:30 At incident site - Briefing by (PM), [Demining group staff] and [Demining group Location Manager] (orientation from minefield map, clearance process, mine incident details, minefield markings and initial investigation findings).

13:50 Visual inspection and photographs taken of incident site by investigation team - markings, mine crater, vehicle, equipment and immediate area.

14:30 Investigation team walk from incident site to vehicles and return to [Demining group] remote camp.

15:00 Investigation team departed Kumchewai

2. Further Actions

[Demining group] mine clearance operations at Kumchewai, Task 116 suspended, pending outcome from Preliminary Investigation.

Kumchewai administration informed of situation and asked not to enter the area of Task 116.

Recover from the incident site serviceable tyres from the Land Rover, Codan Radio and other serviceable equipment.

Compile a Suspension Report for Task 116.

No driving vehicles into areas cleared of anti-tank mines until further notice.

Conduct a further follow-up investigation on 03 December 2002 with the [Demining group] worldwide mine detection dog specialist [name excised].

Date: 04 December 2002

Demining Incident Preliminary Investigation Report for Submission to the [Demining group] and the Eritrean Demining Authority

PART 3 - Follow-Up Investigation Report

Part 3 Follow-up Investigation: 03 December 2002

Annexes:

1. Task 116 Minefield Map – Areas 1, 2 & 3
2. Level 1 Survey Report (22/11/01)
3. Level 1 Survey Report (25/03/02)
4. Task Order - Task 116
5. Mine Detection Dog report - compiled by the [Demining group] Mine Detection Dog Programme Officer [name excised].
6. Report - Clearance plan and conduct of clearance.
7. Background Information to [Demining group] mine clearance operations at Task No.116.

Introduction

A further Follow-up Investigation at Kumchewai was arranged following the arrival of the [Demining group] Mine Detection Dog Programme Officer [name excised], to Eritrea. At the [Demining group] headquarters in Asmara, [name excised] was briefed by the [Demining group] Programme Manager and Operations Manager regarding the mine incident.

Aim

For the [Demining group] Mine Detection Dog Programme Officer to visit the incident site and evaluate the findings from the Initial Investigation and the Follow.

To conduct a ground brief at the incident site relating to the clearance plan, clearance methods and incident details.

Conduct Detector test using the Ebinger GC , Ebinger GCU and MINELAB F3 as part of a continual Internal Assessment.

Location: The [Demining group] Minefield, Task No.116, Kamchewai, Northern Red Sea Zone, Eritrea.

Lat: 16°28'04 N Long: 38°38'52 E UTM: 37462402 E 1820876N

Follow-up Investigation Team:

[Demining group] Operations Manager
[Demining group] Location Manager Debub
The [Demining group] Mine Detection Dog Programme Officer
UNDP Technical Advisor to the Eritrean Demining Authority - EDA

1. Chronology

03/12/02

07:00 Investigation team departed Asmara.

12:00 Investigation team arrived at Task No.116 Kumchewai.

12:15 Equipment unloaded and checked outside minefield.

12:20 Investigation team walked to incident site. Briefing conducted en-route.

12:40 At incident site - Briefing by [name excised] (Ops Mgr) (Site history, orientation from minefield map, clearance process, mine incident details, minefield markings and initial investigation findings).

13:00 Visual inspection and photographs taken of incident site by [name excised] - markings, mine crater, vehicle, equipment and immediate area.

13:15 Detector tests using buried M3 fuze at various depths.

14:30 Inspection team walked from incident site to vehicle.

15:00 Inspection team departed Kumchewai.

2. Further Actions

[Name excised] to compile report based on Initial Investigation, Follow-up Investigations, Mine Detection Dog (MDD) Accreditation report, Internal MDD training and testing, MDD clearance process at Task No.116, clearance report.

3. Detector Test Results

The [Demining group] are currently trialing two detectors in Eritrea, the Ebinger GCU and the MINELAB F3 detector. The main aim of these trials is to assess the suitability of the detectors for [Demining group] mine clearance operations. As part of the assessment process the two detectors were to be trialed at Task No.116 in Kumchewai. This had not occurred due to the mine incident on 23 November 2002, therefore, it was decided to carry out limited testing during the Follow-up Investigation.

