

7-10-2002

DDASaccident383

Humanitarian Demining Accident and Incident Database
AID

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DDAS Accident Report

Accident details

Report date: 19/05/2006	Accident number: 383
Accident time: 07:54	Accident Date: 10/07/2002
Where it occurred: M/F 178, Bayt Yahun	Country: Lebanon
Primary cause: Unavoidable (?)	Secondary cause: Inadequate equipment (?)
Class: Excavation accident	Date of main report: 25/07/2002
ID original source: BOI:No006/2002	Name of source: MACC SL
Organisation: Name removed	
Mine/device: No.4 Israel AP blast / frag	Ground condition: grass/grazing area rocks/stones
Date record created: 22/02/2004	Date last modified: 23/03/2004
No of victims: 1	No of documents: 3

Map details

Longitude:	Latitude:
Alt. coord. system: GR 72579 67196	Coordinates fixed by:
Map east:	Map north:
Map scale: UNIFIL Genimap	Map series:
Map edition:	Map sheet: Sheet A (Tibnin)
Map name: 1:50,000	

Accident Notes

handtool may have increased injury (?)
mechanical follow-up (?)
inadequate equipment (?)

Accident report

A summarised MACC Board of Inquiry report was made available in 2003. It is reproduced below, edited for anonymity. The full Board of Inquiry report is reproduced (edited for anonymity) under the *Other Documents* tab in "Related papers".

Introduction

1. [1st commercial demining group] manual clearance operation commenced in M/F 178 on the 01st June 2002, on the 08th and 10th June 2002 [1st commercial demining group] Mechanical BOZINA assets also conducted ground preparation work in M/F 178. At the time of the accident [1st commercial demining group] Manual Clearance Team No.1 were the only clearance asset operational on M/F 178. From the start of the manual clearance operation at the beginning of June, a total of 1 x base lane, 4 x cut lanes (through the low wire entanglement), 1 x cut lane to dissect M/F 178 and M/F 177 and 5 x main clearance areas had been cut into M/F 178, resulting in the location of the minefield mine rows.

2. A [1st commercial demining group] Deminer was working in the second clearance area of M/F 178. He was initially working in the first clearance lane, clearing the first row of mines, but due to safety distances he was told to move and clear towards the fourth row of mines and then clear along that row. Whilst conducting the detector drill, he picked up a reading forward of his base stick (to the right hand side). The signal was of a high pitch and by interpreting the signal pitches he managed to ascertain that the mine was lying with the fuze pointing away from him.

3. Following the detector sweep the Deminer then wetted the area of the signal and waited approximately 3 x minutes to allow the water to soak in, after the time had elapsed he then rechecked the area of the signal with his detector. He then started to excavate the signal, starting 20cms back from the signal source and working in a right to left hand side excavation method. He had excavated approximately 15 cms towards the initial signal and 5 cms in depth when he came to a rock, he then continued to excavate down when the uncontrolled detonation occurred.



[The accident area.]

Events following the Accident

4. At approximately 07:54 hrs an uncontrolled detonation occurred in the clearance lane. Following the uncontrolled detonation, the Team Leader 2i/c was the first to the accident scene whereupon he saw that the Deminer had fallen back into a cleared area, he then gave the accident whistle signal. The Team Leader then arrived at the accident scene and told Team Leader 2i/c to arrange a stretcher carrying party and bring forward the Team No.1 Medic. On the arrival of Medic, initial medical stabilisation took place and the Deminer's protective jacket was removed and placed adjacent to an uncleared area. The casualty was then taken back to the CP where further medical aid was given by the Medic and also Team Medic No.4 . Following full stabilisation the casualty was then transported to Bint Jubayl Hospital for medical treatment.

5. On hearing, the uncontrolled detonation the Site Supervisor passed back the initial accident report to [1st commercial demining group] base location. The accident scene was then secured and marked as per [1st commercial demining group] current SOPs and National TSGs by the Team Leader.

Medical details

6. The casualty suffered part traumatic amputation of his right hand thumb, closed fractures to his right hand first and second fingers, lacerations and bruising to his right hand and right arm, fracturing to the bridge of his nose, flash burns to his head and face and the loss of his right eye. [1st commercial demining group] Team No.1 Medic and Team No.4 Medic administered medical treatment and stabilisation on-site to the casualty; casualty evacuation by road to Bint Jubayl civilian hospital then took place.

