1-12-2003

DDASaccident389

Humanitarian Demining Accident and Incident Database
AID

DDAS Accident Report

Accident details

Report date:	19/05/2006	**Accident number:**	389
Accident time:	13:10	**Accident Date:**	12/01/2003
Where it occurred:	MF No.3, Arnoun	**Country:**	Lebanon
Primary cause:	Inadequate equipment (?)	**Secondary cause:**	Inadequate equipment (?)
Class:	Missed-mine accident	**Date of main report:**	[Not recorded]
ID original source:	KJ	**Name of source:**	NDO
Organisation:	Name removed		
Mine/device:	No.4 Israel AP blast / frag	**Ground condition:**	electromagnetic grass/grazing area rocks/stones
Date record created:	22/02/2004	**Date last modified:**	23/02/2004
No of victims:	1	**No of documents:**	1

Map details

Longitude:		**Latitude:**	
Alt. coord. system:	GR 36 735185 3691326	**Coordinates fixed by:**	
Map east:		**Map north:**	
Map scale:	UNIFIL Genimap	**Map series:**	(Nabatieh)
Map edition:		**Map sheet:**	B
Map name:	1:50,000		

Accident Notes

inadequate metal-detector (?)

inadequate equipment (?)

inadequate investigation (?)

Accident report

A Board of Inquiry report was made available in January 2004. It is reproduced below, edited for anonymity. Two inconsistent names are given for the victim in the report, and the mine identification is confused – see Analysis.

NATIONAL DEMINING OFFICE, OPERATION SECTION

REPORT FOR ACCIDENT INVESTIGATION BOARD OF INQUIRY – No001/2003

DEMINING Accident that occurred in Arnoun on 12th January 2003 in which a [demining group]

deminer [name excised] was injured.

Map Reference: UNIFIL Genimap 1:50,000 Sheet B (Nabatieh).

References: A. Janes Mines Manual.

Introduction

1. In accordance with the National Technical Standards and Guidelines (TSGs), the NDO director issued a Convening Order on Sunday 12th January 2003, for an accident investigation Board of Inquiry. Annex A details the Convening Order. [Not made available.]

2. This is a comprehensive report by the Board of Inquiry into the Demining Accident that occurred on the 12th January 2003. Based on the investigation, [Demining group]'s internal report, the statements from [Demining group] personnel involved in the accident (see Annex B [not made available]); 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 NDO-OP Section in the "IMSMA Accident Report", attached at Annex C is confirmed. The accident occurred at approximately 13:10 hrs on 12th January 2003, in Minefield (M/F) No 3 at Arnoun, GR 36 735185 3691326, (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 3 on the 12th January 2003.At the time of the accident [Demining group] Manual Clearance Team No.1 were the only clearance asset operational on M/F 3; from the start of the manual clearance operation on 12th January 2003, a total of 1 x access lane and 1 x base lane had been cut into M/F 3.

GENERAL VIEW OF THE AREA:

5. At the time of the accident [Demining group] Deminer [the Victim] was working in the first lane. The actual clearance lane was to the right hand side of the mine rows and due to the high level of metallic contamination in the ground the sapping method of clearance was being used.

6. From the start of the day's clearance activities (4 hrs 10 minutes had elapsed), [the Victim] had not located the mine. He then continued to extend the clearance lane approximately 1m whereupon he came across a rock to the left hand side of his lane marking rope. As the rock

would have been in the approximate location of the mine, he decided to clear around the rock. Prior to actually clearing around the rock, [the Victim] attempted to detect the mine with the detector, but due to the high level of metal contamination in the area he was unable to obtain an exact position of the mine.

7. [The Victim] then excavated around the front and right hand side of the rock using his right hand, nothing being located. As it would have been difficult to excavate around the left hand side of the rock using his right hand. Deminer [second inconsistent name] had moved his legs 15 cms in depth when there was an uncontrolled detonation, after he stepped on the mine.