An M-3 fuze removed from a PRB-M3 anti-tank mine was buried at various depths in a cleared area of the minefield. The results were as follows :

Ground Compensation

Ebinger GCU – Good

MINELAB F3 – Good

1. M-3 Fuze Buried at 15 cm

Ebinger GCU detector - No signal

MINELAB F3 - Medium/High audio signal (with earphones fitted)

2. M-3 Fuze Buried at 12 cm

Ebinger GCU detector - No signal

MINELAB F3 - Low audio signal (without earphones fitted)

MINELAB F3 - High audio signal (with earphones fitted)

3. M-3 Fuze Buried at 11 cm

Ebinger GCU detector - Low audio signal

MINELAB F3 - Low audio signal (without earphones fitted)

MINELAB F3 -High audio signal (with earphones fitted)

4. M-3 Fuze Buried at 10 cm

Ebinger GCU detector - High audio signal

MINELAB F3 - High audio signal (without earphones fitted)

MINELAB F3 - High audio signal (with earphones fitted)

Overall Results of Limited Detector Tests at Task No.116

Ebinger GCU - With the M-3 fuze buried at 10 cm there was a clear (high) audio signal. At a depth of 11cm the audio signal was not clear (low). It is likely that the signal would be missed at a depth greater than 10 cm by an inexperienced deminer unless there was additional evidence (ie, ground disturbance) to indicate the presence of a mine. There were no problems in compensating the detector to the ground.

MINELAB - With the M-3 fuze buried at 15 cm there was a medium-high audio signal when wearing the earphones. At a depth of 12 cm there was a low audio signal without the earphones fitted and a high audio signal when fitted. There were no problems in compensating the detector to the ground.

The MINELAB proved capable of locating the M-3 fuze at a greater depth than the GCU detector.

Date: 07 December 2002

Annex 5 to Part 3

Demining Incident Preliminary Investigation Report for Submission to the [Demining group] and the Eritrean Demining Authority

Mine Detection Dog (MDD) Factors

[Original numbering was confused, and is left in its non-sequential state.]

1. Abstract

1.1 On 23rd November 2002, a [Demining group] landrover carrying demining staff and their equipment drove over, and detonated an anti tank mine in what was thought to be a cleared area of Kamchewai minefield. This led to the death of four staff.

1.2 The subsequent on-site investigation concluded that the mine had been located within a 2.0m wide survey lane previously searched by a [Other commercial demining group]/MDC dog team subcontracted to [Demining group] Eritrea between November 2001 and August 2002.

1.3 [Demining group]'s Mine Detection Dog Programme Officer [name excised] thus arrived in Eritrea on 1st December 2002 in order to review all evidence relating to the accident with programme staff, the aim being;

To identify critical factors from an MDD perspective which may have been instrumental in causing the mine to be missed.

To draw relevant conclusions in relation to [Demining group]'s use of MDDs world wide.

To consider relevant changes to MDD SOPs.

2. Programme and information reviewed

2.1 The following programme was followed;

Monday 2nd December: Discussions with programme staff including viewing of minefield maps and collation of information.

Tuesday 3rd December: Site visit with [Demining group Location Manager 2], and UNDP rep.

Wednesday 4th December: Further discussions in the light of the site visit and completion of data collation.

Thursday 5th December: Report writing

2.2 The following archived information relating to the activities of the dog team at Kamchewai was reviewed;

- MDD training and accreditation records
- Daily search records
- MDD health records
- Weather data

3. Background information, tasking and clearance methodology

3.1 Information gleaned from survey work conducted at Kamchewai by [Demining group] in November 2001 including some limited clearance of visible mines led to the conclusion that the mined area was characterised by a pattern of low density anti tank mines. Mine types confirmed as being present (and substantiated through anecdotal evidence provided by EDF) included TM-46 and PRB-M3.

3.2 What was less clear from this survey work despite the location and removal of five mines (1 x PRB-M3 and 4 x TM-46) was the extent of the mine rows in what is a very open and featureless flat valley bottom between the former Eritrean and Ethiopian lines. As such, the task required an initial phase of technical survey, to be followed by full manual clearance once the mine rows had been located.

3.3 The MDD team was therefore tasked in April 2002 to conduct clearance work at the site. The objectives of this clearance were as follows;

- a. To create an initial safe access to the vicinity of the mine rows from CP 1.

b. To conduct further technical survey in order to identify the location, types and numbers of mines present.