7. On arrival at Bint Jubayl hospital, the casualty was transferred to the Emergency Department where additional trauma care and medical treatment was administered; X-ray's and a CT Scan were also performed prior to him being transferred to Hammoud Hospital Sidon, by the Lebanese Red Cross.

Conclusions

8. Based on the investigation, the statements and visits to the site, the BOI concludes the following:

- There was a sub-surface detonation of an Israeli No.4 Anti Personnel mine. Evidence shows that the crater had heavy blackening to the sides, was of a bulbous shape with primary fragmentation lining the bottom and sides. Evidence of rock fracturing and shattering was located by the BOI, immediately behind the seat of detonation.
- The mine detonated whilst the Deminer was attempting to excavate it, there is no evidence to suggest that the Deminer was carrying out incorrect drills.
- The trowel that was not located by the BOI will either be to the flanks of the minefield or in an uncleared area immediately behind the clearance area.
- The fracturing of the casualty's fingers was due to the positive blast effects resulting from the disintegration of the Israeli No.4 mine, on the detonation of the high explosives.
- The part traumatic amputation of the casualty's thumb was due to the cutting motion of the trowel as the positive blast effects on the detonation of the high explosives, forced the trowel backwards into his hand.
- The loss of the casualty's right eye was due to a piece of the visor slicing through the eye orbit, after the shattering of the visor.
- The visor shattered after being impacted with rock fragments at extremely high velocities following the detonation of the high explosives.
- The casualty's other injuries were sustained from both primary and secondary fragmentation, resulting from the disintegration of the Israeli No.4 mine, on the detonation of the high explosives.
- The on-site stabilisation of the casualty was performed in a dangerous place, with 2 x No.4 AP mines being in extremely close proximity to where the casualty's jacket was removed and placed.
- The post-accident marking of the accident site was carried out in accordance with current TSGs and [1st commercial demining group] SOPs.
- The passage of information in between the accident site and [1st commercial demining group] base location was good with all information being passed in a timely manner.

- The BOI agrees with and accepts [1st commercial demining group] Accident and IMSMA Reports.
- The protective jacket maintained its integrity following the uncontrolled detonation of an Israeli No.4 AP mine.
- The protective visor did not maintain its integrity following the uncontrolled detonation of an Israeli No.4 AP mine.
- The previous flailing of the area (accumulation of pressure), may have had a direct effect on the sensitivity state of the mine fuze.
- The use of a demining probe to investigate signals, in conjunction with a demining trowel may reduce the risk of an uncontrolled detonation occurring.
- Deminers adopting the prone position when investigating signals may minimise the injuries sustained, should an uncontrolled detonation occur.
- While IMAS does not cover Manual clearance techniques in depth, they are adequate for a clearance organisation to develop their own SOPs, specific to the environment that they are operating in.
- No IMAS currently covers Mechanical clearance techniques, the future issue of IMAS 09.50 "Guide to the use of Mechanical Mine Clearance Equipment" will resolve this.

Recommendations

9. The following are recommendations based on the BOI conclusions:

- No amendments are necessary to the National TSG's for Mine/UXO Clearance (005/2002 recommended and details a review of TSG Chapter 10).
- An amendment be made to [1st commercial demining group] SOP Chapter 7 detailing that casualties are to be moved to the central part of any cleared area by the Team Leader / Team Leader 2i/c, before commencement of stabilisation by the Team Medic.
- A full and detailed review of [1st commercial demining group] Mechanical assets deployment, procedures etc is required.
- The following extract is a reiteration of a recommendation made by the BOI during 005/2002 investigation, and is still extant.

"Mechanical assets should only be used in the ground preparation of clearance sites, as opposed to being used as a primary clearance tool."

- [1st commercial demining group] are to consider the introduction of a probe and excavation drill into their current SOPs.
- [1st commercial demining group] are to consider using the prone position when conducting the excavation drill.
- The two remaining areas that have previously been flailed are to be cleared in accordance with the clearance plan written for minefield 178, dated 11 July 02.
- The conclusions detailed in this report be distributed and discussed among all [1st commercial demining group] Operational Field Staff.
- A period of refresher / confidence training is conducted with all [1st commercial demining group] Operational Field Staff, to include the following:

Manual excavation drills.

