

DDAS Accident Report

Accident details

Report date: 19/05/2006	Accident number: 347
Accident time: 08:55	Accident Date: 18/08/1999
Where it occurred: Stup II, Azici, Sarajevo	Country: Bosnia Herzegovina
Primary cause: Field control inadequacy (?)	Secondary cause: Management/control inadequacy (?)
Class: Detection accident	Date of main report: 25/08/1999
ID original source: RB/NH/IG/SD	Name of source: BiH MAC
Organisation: Name removed	
Mine/device: PROM-1 AP Bfrag	Ground condition: building rubble dry/dusty hard metal scrap residential/urban
Date record created: 21/02/2004	Date last modified: 21/02/2004
No of victims: 1	No of documents: 1

Map details

Longitude:	Latitude:
Alt. coord. system: BQ 838582	Coordinates fixed by:
Map east:	Map north:
Map scale: BP 838582	Map series: 525-2
Map edition: M1002 525-2	Map sheet: M1002
Map name:	

Accident Notes

inadequate metal-detector (?)
inadequate training (?)
inadequate equipment (?)

Accident report

The following is the MAC's Accident report, edited for anonymity.

INTRODUCTION

1. As a result of a mine accident on the morning of 18 August 1999 during demining an urban area which was very hard to demine, a Board of Investigation was convened by the Bosnia and Herzegovina Mine Action Centre on behalf of the Government, in accordance with the BH MAC National Technical Guidelines. The verbal report of the accident was received at the BH MAC at 10:00. First visit to the site was convened on 18 August when first information were gathered needed for the Board's work. Initial report on the accident was received 18 August 1999 and attached in Annex B.
2. The accident involved one deminer working as a part of a [Specialist NGO] demining team, during mine clearance operations in the area of Stup II, Aziji, Sarajevo. The task was to clear areas around houses in order to prepare ground for house clearance, since the returnees were about to use them again. The task was done on behalf of the European Community. The site was opened 8 April 1999.
3. The Board of Inquiry members were:
Chairman – Coordination Department BH MAC
Member – Chief of Coordination DTP, BH MAC
Member – Federation MAC Ops Dpt, engineer
Member – QA Inspector, Fed MAC, RO Sarajevo
Interpreter – Coordination Department, BH MAC
4. Investigation Board came out on site 19 August at 09:00 hrs and had a very good cooperation with the [Specialist NGO] representatives.
5. Copy of the Board's Terms of References is attached as Annex A. [Not made available.]

SEQUENCE, DOCUMENTATION AND PROCEDURES OF TASKING

6. The [Specialist NGO] demining team was on an authorised task awarded by the EU. The task Red folder with a MAC ID No 1681 was received 30 November 1998. Work started on the site on 08 April 1999.
7. On the morning of 18 August 1999, the mentioned demining group with a supervisor and four section commanders, as well as medical supervisor, had arrived on site at 6:45 Stup II, Azići. Supervisor issued tasks for each section in 15 minutes so that the work in the minefield began at 7:00. Section commander in which the accident occurred had met all deminers along with the medic in order to inform her about the places of deminers in working lanes, as well as with the access to the site.
8. Deminers used 'one-man system'; one deminer was at the rest area while the other worked in his working lane in the minefield. Section commander controlled deminers in the minefield. Deminers in minefield were at the stated safety distances.

GEOGRAPHY AND WEATHER

9. The accident occurred some 16 metres from the access lane, between two devastated houses. The area between houses is very hard to demine since the density of the vegetation, large quantities of metal and other debris. The site is located at BQ 838582, map sheet M1002, series 525-2. The assessment of the mine threat map (1:10000) and the sketch of the site and the accident site are attached in Annex C.
10. The site is accessible from the tarmac road and is located in the urban area of Azici. The site is located in the vicinity of an industrial and the houses already inhabited by the returnees.



[The picture above shows the accident area.]

11. The site consists of a flat area where the vegetation is high and sparsely in turfs. When the vegetation between turfs is cut, the approximate distance between the surface and the cut vegetation is up to 10 cm at places. To the South East of the access lane there is a sparse agricultural area as well as the area covered with up to 70cm height of weed. Site sketch is attached in Annex C. [Not made available.]

12. The prodder could prod into the ground to the depth from 5 to 8 cms, which proves that the ground is dry and hard to prod.