3.4 Once this had been achieved, then the dog team was to be withdrawn, and full clearance of the identified danger areas completed by manual deminers.

3.5 The MDD clearance methodology adopted was lane search, since the main requirement was to create access, and then conduct further technical survey through imposing a grid of 2.0m wide lanes in an intersecting pattern. Lane search involves the laying out of five x 0.6m wide by 12.0m long lanes side by side to create a 12.0m long by 3.0m wide search bound. Each individual lane within that bound is demarcated by a 3/4" diameter x 12.0m long UPVC pipe. A 1.0m overlap is maintained at either end of the bound, and 0.5m down either side. This implies that once the full bound has been searched by both dogs (and no indications made), then the central 2.0m wide x 10.0m long strip is declared as clear, effectively forming a 2.0m wide access lane. Successive bounds are thus cleared in this way, and survey lanes cleared into the mined area.

3.6 Once the initial access way had been cleared from CP1 into the mined area, then blocks of ground (Areas 1 and 2) were subjected to technical survey with the dogs clearing "vertical" 2.0m wide lanes into the mined area from the cleared base-lane, and manual deminers completing the boxing of the areas by clearing 2.0m wide "horizontals".

3.7 It is therefore [Name excised]'s conclusion that the tasking of the MDD team was quite legitimate in terms of the methodology adopted (lane search), and given the prior evidence of the nature of the mines and anticipated pattern and density of mine laying.

3.8 Indeed, it is to be noted that this process did in fact work successfully, with the MDD team locating and clearing six TM-46 AT mines (4 additional TM-46 were located by support deminers from the MDD team using Ebinger GC detectors), and more importantly, providing the requisite information on which to base the subsequent manual clearance of the area.

4. Site visit and physical conditions

4.1 [Name excised] visited the accident site with [Demining group Location Manager 2], and [name excised] on Tuesday 3rd December. The ground was walked, and [names excised] provided an overview of how the clearance had been planned, how it subsequently progressed, and the circumstances surrounding the accident itself.

4.2 In terms of the site conditions, it is characterised by a mainly flat and sandy soil with (at the time of the clearance in May 2002) very little vegetation. As such, this provided ideal MDD search conditions with very little pre-preparation or vegetation cutting required.

4.3 [Name excised] noted that in the area of the accident site, areas of sand erosion due to surface water scour, and deposition around the base of vegetation which may have affected the exposure or increased burial of mines. Indeed, the five mines lifted by [name excised] in November 2001 were all visible, plus the first TM-46 mine located by the MDD team was subsequently reported to have been located at 28.0cm deep. This evidence would seem to suggest that the area is affected by both erosion and deposition.

4.4 A further consideration of the MDD searched lane itself where the mine detonated confirmed that the mine would have been located slightly to one side of the centre line, and at the junction with a manually-cleared "horizontal" lane. Whilst some doubts were raised as to whether the manually cleared lane would actually have crossed through the MDD cleared "vertical", (and thus over the mine) it is [name excised]'s opinion that since the MDD lane was cleared first, the deminer clearing the "horizontal" at that point would simply have begun his/her clearance at the edge of the lane. It is therefore highly unlikely that this mine was also missed by a manual deminer .

4.5 In terms of the detonation crater itself, there is no evidence to suggest abnormal circumstances in terms of a deeply buried or boosted mine. No metal fragments have been located within the base or walls of the crater itself which could suggest that the mine was non-metallic. This is however, not a definitive conclusion.

4.5 However, on the balance of evidence, it is [name excised]'s opinion that there is a reasonable expectation that the mine was of plastic construction, and given the previous

location of this mine type close to the point of the accident, then it is not unreasonable to assume that it may have been a PRB-M3.

5. Review of archived data

5.1 The following available information regarding MDD training, accreditation, daily search records, health and weather data was reviewed.

MDD training

5.2 [Demining group] MDD SOPs place a particular emphasis upon ensuring that MDD teams are correctly trained prior to the conduct of live clearance tasks. This includes not only the type of clearance methodology to be practised, but also education of dogs to recognise all mine types known or anticipated to be present within the local theatre.

4.3 To this end, two weeks of training was conducted with the MDD team at the Asha Gol Gol training site during early and mid-April 2002, just prior to the start of the Kamchewai task. The main aim of this process was to train the dogs in lane search and the clearance of access and survey lanes. This process was overseen first by [Demining group]'s MDD Trainer [name excised], and latterly by [name excised].