Accident / accident procedures.

Signed: QA Officer, Mine Action Co-ordination Centre Southern Lebanon

Victim Report

Victim number: 500	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: not known
Compensation: Not made available (insured HMT)	Time to hospital: Not recorded
Protection issued: Frag jacket Long visor	Protection used: Frag jacket; long visor

Summary of injuries:

INJURIES

minor Arm

minor Head

severe Face

severe Hand

AMPUTATION/LOSS

Eye

Finger

COMMENT

No medical report was made available.

Analysis

The primary cause of this accident is listed as *"Unavoidable"* because the deminer may have been working as directed and in accordance with approved working methods when the detonation occurred. The secondary cause is listed as *"Inadequate equipment"* because the deminer was not issued with a probe to loosen soil as he excavated.

From the full Board of Inquiry (see Related papers) and the Victim's statement, it seems likely that the mine was rendered unusually sensitive by the prior use a ground-engaging machine in the area.

This was the third visor failure for this demining group in this country at this time and could indicate a possible problem with age or quality (polycarbonate hardens with UV exposure so old visors are much more likely to break than new ones). It is possible that the visor was struck by the handtool, or part of it, but it still should not have failed in this way. The visor was manufactured in Zimbabwe, and may have been part of the batch originally purchased three or four years previously. If so, UV exposure was a very likely cause of failure.

The inadequate equipment referenced in the notes refers to the unsuitable excavation tool and to the lack of a conventional prodder.

The Victim's gardening gloves are sometimes called PPE, but are not. They protect against ground scratches as the user works, but have provided no significant protection in those blast events when they have been worn.

Several paragraphs in this and other reports from Lebanon at this time were clearly copied from other reports (by the same investigator) and lightly edited. This may be convenient but raises questions about the thoroughness of the investigation.

Related papers

The full Board of Inquiry report for this accident was made available in 2004. It is reproduced below, edited for anonymity.

REPORT FOR ACCIDENT INVESTIGATION BOARD OF INQUIRY – No006/2002

MINE Accident that occurred in OES 2 on 10th July 2002.

Map Reference: UNIFIL Genimap 1:50,000 Sheet A (Tibnin).

References: A. Janes Mines Manual.

Introduction

1. In accordance with the National Technical Standards and Guidelines (TSGs), the MACC SL Programme Manager issued a Convening Order on Wednesday 10th July 2002, for an accident investigation Board of Inquiry. Annex A details the Convening Order.
2. This is a comprehensive report by the Board of Inquiry into the Mine Accident that occurred on the 10th July 2002. Based on the investigation, [Demining group]'s internal report, the statements from [Demining group] personnel involved in the accident (see Annex B); visits to the accident site and the photos from the accident site, this accident is considered preventable.
3. The information provided by [Demining group] to the MACC SL QA Section in the "IMSMA Accident Report", attached as Annex C is confirmed. The accident occurred at approximately 0754 hrs on 10th July 2002, in Minefield (M/F) No 178 at Bayt Yahun, GR 36 72579 67196, (Seat of Detonation). Annex D details a map of the general area.

Events leading up to the Accident

4. [Demining group] manual clearance operation commenced in M/F 178 on the 01st June 2002, on the 08th and 10th June 2002 [Demining group] Mechanical BOZINA assets also conducted ground preparation work in M/F 178. At the time of the accident [Demining group] Manual Clearance Team No1 were the only clearance asset operational on M/F 178; from the start of the manual clearance operation at the beginning of June, a total of 1 x base lane, 4 x cut lanes (through the low wire entanglement), 1 x cut lane to dissect M/F 178 and M/F 177 and 5 x main clearance areas had been cut into M/F 178, resulting in the location of the minefield mine rows. Annex E details [Demining group] Team No1 Site Clearance Map (Team Leaders Map).
5. [Demining group] Deminer [the Victim] was working in the second clearance area of M/F 178, he was initially working in the first clearance lane, clearing the first row of mines, but due to safety distances he was told to move and clear towards the fourth row of mines and then clear along that row. Whilst conducting the detector drill, he picked up a reading forward of his base stick (to the right hand side). The signal was of a high pitch and by interpreting the signal pitches he managed to ascertain that the mine was lying with the fuze pointing away from him.
6. Following the detector sweep Deminer [the Victim] then wetted the area of the signal and waited approximately 3 x minutes to allow the water to soak in, after the time had elapsed he then rechecked the area of the signal with his detector. He then started to excavate the signal, starting 20cms back from the signal source and working in a right to left hand side

excavation method. He had excavated approximately 15 cms towards the initial signal and 5 cms in depth when he came to a rock, he then continued to excavate down when the uncontrolled detonation occurred.