Events following the Accident

8. At approximately 13:10 hrs an uncontrolled detonation occurred in clearance lane. Following the uncontrolled detonation, Team Leader [Name excised] was the first to the accident scene whereupon he saw that [the Victim] had fallen back into a cleared area, he informed Site Supervisor [name excised] and then gave the accident whistle signal; all remaining Deminers then immediately moved out of the minefield to the rest area.

9. On the arrival of Team Medic [name excised], an initial medical examination and on-site stabilisation took place. [Demining group] Medic was in the area and also moved to the accident scene to assist with the medical aid of the casualty. After stabilisation had been achieved [the Victim] was then transported to Nabatieh Hospital for medical treatment.

10. Following the accident, 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 SOP's and National TSGs by Team Leader.

The picture below shows the accident site.

BOI Post Accident Activities

11. On arrival at the accident scene, due to the effects of the detonation wave the BOI could only gain safe access up to the daily work marker, the BOI therefore only initially conducted the investigation to that point.

Work History of the Casualty

12. [The victim] commenced his employment with [Demining group] in May 2002, whereupon he completed the [Demining group] Southern Lebanon in-country 2 x week demining course, prior to operational deployment at Nabatieh. He has previously worked on a demining operation in the Bosnia minefields for 6 years. He is considered by [Demining group] to be competent, trustworthy and someone who was being observed closely for possible future internal promotion; disciplinary action had never had to be taken against him. He worked also with Norwegian company (NPA) for 2 years.

Past History of the Area

13. The Israeli Force (IF) initially occupied this area, using it as a Brigade location, later the South Lebanese Army (SLA) took over the occupation. The mine contamination around the

former Palestinian position consists of an unknown number of AP mines, and no information about when and how it was been laid.

14.
Reference Point GR 36 735185 3691326.
Quantity of mines unknown.
Quantity of mine rows unknown.
Minefield map is unavailable.
Date the mines were laid is not known.

Sequence, Documentation and Procedure of Tasking

15. Task Dossier was issued to [Demining group]; the TD contains details of the 5 x minefields in and around Arnoun. Up to the time of the accident a total area of 52950 square metres had been cleared by manual assets, resulting in the disposal of a total number of 6 x Israeli Illuminating mines, 79 UXO, and 26 cluster bombs. (It should be noted that the square metres 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

16. Arnoun task site is located in an open area on a prominent natural hillock (altitude 600m+), to the North East of Arnoun 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 20 to 21 degrees Celsius.

Site Layout and Marking

17. 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

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

Quality Assurance and Quality Control

19. [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. External QA is carried out by the NDO QA Section.

Communications and Reporting

20. Communications in-between the Arnoun 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.

21. 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 NDO in a timely manner. Annex G details the Initial Casualty Report. [Not made available.]

Medical Details

22. [The victim] suffered closed fractures to his left leg and lost his right leg. [Demining group] Team No.1 Medic administered medical treatment and stabilisation on-site to [the Victim]; casualty evacuation by road to Nabatieh civilian hospital then took place.

23. On arrival at Nabatieh hospital, [the Victim] was transferred to the Emergency Department where additional medical treatment was administered; X-ray's were also performed. Annex H details the medical report from Medic [name excised] (a more comprehensive and detailed report than the Nabatieh Hospital report). [Not made available.]

Personnel

24. 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 an Appendix to the Annex. [Not made available.]

Dress and Personal Protective Equipment (PPE)

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

- No fragmentation on the outer cover.
- The blast debris and damage was concentrated in the legs of the deminer.
- [A photograph showed a flak-jacket with no obvious damage.]
- 26. On inspection of parts of the protective visor, the following points were noted:
- The visor face had maintained its integrity.
- There was no fragmentation damage to the centre of the visor face, and no fragmentation penetration.
- The visor securing bolts had maintained their integrity.

[A photograph showed a bright and clean visor with no dust or damage visible.]