13. The site is located between the defence lines of the FWF of VRS and AbiH. There are minefield records in the Red Folder.

14. The weather on the day of the accident was very warm, humid and bright.

15. [Photographs, some of which were made available].

SITE LAYOUT AND MARKING

16. The site layout was adequate and in accordance to the [Specialist NGO] SOP.

17. The marking was adequate in accordance with [Specialist NGO] SOP. 1.3 high tape connected sticks identify the boundaries between the cleared and the unclear areas, while 1.3 high tape connected sticks identify the corners at the end of the working lane.

18. 1m² metal collecting pit is marked with four sticks and is located in the cleared area. Metal collecting pit is filled with different types of metal debris.

SITE SUPERVISION AND DISCIPLINE

19. The [Specialist NGO] demining teams had several levels of supervision. The supervisor does team supervision himself and the Section Commander of the site. A senior supervisor (in kind) provides additional full-time supervision. Supervisor at the site is [Site Supervisor], while the Commander of the Section where accident occurred is [Section Commander].

20. Federal MAC Inspectors (at least once a week) have frequently visited the site. Inspectors' remarks (Annex E) referred to the following: - the distance between the Control Point and the minefield itself; - some of deminers did not have in their equipment the tripwire feeler while working in working lane; - civilians did not stop while using the access lane which is in the very vicinity of the site though having been notified by the [Specialist NGO] staff. (Access lane photograph shown at Annex D.).

21. Safety distances between deminers in the minefield are in accordance to the [Specialist NGO]'s SOP.

22. Medical area is located at the Control Point. The medic was at the CP at the time of the accident and was able to move quickly to the accident location in order to take care of the victim. Medical supervisor reached the site very quickly as well (1 minute after the accident occurred).

23. The [Specialist NGO] do not demine using direct supervision where deminer 1 is supervised with deminer 2 (deminer 2 rests at the resting area while the deminer 1 is in his working lane). Deminer 1 works in his lane for a whole hour though the working conditions in the minefield are very hard. The description of working schedule (one hour's work, one hour's rest) is not included in the [Specialist NGO] SOP. It is recommended in BH MAC Technical and Safety guidelines that a deminer can work to the maximum of 30 minutes, supported by his Nr 2 Deminer. What is also not clearly described in the SOP is the one-man system practised in demining done by the [Specialist NGO] organisation.

QUALITY ASSURANCE

24. There is a large quantity of metal debris both in the ground as well as on the surface. All the metal from the ground and the surface is to be removed in order to efficiently use metal detector.

25. Section commander did not provide Quality Control of the area cleared though it is stated in [Specialist NGO] SOP that he has to do it with the use of metal detector. As requested by the Investigation Board, supervisor did check the area with MD sensitivity set to 2. Metal detector was signalling the presence of metal in the cleared area very frequently. There was a metal chain and a can lid on the cleared area, in the very vicinity of the place where accident occurred.

26. "Metallic content of soil" – Demining procedure with the metal detector is to be taken out if this is the case and fully done by prodding and excavating. That is also stated in the [Specialist NGO] SOP. If a metal detector is not useful, BH MAC Technical and Safety Guideline recommend reduction in deminers' shifts in working lanes, as well as extra supervision.

27. Additionally, Federal MAC Inspectors frequently visited this site. Their reports about inspectors' remarks for not breaching the BH MAC Technical and Safety Guidelines are attached as Annex E.

TASKING, REPORTING AND COMMUNICATIONS

28. The [Specialist NGO] had received the Crveni folder 30 November 1998 with MAC ID No 1681, the site being open 8 April 1999.

29. Section Commander made requested daily reports, while the details on the daily job were added to the report by the group supervisor. [Specialist NGO] weekly reports are attached in Annex H. [No annexes were made available.]

30. Communications on the site are by hand-held radios. Communications were checked every hour as well as the communication with the [Specialist NGO] office.

MEDICAL

31. [The Victim] involved in the accident, was very severely injured, which caused his death in the hospital. Death report from the clinic is attached as Annex F. [Not made available.] 35 minutes have passed since the moment of the detonation until the moment injured was received at the Urgent Medical Centre. As for the Investigation Board, the CASEVAC and MEDEVAC procedures were very well done considering severity of the injuries.