Events following the Accident

7. At approximately 0754 hrs an uncontrolled detonation occurred in the clearance lane. Following the uncontrolled detonation, Team Leader 2i/c [name excised] was the first to the accident scene whereupon he saw that Deminer [the Victim] had fallen back into a cleared area, he then gave the accident whistle signal. Team Leader [name excised] then arrived at the accident scene and told Team Leader 2i/c [name excised] to arrange a stretcher carrying party and bring forward the Team No1 Medic [name excised]. On the arrival of Medic [name excised], initial medical stabilisation took place and Deminer [the Victim]'s protective jacket was removed and placed adjacent to an uncleared area. The casualty was then taken back to the CP where further medical aid was given by Medic [name excised] and Team Medic No4, Medic [name excised]. Following full stabilisation the casualty was then transported to Bint Jubayl Hospital for medical treatment.



8. On hearing, the uncontrolled detonation Site Supervisor [name excised] passed back the initial accident report to [Demining group] base location. The accident scene was then secured and marked as per [Demining group] current SOPs and National TSGs by Team Leader [name excised] Annex F details schematic diagrams of the general working area and accident area / scene.

[The accident area after the detonation.]

Work History of the Casualty

9. Deminer [the Victim] commenced his employment with [Demining group] on the 11th May 2002, whereupon he completed the [Demining group] Southern Lebanon in-country 2 x week demining course, prior to operational deployment at Bayt Yahun. He has previously worked on a demining operation in the Zimbabwean border minefields for 2 years, in 1998 and 1999. He is considered by [Demining group] to be a competent and trustworthy employee; disciplinary action had never had to be taken against him.

Past History of the Area

10. The Israeli Force (IF) initially, and later, the South Lebanese Army (SLA) previously occupied Bayt Yahun. The mine-contaminated areas consist of the following:

- Defensive minefields around 2 x former IF / SLA positions situated at GR 36 7258 6718 (W138) and GR 36 7265 6726 (W139).
- 2 x defensive / protective minefields than run along the South West side of the main road linking the above 2 x positions.
- A protective minefield that runs from former position W129, on the North East side of the village down to and across the access road leading to former UN position 6-20 (M/F 147).

11. The MACC SL designated the minefield above as M/F 178. MACC SL Operations Officer reported the minefield details on the 16th June 2001, the minefield details reported were:

- Reference Point GR 36 725709 672040.
- Quantity of mines not known.
- Quantity of mine rows not known.
- Date mines were laid not known.
- No minefield map is available.

Sequence, Documentation and Procedure of Tasking

12. Task Dossier (TD) OES 2 #011 was issued to [Demining group] on the 14th May 2002; the TD contains details of the 11 x minefields in and around Bayt Yahun. The following is description of events prior to the accident occurring:

- 01st June 2002 – Manual clearance operation start date.
- 08th & 10th June 2002 – Mechanical ground preparation phase.
- 11th June – 26th June – Manual clearance phase.
- 26th June 2002 – [Demining group] Mine Accident (005/2002).
- 28th June - 10th July – Manual clearance operation phase.
- 10th July 2002 – [Demining group] Mine Accident (006/2002).

13. Up to the time of the accident a total area of 655 sq.m had been cleared by Manual assets, resulting in the disposal of a total number of 168 x Israeli No4 AP mines, the Mechanical assets prepared 260 sq.m of ground resulting in the detonation of 58 x Israeli No4 AP mines (It should be noted that the sq.m for the days clearance activities prior to the accident, are not included in the above total as they were not available at the time of writing this report).

Geography and Weather

14. The task site is located in an open area to the North West of the village of Bayt Yahun. Access to the site is via a tarmac road from the main Tibnin / Bint Jubayl road, which dissects the village of Bayt Yahun. The area is on a natural incline, sloping downwards in a North - North Easterly direction from the high point of 864m, located to the South East of the village. The mined area was previously arable agriculture land, used for animal grazing; there are no forested areas within the immediate district. The weather at the time of the accident was fine and sunny with a temperature of approximately 26 to 28 degrees Celsius.