Tools and Equipment

27. At the time of the accident, a standard [Demining group] excavation probe was being used by [the Victim]. ([Demining group] currently have a policy of not using demining probes, therefore probes are not part of the Deminers equipment).

28. On inspection of the probe, the following points were noted: No marks on the probe from the detonation.

[E]binger Detector:

[A photograph showed a long-handled Ebinger 420 detector.]

Technical Data:
Battery: 6 x 1.5V C-cells, alkaline, LR14 optional 9V UV9L or rechargeable 1.2V C-cell type
Temperature range: -25^{O}C to +55^{O}C
Search Coil: approx. 260 x 156 mm.
Search Arrangement: approx. 270 mm.
Short Version Weight: 2.2 Kg
Long Version Weight: 2.4 Kg
Complete in rucksack: 3.4 Kg
Magnetic Safety: approval in British Army Test.

Details of Mine Involved

29. The Grata (Hungarian) blast mine consists of a plastic box with a hinged lid that overlaps the sides. The main charge is 300g 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.

[There is no Grata Hungarian blast mine listed in the Janes Mines and Mine Clearance that the investigator cites as a reference. The name is the GYATA-64, but that is not a hinged box mine. The description given in this report fits the Israel No.4 shoe-box mine known to have been used in this area, so this is inferred.]

30. 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.

31. 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 31 – 33 inclusive extracted from Reference A). [Not made available.]

32. 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

33. 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:

12/01/03
1310hrs – Uncontrolled detonation at M/F 3.
1315hrs – Accident Information passed to [Demining group] Base Location.
1320hrs – [Demining group] informs NDO Operations Officer of accident.
1330hrs – Casualty on route to Nabatieh Hospital.
1350hrs – Accident site secured

13/01/03
0800hrs – Initial accident report received at NDO.
0815hrs – BOI Convened.
0820hrs – BOI leaves NDO on route to accident site.
0920hrs – BOI Arrives at accident site and informs [Demining group] QA Officer of BOI convening order.
1030hrs – Casualty is discharged and departs Nabatieh Hospital on route to Rizk Hospital at Beirut.

14/01/03
0945hrs – BOI departs NDO to move to [Demining group] base location at Host.
1000 hrs – BOI arrives at [Demining group] base location at Host to conduct witness interviews.
1330hrs – BOI leaves [Demining group] base location at Host to move to NDO.
1340hrs – BOI arrives at NDO.

Insurance Details

34. [2nd, inconsistent deminer name] is covered by the standard [Demining group] insurance for all International personnel conducting 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 NDO-OP QA Section.

Conclusions

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

- Following a full and detailed examination of Binger detector, no defects were discovered.
- The Grata Anti Personnel mine detonated whilst [the Victim] was attempting to detect a mine using the mine detector.
- The mine functioned when he stepped down on the plastic lid of the mine. This in turn would have released the slotted striker retaining plate and subsequently released the cocked striker mechanism.
- If the clearance lane had been placed on the opposite side of the mine row, [the Victim] would have been excavating on the back side of the mine as opposed to the fuze side of the mine, this was a conscious decision made by the Team Leader as the terrain was more suitable for manual demining operations.
- There was a sub-surface detonation of the mine, evidence shows that the crater had heavy blackening to the sides, was of a bulbous shape and contained primary fragmentation.
- The vast majority of the blast effects were directed away from [2nd, inconsistent deminer name] due to his body position in relation to the direction that the detonating wave was travelling, the result being a 170 degree directional effect as opposed to a 360 degree omni-directional effect.
- The fracturing of [2nd, inconsistent deminer name] left leg and right leg were due to the positive blast effects resulting from the disintegration of the Giata mine, on the detonation of the high explosives.
- The loss of [the Victim]'s right leg when he was forced backwards by the blast wave following the detonation of the high explosives.
- The on-site stabilisation and treatment of the casualty was conducted in a professional and expedient manner.
- 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, in particular the conclusion detailed at Para 4.5 (PPE and medics). [Not made available.]
- The protective jacket maintained its integrity following the uncontrolled detonation of a Grata AP mine.
- The protective visor maintained its integrity following the uncontrolled detonation of a Grata AP mine.
- The use of a demining probe to investigate signals. When used correctly, Deminers have a tangible and physical indication of any hidden object prior to any excavation actually being undertaken.