32. Accident occurred at approximately 08:55 hrs. The supervisor was the first to reach the site (he was 100 metres away), immediately followed by the First Section Commander. The supervisor, immediately took over control over what happened and prodded his way to the injured deminer. Together with the Section Commander and the Medical supervisor, he tried to pull the deminer out with a fabric tape attached to his leather belt, but the belt tore after they pulled him for about 30 cm. They taped him again and tried to pull him out to the

safe area. The Supervisor and a deminer pulled him on their arms to the safe area where the medics took over. Evacuation from the working lane lasted for 2-3 minutes. The injured deminer's pulse was hard to detect and uneven, while he was hardly breathing that it was almost not possible to detect if he breathed or not. He received artificial AMBU-balloon breathing and the medical team had taken care of all the wounds at the safe area. There were multiple injuries such as amputation of his right lower leg, his left leg foot was attached to the leg on a piece of skin, left lower leg was broken at a few places. There were quite a few shrapnel wounds in his left upper leg. A shrapnel made wound was found in the right side of his neck. Right side of his face as well as his right eye was injured. Four fingers of his left hand were amputated. There was a 2-cm wide wound in the wrist of his right fist. He was received at the Urgent Medical Centre at 09:27 and sent to OTO Clinic half an hour later, where he died.



[The Victim's overall is shown above. It is upside down, so most damage occurred at the top of the legs, where it was shredded.]

33. As for the CASEVAC, the entire procedure was done very professionally.



[The remains of one of the Victim's shoes is shown above, implying that he may have stepped on the mine and not detonated it with the detector head.]

[The Victim's frag-vest is shown below. Fluffs of its Kevlar inner imply some penetrations.]



[The victim's helmet and visor (holed) is shown below.]



PERSONALITIES INVOLVED AND EXPERIENCE

34. The [Specialist NGO] is organised on the principle of demining groups. [Name excised] was the supervisor for a group where the accident occurred. Section Commander for the same group is [Name excised]. Mr. [Name excised] was the medical supervisor, while the medic in the section where accident occurred was Miss [Name excised]. Deminers in the section included:

Deminer No.1: worked from 7:00-8:00	course 26/05/98
Deminer No.2: worked from 7:00-8:00	course 03/12/96
Deminer No.3: worked from 7:00-8:00	course 26/05/98
Deminer No.4: worked from 8:00-8:55	course 26/05/98
Deminer No.5: worked from 8:00-8:55	course 26/05/98
Deminer No.6: worked from 8:00-8:55	course 26/05/98

EQUIPMENT AND TOOLS

35. The equipment and tools used at the site were the standard ones recommended by BH MAC as well, including MD-8 metal detector, prodder, trowel, shears, tripwire feeler, hammer, saw. The equipment used by deminers consisted of helmets with visors, protective jacket, knee shields as well as the standardised [Specialist NGO] working suit and boots.



[The head of the victim's detector is shown above.]

36. Damages to the equipment helped in finding out the position of the deminer in the very moment of the accident.

DETAILS OF THE MINE INVOLVED

37. The mine that caused the fatality was a PROM-1. The Investigation Board was not able to recover the base plate of the mine since the police, along with the late deminer's equipment, for their own investigation took it. Photographs of the base plate, helmet with visor and his protective jacket are shown as Annex G. [Not made available, although some pictures were.]

38. The PROM-1 detonated 20 (twenty) cms above the surface. (Easily spotted shrapnel in the wall of the nearby house. Photograph attached as Annex D.) [Not made available.]

39. At about 08:20 hrs the late deminer found another PROM-1 mine at a 1.40m distance from the one that caused the accident, in the same working lane. Supervisor had disarmed the mine and noticed no tripwires attached to it. August 12 1999 a PROM-1 was found on the other side of the house. This one was attached to tripwires but disarmed as well.

EVIDENCE OF MINING/REMINING

40. There was no evidence to indicate that remining had occurred. Accident occurred within the heavily vegetated area so that searching the lane in front of the base stick would have spotted any kind of remining.

DETAILED ACCOUNT OF EVENTS ON 18 august 1999

41. Group supervised by [Site Supervisor] gathered at the [Specialist NGO] warehouse where all the [Specialist NGO] staff usually gathers. They assembled at 06:30 hrs. It has been assigned to go to Stup II Azici site, where they arrived at 06:45. The schedule and tasking to the Section Commanders was finished until 07:00 when the demining started.