Site Layout and Marking

15. The site layout and minefield marking prior to the accident was in accordance with National TSGs and [Demining group] SOPs; as was the post accident marking.

Management Supervision and Discipline

16. [Demining group] clearance operation is supervised by an International Operations Manager and an International Site Supervisor was in overall charge of Bayt Yahun task site. 1 x International Team Leader commands Manual Clearance Team No1. There are no reports of disciplinary action being taken against [Demining group] personnel on the Bayt Yahun task.

Quality Assurance and Quality Control

17. [Demining group] Internal Quality Assurance (QA) is achieved through a system of on-site checks by an International QA Team to ensure adherence to National TSGs and [Demining group] SOPs. The last Internal QA Evaluation was conducted on the 4th July 2002, with no major problems being identified. External QA is carried out by the MACC SL QA Section (Armor Group). The last External QA Evaluation was conducted on the 09th July 2002 where a CASEVAC exercise was conducted and evaluated; the exercise evaluation result was good.

Communications and Reporting

18. Communications in-between the Bayt Yahun task site and [Demining group] base location is maintained via the use of the Cell phone system. On site communications in-between teams is maintained via VHF handheld radios.

19. On the day of the accident, the site had proper and appropriate communications and managed to pass all relevant accident information back to [Demining group] base location, which in turn passed the information to the MACC SL in a timely manner. Annex G details the Initial Casualty Report. [Not made available.]

Medical Details

20. Deminer [the Victim] suffered part traumatic amputation of his right hand thumb, closed fractures to his right hand first and second fingers, lacerations and bruising to his right hand and right arm, fracturing to the bridge of his nose, flash burns to his head and face and the loss of his right eye. [Demining group] Team No1 Medic [name excised] and Team No 4 Medic [name excised] administered medical treatment and stabilisation on-site to Deminer [the Victim]; casualty evacuation by road to Bint Jubayl civilian hospital then took place.

21. On arrival at Bint Jubayl hospital, Deminer [the Victim] was transferred to the Emergency Department where additional trauma care and medical treatment was administered; X-ray's and a CT Scan were also performed prior to him being transferred to Hammoud Hospital Sidon, by the Lebanese Red Cross. Annex H details the medical report from both Bint Jubayl and Hammoud Hospitals. [Annex H was not made available.]

Personnel

22. A list of all personnel and their duties is detailed at Annex B. Written statements from [Demining group] personnel involved in the accident and [Demining group] internal report form part of the Appendices to the Annex.

Dress and Personal Protective Equipment (PPE)

23. At the time of the accident, Deminer [the Victim] was wearing his protective apron and protective visor. On inspection of the protective apron, the following points were noted:

- The outer cover was not ripped.
- The blast debris and damage was concentrated at top right hand side.
- There was fragmentation penetration of the Kevlar lining.

[There was no full penetration of the aramid lining.]

24. On inspection of parts of the protective visor, the following points were noted:

- The visor had not maintained its integrity and shattered into several pieces, of which on 3 pieces were located by the BOI.
- The visor securing bolts had maintained their integrity.



[The Victim's visor.]

25. On inspection of the demining gloves, the following points were noted:

- The right hand glove was ripped in several places, with a main tear in the location of the sleeve part of the thumb.
- No damage was sustained to the left hand glove.



[The Victim's gardening gloves.]

Tools and Equipment

26. At the time of the accident, a standard [Demining group] excavation trowel was being used by Deminer [the Victim]. At the time of writing the accident investigation report, the trowel had yet to be located. [Demining group] have a policy of not using demining probes, therefore probes are not part of the Deminers equipment.

Details of Mine Involved

27. The Israeli No4 AP blast mine consists of a plastic box with a hinged lid that overlaps the sides. The main charge is 188g of cast TNT, housed in an internal plastic compartment, which occupies just over half of the volume of the box at the hinged end. The wall of this compartment is threaded to accept the fuze assembly; the remainder of the box is empty.