- Deminers adopting the prone position when investigating signals will minimise the injuries sustained, should an uncontrolled detonation occur.
- Paragraph 4.19 to Chapter 4 of National TSGs does not cover in sufficient details the action to be taken when clearing around rocks.

Recommendations

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

[Demining group] should introduce a probe and a lightweight excavation trowel procedure into their current SOPs. The International Deminers currently working for [Demining group] should have access to the full range of manual clearance tools and equipments that are available.

[Demining group] should strongly consider the introduction of the prone position when conducting the excavation drill into their current SOPs.

When the terrain permits and detailed information is known on the minefield lay out, clearance lanes should be ideally located on the side of the mine row where the rear part of the mine will be the first thing located during excavation.

An amendment is made to [Demining group] SOPs detailing that following any accident, Medics can enter the M/F (escorted), without actually wearing PPE, in order to administer first aid and stabilisation to a casualty.

The conclusions detailed in this report be distributed and discussed among all [Demining group] Operational Field Staff.

A one week period of refresher / confidence training is conducted with all [Demining group] Manual Team No1, to include the following:

Manual excavation drills.

Signed: NDO Operation Officer

Annexes: [Not made available.]

A. NDO 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 2 Briefing Map.
F. Schematic diagrams of the general working area and accident area/scene.
G. Initial Casualty Report.
H. [Demining group] Senior Medic [name excised] Medical Report.

Comments by the NDO Operation Officer

I have read the BOI's report and the Company's investigation report and I concur with the conclusions and recommendations made.

The correct application of appropriate tools and the S.O.P.s of the concerned organization is an essential element of manual mine clearance operations. In this case, it is evident that the deminer did not have available to apply the appropriate tools, in the case a mine probe. With years of experience acquired from many different countries in often difficult terrain the mine probe has always formed a part of the deminer's basic tool kit.

The recommendation of the BOI, paragraph 38 a, is strongly supported. The company should introduce the use of the mine probe as a part of the basic demining tool kit and instruct their deminers in the correct use of this tool as soon as possible.

The question of the physical position of the deminer when conducting excavation or probing drills is often determined by the ground in which the deminer is working. However,

experience has shown that the prone position offers the best protection to the deminer and this position should be applied wherever possible.

Care must be taken when working in areas of rough terrain, especially with the presence of rocks in the immediate area of the deminer's working site.

The completion of the BOI Report has been delayed by the UN Programme Manager. However notwithstanding this, all actions required to be undertaken as detailed in the BOI report have been carried out.

Signed: NDO Operation Officer

Victim Report

Victim number:	504	**Name:**	**Name removed**
Age:		**Gender:**	Male
Status:	deminer	**Fit for work:**	not known
Compensation:	not made available	**Time to hospital:**	not recorded
Protection issued:	Frag jacket Long visor	**Protection used:**	Frag jacket, long visor

Summary of injuries:

INJURIES

severe Leg

AMPUTATION/LOSS

Leg Below knee

COMMENT

No medical report was made available.

Analysis

The primary cause of this accident are listed as inadequate equipment because the investigators determined that the Victim was not issued with appropriate excavation tools, and because it is possible that the detector was not capable of detecting the mine in the electromagnetic ground at the accident site.

The victim was not excavating the site where the mine was because he stood on that, so the inadequate excavation tools may not have been directly relevant.

The investigators used two (entirely different) names for the victim, misnamed the metal-detector used and misidentified the mine involved, so it is perhaps not surprising that they also claim that "experience has shown" that the prone position is safest when excavating during Humanitarian Demining. The records in this database demonstrate that precisely the opposite is true. In this case, if the Victim had been lying on top of the missed-mine his injuries would have been very much worse.