4.4 At the time, it was not confirmed which site the dogs would be deploying to since further survey was on-going, plus negotiations being conducted with EMAP in order to gain access to suitable task sites outside of the TSZ.

4.5 Although details of the training conducted were not recorded, the emphasis was based upon ensuring that the dog team was working effectively in lane search, i.e that the drills and pattern of search were effective. Less emphasis was thus given to educating the dogs to mine types other than those which they had already been exposed to during previous training and accreditation periods (PMN, PMD-6, TM-46, TM-57).

4.6 The [Demining group] MDD training site at Adi Hilmo (Tsorena) did not at that time include PRB-M3 mines (one added in June 2002). The box map records for Asha Gol Gol are known to be inaccurate and incomplete, and it is unsure whether PRB-M3s are present there. Thus, it is reasonable to conclude that prior to the start of MDD clearance at Kamchewai (where a PRB-M3 presence had previously been confirmed in November 2001), the dogs had not been adequately exposed to this mine type.

4.7 In [name excised]'s opinion, this is a most serious omission and almost certainly an important factor in the occurrence of this accident -if the mine which detonated was indeed a PRB-M3.

MDD Accreditation Testing

4.8 [The] MDD team underwent and passed both internal and external accreditation testing during the contract period. In November 2001, internal testing was passed on [Demining group]'s site at Adi Hilmo, and this was followed by an external examination conducted by UNMEE MACC at Asha Gol Gol. This was also passed, although a weakness in relation to AT mines was noted. This issue was subsequently resolved prior to the conduct of any live clearance through specific training in relation to AT mines. No written documentary evidence exists to confirm how this training was conducted, or indeed, whether a variety of AT mine types were used. It is however [name excised]'s expectation that emphasis would have been placed upon TM-46 and TM-57's as the most prevalent AT mine types in Eritrea (also known to be available at Asha Gol Gol).

4.9 The last internal assessment prior to the search at Kamchewai took place in February 2002 at [Demining group]'s Adi Hilmo site. This was passed successfully, although did not include search for AT mines.

4.10 Both external and internal MDD testing requirements had therefore been met prior to the conduct of the task at Kamchewai.

Daily Search Records

4.11 Evidence from the marking of QA boxes (No's 65 and 66) cleared in the immediate vicinity of the accident site has confirmed that the search over that area would have taken

place on either 14th or 15th May 2002. [Name excised] thus re-visited the daily search records for those days and notes the following;

Weather Data

Weather data was recorded from a Campbell Scientific Basic Weather Station which was located at Kamchewai for the duration of the task in order to monitor the main weather conditions. This was backed up through the use of Kestrel 3000 hand-held anemometers at the clearance site itself.

Conditions during the periods of search on both days (05.30hrs-07.55hrs) were within acceptable parameters. Temperatures did not exceed 30 degrees C, with low wind speeds in the 0-3.0m per second range recorded. Air humidity remained relatively low at between 80% and 33%. Rainfall totalled only 2.6mm during May, and fell prior to the period of the 14th/15th. It did not have any significant effect upon the pattern of soil moisture.

Soil moisture

Soil moisture remained at a very constant and relatively low level, with variation only being recorded between 6.7% and 6.8%. This would suggest that levels of evaporation (which are known to assist MDD search) would have been very low.

Work load and MDD health

The total ground searched by the dog team over both days was 693m², an average of 346m² per dog per day in a single morning working session. This is entirely consistent with normal rates of work, and does not suggest any over-stressing of the team given the prevailing conditions.

The daily health check records for the period confirm that the dogs were at all times fit to work.

Performance

The notes provided within the daily search records for both days (signed by the handler and MDD team supervisor) suggest that the performance of the dogs on both days was good, with high drive and concentration noted. This corroborates similar evidence from the remainder of the task, and suggests that to all intents and purposes, the dogs were performing as they should. This was backed up by the physical evidence of the location of 6 x TM-46 AT mines indicated by the dogs over the duration of the task.

Speed of search over the duration of the Kamchewai task was 2.84m² cleared per minute of search undertaken. This is the slowest search rate recorded by this team over the duration of the full contract period, and suggests that particular care was being taken in view of the proven mines presence.