28. The metal fuze assembly, which incorporates a lead-shear arming delay, is fitted through a hole in the end of the mine and screwed into the wall of the charge compartment and sealed with a rubber O-ring. The arming pin protrudes through the end of the mine opposite the hinge. The arming pin is attached to a pull ring, which is looped over the fuze body and retained by a plastic cap during transit for additional safety. The striker is retained and secured by a square shaped slotted plate on which the open end of the box rests.

29. The mine is designed purely for direct pressure operation. To arm the mine, the plastic cap on the end of the fuze is removed to release the pull ring; the arming pin is then removed. The spring-loaded striker is retained until it has sheared through a lead wire, which runs through holes in the end of the fuze. The arming process normally takes several hours. Once armed, the striker is retained only by the slotted plate; pressure on the lid (in excess of 8kgs), simply pushes the slotted plate out which in turn releases the spring loaded central striker. The striker then impacts with the integral fuze detonator, which then passes the detonating wave to the main TNT charge causing the mine to disintegrate. (Paragraphs 27 – 29 inclusive extracted from Reference A)

30. There have been instances reported where foreign bodies have embedded themselves in between the recess in the striker mechanism and the slotted striker retaining plate, therefore allowing the partial downward release of the plate. The spring-loaded striker is now therefore only being held by the foreign body. Accumulated pressure over a period of time (especially in heavy soil conditions), can also slowly release the slotted striker retaining plate. This will therefore reduce the direct pressure required to activate the mine.

Account of Activities

31. The following is a description of the events before and after the accident. The information from the investigation forms the basis of the description of events:

10/07/02

- 0754hrs – Uncontrolled detonation at M/F 178.
- 0755hrs – Accident Information passed to [Demining group] Base Location.
- 0818hrs – Casualty evacuation of casualty to Bint Jubayl hospital.
- 0820hrs – Accident site secured.
- 0825hrs – Casualty arrives at Bint Jubayl hospital.
- 0830hrs - MACC SL Planning Officer informs MACC SL QA Officer of accident.
- 0840hrs – MACC SL Operations Officer informs MACC SL QA Officer of accident and instruction to move to accident scene.
- 0843hrs – BOI Convened.
- 0925hrs – BOI Arrives at accident site and informs [Demining group] Programme Manager of BOI convening order.
- 1030hrs – Casualty departs Bint Jubayl Hospital on route to Hammoud Hospital Sidon.
- 1130hrs – Casualty arrives at Hammoud Hospital Sidon.
- 1240hrs – BOI Leaves accident site to move to Bint Jubayl Hospital.
- 1250hrs – BOI arrives at Bint Jubayl Hospital.
- 1330hrs – BOI leaves Bint Jubayl Hospital to move to [Demining group] base location.
- 1430hrs – BOI arrives at [Demining group] base location to conduct witness interviews and collate task information.
- 1545hrs – BOI leaves [Demining group] base location to move to MACC SL.
- 1605hrs – BOI arrives at MACC SL and briefs Programme Manager, Operations Officer and Planning Officer.

15/07/02

- 0830hrs – BOI departs MACC SL to move to Hammoud Hospital Sidon.
- 0930 hrs – BOI arrives at Hammoud Hospital Sidon to question casualty.

- 1045hrs – BOI leaves Hammoud Hospital Sidon to move to MACC SL.
- 1200hrs – BOI arrives at MACC SL and briefs Programme Manager and Planning Officer.

Insurance Details

32. Deminer [the Victim] is covered by the standard [Demining group] insurance for all International personnel in mine/UXO clearance activities in Lebanon. All insurance policies for [Demining group] are through HMT Insurers of London. A copy of the scale of entitlements is held at the MACC SL QA Section.

Conclusions

33. Based on the investigation, the statements and visits to the site, the BOI concludes the following:

- There was a sub-surface detonation of an Israeli No4 Anti Personnel mine. Evidence shows that the crater had heavy blackening to the sides, was of a bulbous shape with primary fragmentation lining the bottom and sides. Evidence of rock fracturing and shattering was located by the BOI, immediately behind the seat of detonation.
- The mine detonated whilst Deminer [the Victim] was attempting to excavate it, there is no evidence to suggest that Deminer [the Victim] was carrying out incorrect drills.
- The trowel that was not located by the BOI will either be to the flanks of the minefield or in an uncleared area immediately behind the clearance area.
- The fracturing of Deminer [the Victim]'s fingers was due to the positive blast effects resulting from the disintegration of the Israeli No4 mine, on the detonation of the high explosives.
- The part traumatic amputation of Deminer [the Victim]'s thumb was due to the cutting motion of the trowel as the positive blast effects on the detonation of the high explosives, forced the trowel backwards into his hand.
- The loss of Deminer [the Victim]'s right eye was due to a piece of the visor slicing through the eye orbit, after the shattering of the visor.
- The visor shattered after being impacted with rock fragments at extremely high velocities following the detonation of the high explosives.
- Deminer [the Victim]'s other injuries were sustained from both primary and secondary fragmentation, resulting from the disintegration of the Israeli No4 mine, on the detonation of the high explosives.
- The on-site stabilisation of the casualty was performed in a dangerous place, with 2 x No4 AP mines being in extremely close proximity to where Deminer [the Victim]'s jacket was removed and placed.
- The post-accident marking of the accident site was carried out in accordance with current TSGs and [Demining group] SOPs.
- The passage of information in between the accident site and [Demining group] base location was good with all information being passed in a timely manner.
- The BOI agrees with and accepts [Demining group] Accident and IMSMA Reports.
- The protective jacket maintained its integrity following the uncontrolled detonation of an Israeli No4 AP mine.
- The protective visor did not maintain its integrity following the uncontrolled detonation of an Israeli No4 AP mine.
- The previous flailing of the area (accumulation of pressure), may have had a direct effect on the sensitivity state of the mine fuze (Para 30 to this report refers).
- The use of a demining probe to investigate signals, in conjunction with a demining trowel may reduce the risk of an uncontrolled detonation occurring.
- Deminers adopting the prone position when investigating signals may minimise the injuries sustained, should an uncontrolled detonation occur.
- While IMAS does not cover Manual clearance techniques in depth, they are adequate for a clearance organisation to develop their own SOP's, specific to the environment that they are operating in.

- No IMAS currently covers Mechanical clearance techniques, the future issue of IMAS 09.50 “Guide to the use of Mechanical Mine Clearance Equipment” will resolve this.

Recommendations

34. The following are recommendations based on the BOI conclusions:

- No amendments are necessary to the National TSGs for Mine/UXO Clearance (005/2002 recommended and details a review of TSG Chapter 10).
- An amendment be made to [Demining group] SOP Chapter 7 detailing that casualties are to be moved to the central part of any cleared area by the Team Leader / Team Leader 2i/c, before commencement of stabilisation by the Team Medic.
- A full and detailed review of [Demining group] Mechanical assets deployment, procedures etc is required.
- The following extract is a reiteration of a recommendation made by the BOI during 005/2002 investigation, and is still extant.
“Mechanical assets should only be used in the ground preparation of clearance sites, as opposed to being used as a primary clearance tool.”
- [Demining group] are to consider the introduction of a probe and excavation drill into their current SOPs.
- [Demining group] are to consider using the prone position when conducting the excavation drill.
- The conclusions detailed in this report be distributed and discussed among all [Demining group] Operational Field Staff.
- A period of refresher / confidence training is conducted with all [Demining group] Operational Field Staff, to include the following:
 - Manual excavation drills.
 - Accident / Incident procedures.

Note

A site planning meeting was held at M/F178 on the 11th July 2002, with the MACC SL Planning Officer and [Demining group] Programme Manager being present. A post accident clearance methodology has been decided upon and is detailed in “Clearance Plan M/F 178” dated 11th July 2002.

Signed: QA Officer, Mine Action Co-ordination Centre Southern Lebanon

Annexes: [most not made available.]

- A. MACC SL convening order for accident investigation Board of Inquiry.
- B. List of personnel involved with attached statements as Appendices.
- C. IMSMA Mine/UCO accident report.
- D. Map of the general area.
- E. [Demining group] Team No 1 map.
- F. Schematic diagrams of the general working area and accident area/scene.
- G. Initial Casualty Report
- H. Medical reports from Bayt Yahun and Hammoud Hospitals

Comments by the MACC SL Operations Officer

I have read the Report for Accident Investigation Board of Inquiry – No. 006 and concur with the Conclusions and Recommendations made by the Quality Assurance Officer. In particular I draw attention to the statement made in the second conclusion, quote “ there is no evidence to suggest that Deminer [the Victim] was carrying out incorrect drills” unquote. If this is to be believed and reading his witness statement indicates nothing incorrect in his drills, then it can be strongly assumed that the fuze of the Israeli No4 AP mine was already in an extremely dangerous near functioned position prior to Deminer [the Victim]’s excavation drill. Given that this particular area had been previously flailed resulting in the failed detonation of this mine,

then weight must be placed upon the theory that the previous flailing has resulted in the mine being left in a state that required very little movement for it to function.