Clearance of indications and QA

4.12 [Name excised] assessed the conduct of clearance of indications of QA, and noted the following. In both cases, procedures were followed correctly, with a 3.0m x 3.0m box being cleared around each indication using 420GC detectors. A total of eighteen indications were recorded, with 162m² of ground being cleared during the investigation process.

In terms of QA, the 2.0m x 2.0m QA boxes were sensibly distributed throughout the lanes cleared by the dogs, and amounted to a total of 396m² (or 9.85% of the MDD cleared area). This conforms to the minimum [Demining group] requirement of 10%.

However, it is [name excised]'s observation that given the confirmed presence of mines at this site, and the fact that manual deminers supporting the MDDs were able to clear a further 8,931m² of ground, that a greater emphasis should have been given to QA, with a higher proportion of the dog-searched ground being retrospectively cleared by manual deminers.

A further issue is that both the investigation of indications and QA was carried out using the 420GC detector. Whilst this is clearly acceptable where only a metallic mine threat exists, the prior confirmed presence of minimum metal anti tank mines at Kamchewai, and the knowledge (confirmed by previous field tests) that this detector could only locate a PRB-M3 to +/- 7.0cm (to the top of the pressure plate), raises questions about the validity of this method.

In [name excised]'s opinion, all investigation of MDD indications and QA should have been conducted using manual excavation. This would have been a relatively easy process given

the light and loose nature of the to 20cm of soil, and would not have significantly retarded the progress of clearance since the areas involved were not large.

Moreover, more QA should have been conducted behind the dogs given the nature of the threat and available resources. This "thickened" level of QA has previously been employed by [Demining group] where dogs have worked on confirmed minefields in Somaliland.

5. Conclusions and recommendations

5.1 It is clear that the mine accident in ground which was assumed to be clear at Kamchewai on 23rd November 2002 was the result of a number of important factors, some in direct relation to the performance of the dog team, and some detailed elsewhere within this accident report in relation to command and control issues.

5.2 It is clear that an AT mine - possibly a PRB-M3, was missed by a sub-contracted [Other commercial demining group]/MDC team on the 14th or 15th May 2002 whilst conducting the clearance of lanes as part of the technical survey process in Area 2 of the minefield. It does not seem likely that this mine was particularly deeply buried, nor is there any other evidence which calls into question the validity of the teams' tasking *given the information available at the time*.

5.3 The dog team had been formally tested both internally and externally, and had proven its competence in this respect on at least three occasions prior to the conduct of tasking at Kamchewai. Six TM-46 AT mines were located by the dogs during the course of clearance with a further four being detected by supporting manual deminers clearing ground with 420GC detectors.

5.4 Over the period of clearance, site conditions were good, and weather within acceptable parameters. The dogs' health was good, and performance at all times reported as being at an operationally acceptable level.

Signed: Mine Detection Dog Programme Officer 05th December 2002

Annex 6 to Part 3

Proposed clearance plan and Conduct of Clearance in Kumchewai Minefield (IMSMA Task No.116)

Proposed Clearance Plan (Refer to attached sketch map -Completed to Phase 5)

Phase 1: Clear a breach lane from the north in a southerly direction to the location of the AT mines removed during the survey. Establish a base lane and safe access to the mined area from which MDDs would be deployed in order to conduct further investigation of the area.

Phase 2: MDDs to clear 2 metre wide lanes perpendicular to the MDD breach lanes therefore, creating a grid pattern (boxes). The aim of this process was to conduct area reduction in order to locate further mines and establish the mine pattern.

Phase 3: Manual deminers (from the MDD team) to clear the remaining areas (inside the boxes) in order to verify the presence of any additional mines in the area.

Phase 4: Task handed over by MDD team to a manual team.

Phase 5: Manual team conduct additional clearance around areas identified as mined by the MDD team and conduct further area reduction in order to confirm the presence of additional mines / pattern.

Phase 6: Area reduction and Verification using mechanical anti-tank rollers in areas outside the cleared areas.

Phase 7: Task Completion and Handover.

Mine Detection Dog Training

On 30 November 2001, all four [Demining group]/[Other commercial demining group] dogs passed their accreditation with buried anti-personnel and anti-tank mines at Asha Golgol

training area. In February 2002, the dogs were tested by [Demining group] in Asha Golgol on buried anti-personnel mines. In April 2002, prior to deploying the two remaining dogs to Kumchewai, training was conducted in Asha Golgol with buried AP and AT mines.