The two remaining areas that have previously been flailed are to be cleared in accordance with the clearance plan written for minefield 178 and dated 11 July 02.

Signed: Planning Officer, Mine Action Co-ordination Centre Southern Lebanon

Comments by the MACC SL Programme Manager

I have read the BOI Report and I concur with the Board's conclusions and recommendations. One of the key issues is the use of mechanical means as a primary clearance means in known mined areas. This issue has been addressed with the Company on advice of the MACC Operations Staff. Special note must be taken of the terrain in which the Deminers are working and site supervisors and team leaders must be particularly vigilant in this terrain.

I have noted the very professional and detailed Company Accident Report. The clear, precise, and accurate information provided in the diagrams is very helpful. The Company investigating officer responsible is to be highly commended for his work.

Signed: UN Programme Manager, Mine Action Co-ordination Centre Southern Lebanon

Statements

The following statement from the Victim was made available.

The following witness statement from Deminer [the Victim] was conducted at 0930 hrs on the 15.07.02 at Hammoud Hospital, Sidon. Due to the seriousness of Deminer [the Victim]'s hand injury, the statement was taken verbally by the BOI Investigating Officer.

Q1. Explain what you remember happened before the accident occurred?

A1. I was working in the second clearance area of M/F 178, I was initially working in the first clearance lane, clearing the first row of mines, but due to safety distances I was told to come out of that lane and clear towards the fourth row of mines and once there clear along that row.

I got a reading with my detector and managed to verify the reading and pinpoint the location of the signal. I knew that the mine was lying to the right hand side of my clearance lane with the fuze pointing away from me. I could specify this, as my first sweep across the lane I received just one signal, when I then passed the detector at 90 degrees to the first sweep I received two signals, a weak one then a strong one.

Knowing that this was the first mine in the fourth row, I then watered the area and waited approximately three minutes to allow the water to soak in. After the three minutes wait I checked the area again with my detector and then started to excavate, starting 200mm back from the signal. I excavated from the right hand side, moving towards the left hand side of the excavation trench; the soil was relatively loose and easy to excavate. After I had excavated for a short while I came to a large rock, I then started to excavate down in between the rock and there was a big bang.

Q2. Can you confirm the location of the signal?

A2. It was on the right hand side of the clearance lane, in front of a rock.

Q3. What strength was the signal?

A3. Very strong.

Q4. How much water was left in your water container?

A4. Nothing, it was empty.

Q5. What tool were you using during the excavation?

A5. My excavating trowel.

Q6. Are you right or left handed?

A6. Right handed.

Q7. How do you hold your trowel?

A7. In the normal position by holding the trowel with my right hand, with the trowel is on its side and the tip of the trowel pointing towards my left hand.

Q8. At what distance do you start to excavate?

A8. 200mm back

- Q9. How much had you excavated prior to the detonation?
- A9. I had excavated approximately 15 cms diagonally down, when I came to a large rock, I then started to excavate down in between the rock and there was a bang.
- Q10. How wide was your excavation trench?
- A10. The normal width of 15 cms.
- Q11. Were you in a stable or unstable position during the excavation?
- A11. I was in a stable kneeling position.
- Q12. After the detonation, did you see where the trowel landed?
- A12. No I did not see where the trowel had landed.
- Q13. Did you see the other mine on the RHS of your lane?
- A13. No I never saw the other mine.
- Q14. Were there anymore signals in the immediate area?
- A14. No there were no more signals in the immediate area.
- Q15. Did you actually see the mine?
- A15. No just the large rock.
- Q16. At what depth would you estimate the mine was located at?
- A16. At 10 cms below the surface.
- Q17. Anything else that you think will be useful for the investigation.
- A17. Yes three of the mines that I had previously cleared were in a bad state, because the flail had been used over them.

Signed: QA Officer, MACC Southern Lebanon.