Conduct of Clearance (Area 1)

Phase 1: A 4 metre wide lane was cleared from the Bench Mark / Datum Point using MDDs and manual deminers. 50 % of the lane was cleared by manual deminers (1m wide both sides of the 2 metre wide dog lane), 50% was cleared by MDDs (2 metre wide between the manual cleared lanes) and a 10 % quality assurance of the MDD cleared area was conducted by manual deminers. These areas were marked with black/white numbered stones on the ground and recorded on the minefield map. One TM-46 AT mine was located by the MDDs.

Phase 2: After locating the TM-46, MDDs were deployed in this area in order to establish a mine pattern. Four additional TM-46 mines were subsequently located by the MDDs in a staggered line. One of the mines was reported by the MDD handler to have been located at a depth of 28 cm, all others were located less than 10 cm deep. Quality assurance by manual deminers was conducted in 10 % of the area cleared by MDDs.

Phase 3: Manual deminers cleared a minimum of 10 metres to the sides of the mines located by the MDDs in order to confirm the presence of additional mines. Three TM-46 mines were located by manual deminers at a depth of less than 10 cm.

Conduct of Clearance (Area 2)

Administration / parking area No.1 was established in a cleared area 140 metres north-east of Area 1 where the mines had been located by the MDDs. No.2 administration / parking area was established 250 metres south-east of the first administration area. No.3 administration / parking area was established 300 metres south-east from the second administration / parking (mine incident site). This was established on 11 November 2002.

Phase 1: Clearance was conducted from Area 1 to Area 2 using the same clearance process as conducted in Area 1 in order to extend the breach lane to the area where the mines were located during the survey.

Phase 2: MDDs were deployed from the base lane into the area where the mines were located during the survey. The MDDs cleared 2 metre wide investigation lanes in order to confirm the presence of further mines and establish the mine pattern. Two metre wide lanes were cleared by manual deminers perpendicular to these lanes in order to grid the area (create boxes) and provide the handler with a manually cleared base lane to deploy the dogs from. Manual deminers conducted 10% quality assurance of the MDD cleared areas. These areas were marked with black/white numbered stones on the ground and recorded on the minefield map. One TM-46 was located by the MDDs in this area.

Phase 3: Manual deminers cleared the areas inside the boxes in order to confirm the presence of additional mines. No mines were located.

The MDD team finished work in Kumchewai on 22 May 2002 and on 09 June 2002, the manual team commenced operations.

Phase 1: Manual deminers conducted clearance in Area 1 in order to confirm the presence of additional mines in areas around the location of the MDD mine finds. No mines were located.

Phase 2: Manual deminers were deployed to Area 2 to verify the presence of additional mines and conduct area reduction in order to reduce the size of the mined area prior to completion.

The Team leader was briefed by the Operations Manager (DW) to conduct complete excavation to a depth of 30 cm in the area where the PRB-M3 was located during the survey. The aim of this was to try and establish the presence of additional AT mines, in particular, PRB-M3 minimum metal mines and if located confirm the depth of the mines. On average, a manual deminer using a detector was clearing 80 + square metres per day in contrast to the area being excavated where the deminer was clearing less than 5 metres per day. After a number of TM-46 mines had been located in Area 2 at a depth of less than 10 cm using detectors and an area of approximately 900 square metres had been excavated resulting in

no mines being found, it was decided to stop the excavation process and continue clearance with detectors only.

Phase 3: Further manual clearance was conducted in Area 2 which resulted in additional mines being located and a better understanding of the mine pattern.

Conduct of Clearance Using the Large Loop Detector

In order to conduct additional investigation and consequently, speed up the clearance process, Large Loop Detector (LLD) procedures were written and introduced. LLD procedures for the clearance of high metallic content anti-tank mines had already been written and were included in the [Demining group] Eritrea Manual Demining SOPs. As there was a threat from minimum metal AT mines in Kumchewai there was a requirement to write additional procedures. These procedures were written as an annex to the Manual Demining SOPs. Prior to deploying the LLDs, the Operations Manager conducted training in Kumchewai with the Debub Location Manager, the Debub Demining Supervisor, the Kumchewai manual Team Leader and Section Commander. Subsequent training was given to the remainder of the team. Clearance commenced on 24 October 2002.

Phase 1: A 2 metre wide lane was cleared from Area 1 to the location of the 3 AT mine holes to the west.

Phase 2: Clearance between the holes in order to confirm the presence of additional mines and establish the pattern. No mines were found between the 3 holes.

Phase 3: Further clearance was conducted around the three holes. No mines were located.

Phase 4: Clearance was conducted from the third hole in a southerly direction in order to trace the mine line. 5 mines were located in a line which had been laid in a single line in intervals of 10-20 metres in a zig-zag pattern at a depth of less than 10 cm.

Additional Information: There had been numerous [Demining group] expatriate visits to the site throughout the entire clearance process and the Team Leader was continually given advice on the clearance plan and procedures. Discussions took place in Kumchewai between the Operations Manager, the Debub Location Manager and the Kumchewai Team Leader about the threat from PRB-M3 minimum metal mines and the depth of these mines. Clearance plans were formulated based on evidence up to that date. Only 1 PRB-M3 had been located during the survey which was only partially buried, four TM-46 had been located in the vicinity only partially buried during the survey, the unconfirmed report of a TM -46 located in Area 1 at a depth of 28 cm was the only one located deeper than 10 cm and this area is a distance of 300 metres from the mines located in Area 2. All 18 mines located in Area 1 were metallic TM-46 mines. An area of 900 square metres was manually excavated around the location of the PRB-M3 and it was only after additional mines had been located in the area at depths of less than 10 cm and the previously mentioned points, that the excavation process was stopped.

There had been discussions about deploying the armoured Terex with the AT 'Gill system' to Kumchewai in order to carry out mechanical excavation. This did not happen for the following reasons:

- (1) The difficulty in deploying the low-loader and Terex to Kumchewai due to poor road conditions/access.
- (2) It was decided that the clearance process would be slow as the Terex would have to excavate its way to Area 1 from a distance of 300 + metres.
- (3) The availability of the Terex at the time.

Planning was therefore based on the number of deep buried mines located, the number of minimum metal mines located and the depth and the fact that all AT mines located with the exception of one, were at a depth of less than 10 cm.

As clearance continued, [Demining group] were able to obtain additional mine information from the local people:

- (1) A report of AP mines being laid on hills to the north.

(2) A TM-46 had been seen by a local man at approximately 500 metres to the south/south-west direction from Area 2 of the minefield.

(3) Three holes had been seen approximately 200 metres to the west of Area 1 of the minefield. It was reportedly by locals the holes marked the location where 3 x AT mines had been removed by the EDF.

All these reports were investigated and resulted in a survey of the suspected AP minefield being conducted and confirmation of the location of the 3 mine holes using the Large Loop Detector (this led to subsequent clearance using the LLD and the location of 5 x TM-46).

In Area 1, mines had been laid at 10-20 metre intervals in a zig-zag pattern heading in a north-west to south-east direction (classic Soviet mine laying pattern). In Area 2 mines were laid at irregular intervals of between 5-30 metres in a zig-zag pattern heading in a north-east to south-west direction. It is likely that the mines located in Area 1 and by the Large Loop Detector are part of the same line. To aid the Team Leader in drawing the minefield map, metal poles with flags were placed where mines had been located and compass bearing were taken.

Annex 7 to Part 3

Background Information To [Demining group] Mine Clearance Operations at Task No. 116

The [Demining group] commenced mine clearance operations in Eritrea in April 2001 and up to the end of October 2002 had located and destroyed 2263 anti-personnel mines and 210 anti-tank mines. [Demining group] currently deploys 6 manual demining teams, each team comprising 3 sections of 7 deminers. The 6 teams are split equally between Gash Barka and Debub locations. A technical survey team is currently deployed in the Gash Barka region (western Eritrea), 2 EOD/Survey teams are working in Gash Barka and the Northern Red Sea region and 6 mechanical teams are operating in Gash Barka. Up until the end of August 2002, [Demining group] deployed 10 manual demining teams (6 in Gash Barka and 4 in Debub). A mine detection dog team comprising 2 pairs of dogs sub-contracted from [other commercial demining group], 2 handlers, a supervisor, team leader and 5 manual deminers was deployed in Eritrea from June 2001 up until the end of March 2002. After one of the dog handlers left the program in April 2002, the team was reduced to 2 dogs and 1 handler.

Kumchewai is situated approximately 75 Km north-east of Keren and can be reached by vehicle along a dirt/sand road. [Demining group] established a remote demining camp near the village and the minefield is situated 6.5 Km north-west of the camp which is a drive time of 15-20 minutes along a sandy track.. Anti-tank mines were laid in 1978 by Eritrean forces in order to prevent Ethiopian armour from moving through the area.

On 22 November 2001, a Level 1 survey was conducted in Kumchewai (IMSMA Task No.116) by the [Demining group]. After talking with the Kumchewai Administrator, villagers living adjacent to the minefield, information from EMAP (Eritrean Mine Action Program) and seeing visible AT mines, the survey team concluded that the minefield contained anti-tank mines only. According to information from the EMAP, the EDF (Eritrean Defence Force) had conducted clearance in the area and removed several AT mines. During the survey, 1 x PRB-M3 and 4 x TM-46 were clearly visible. The mines were partially buried with the pressure plates protruding above the surface of the ground. (See photographs attached to [Demining group] Survey Report YT/E-37-126/93). On 22 January 2002, a [Demining group] expatriate who was working at the time as BOD/ BAC Supervisor, visited the Kumchewai minefield with the aim of confirming the information from the survey report and recovering the visible mines or if required, conduct in situation explosive ordnance disposal.

During the initial mine incident investigation carried out in Kumchewai on 26 November 2002, [name excised] reported that on 22 January 2001, he had used an Ebinger H detector to sweep into the suspected area from an area to the north-west of the visible mines. He was wearing ballistic body armour and visor and had swept the detector to the front of him in interlocking arcs as he walked forward. [Name excised] stated that no signals were detected

and was convinced that his search had covered the location that the mine accident (23 November 2002) had occurred. [Name excised] removed the visible anti-tank mines (1 x PRB-M3 and 4 x TM-46) which were subsequently, recovered to Asmara for destruction at the CDS (central demolitions site). The location of each mine removed was marked with a metal 'danger mine' sign and 'danger mine' signs were placed to mark the perimeter of the dangerous area.

A re-survey was conducted by the [Demining group] on 25 March 2002, confirming the information gathered during the initial Level1 survey. (See photographs attached to [Demining group] Survey Report AGG/E-37-126/93).

A Task Order requesting the [Demining group] to conduct a reconnaissance, a technical survey and clearance using MDDs and clearance using manual deminers was issued by the EMAP on 20 May 2002. This was signed and returned by the [Demining group] on 03 June 2002. (See attached Task Order 34/02 [Demining group]).

Prior to [Demining group] commencing mine clearance operations in Kumchewai the site was visited by the Operations Manager, the MDD (Mine Detection Dog) Handler and a [Demining group] worldwide MDD specialist. A clearance plan was formulated in the Operations Cell in Asmara and a MDD Team was deployed and commenced operations in Kumchewai on 19 April 2002. During the MDD clearance phase the task was visited by the former Debut Location Manager who was accompanied by the Programme Manager. The MDD team completed operations on 22 May 2002 and on 09 June 2002 Manual Team 1 commenced work in Kumchewai. Prior to this a handover between, [name excised] (MDD Team Leader), [name excised] (Dog Handler) and [name excised] (Team Leader Manual Team 1) occurred in Kumchewai.

On 29 August 2002, [Demining group] suspended all its operations in Eritrea while discussions took place between the Eritrean government and the [Demining group] over employment issues. This period of time was a huge disruption to [Demining group]'s operations in Eritrea and [Demining group] were forced to dismiss a number, of key personnel including [name excised]. Consequently, the Kumchewai minefield map was not updated and a number of task documents such as the visitors / comments book was lost. [Demining group] commenced operations again on 26 September 2002 and in Kumchewai, [Victim no.3] replaced [name excised] as Team Leader, commanding a section from Manual Team 2.

Prior to the mine incident on 23 November 2002, the [Demining group] had cleared the following anti- tank mines in Kumchewai (IMSMA Task No.116) :

Indicated by MDD and cleared by manual -6 x TM-46 (5 in Area 1, 1 in Area 2)

Manual Deminers from the MDD team -4 x TM-46 (3 in Area 1, 1 in Area 2)

Manual Team using GC detectors -11 x TM-46 (Area 2)

Manual Deminers using Large Loop Detector -5 x TM-46 (North-east of Area 2)

Removed during survey -1 x PRB-M3, 4 x TM-46 (Area 2)

TOTAL 30 x TM-46 1 x PRB-M3