42. The Section Commander scheduled his three pairs of deminers and shown their positions in working lanes with the medic. Closest pair of deminers to the CP were [Deminer No.2] and [the Victim]. [Deminer No.2] started at 07:00 while [the Victim] was at the resting area. [The Victim] entered the minefield at 08:00, while [Deminer No.2] went out to the resting area. All the personnel who talked to [the Victim] stated that he was in a good mood before he entered the minefield.

43. At 08:20 [the Victim] signalled to the Section Commander that he had found a mine. Commander affirmed the mine was found since the PROM-1 fuse prongs could have been spotted between the two turfs. He called the Supervisor to neutralise the mine. Supervisor withdrew the section (three deminers) from the minefield until he neutralised the found PROM-1. Neutralisation of the mine ended at 08:40 and section went back into the minefield.

44. [The Victim] continued with his work at 08:40. A strong detonation was heard at 08:55. It took one minute for the supervisor and the Section Commander to reach the injured deminer. Supervisor prodded around the deminer and pulled him out with the help of others. They pulled him out to the safe area where he received the first aid. He was evacuated to the Urgent Medical Centre at 09:27.



[The picture shows the blast crater on the left, rubbish on the right.]

45. According to [Specialist NGO] SOP, supervisor organised a group, withdrew the deminers from the minefield to the CP as well as provided necessary number of men who would participate in CASEVAC.

46. Accordingly, [Specialist NGO] organised the session for all the deminers with a psychologist and a sociologist since there was apparent state of shock visible within deminers.

SUMMARY

47. Deminer worked in a minefield with a metal detector on a metal contaminated ground. Area demined was sparsely sparkled with turfs. When the vegetation was cut from these turfs (5 cms in accordance to their SOP) the area to demine is left with turfs and the surface with 10 cm distance from the top of the cut vegetation. Deminer was standing up when the accident occurred. He had his metal detector in his right hand (he was right handed), with his right leg in front, body slightly leaned forward with his left arm down. The Board supposes that he was sweeping the area with his metal detector in front of his base stick, where the vegetation was removed. He had many MD signals as sweeping over and between the turfs so he supposedly sometimes put the detector between the turfs in order to get it as close to the surface as possible in order to locate the exact place of the signal. While lifting the detector's head from the surface towards the turf, the detector must have been slanted so it could have easily activated the PROM's detonator if it was to be at the edge of the turf.

CONCLUSIONS

48. Minefield where the accident occurred was a very heavy one to clear due to several details such as very dangerous mines, metal contaminated, soil hard to prod, large quantity of metal and other debris on the surface, including very warm and humid weather.

49. PROM-1 mine was dug and set to pressure. There was a turf very close to it so it was hard to locate it visually during the search and vegetation removal in front of the base stick.

50. Deminer had to enter with the MD's head between the turfs in order to sweep the area at the same height, with detector's head slanted. That was the only way to precisely locate the source of its signal, so he could have easily activated the fuse prongs of the PROM-1.

51. This assumption can be approved by the nature of the damages to the metal detector that was found near the working lane (Sketch at Annex C shows the places where pieces of MD were found, while the photographs at Annex G show the degree of damages to the

detector) Injuries to the deminers are attached at Annex F (Death Certificate). CASEVAC and MEDEVAC were done in a very professional manner. [Annexes not made available.]

52. The [Specialist NGO] do not demine with deminer 1 being supervised by deminer 2, (deminer 2 rests at the CP while the deminer 1 works in the lane). Deminer 1 works for an entire hour though the conditions for work are very hard in this minefield. This working schedule is not stated in the [Specialist NGO] SOP (one hour of work – one hour of resting). The one-man system is not clearly written as compared to the practice done by the [Specialist NGO]. Accident occurred just before the deminer's shift was over.

53. Quality Control of the cleared area was not done in accordance to the [Specialist NGO]'s SOP since the cleared area was full of metal both in the ground and on the surface. Along with the members of the Board, the Supervisor checked the cleared area with metal detector with sensitivity set to 2, as well as the damaged detector. He received many signals of metal presence in the ground.

54. BH MAC Technical and Safety Guidelines recommend extra safety measures such as changing deminers' shifts more often, more supervision procedures since these were very hard conditions for the concentrated work for a deminer.

55. [Paragraph not in English, excised.]

RECOMMENDATIONS

56. It is **not allowed** in such conditions for a deminer to work for entire hour in a minefield. It is impossible for them to get concentrated for entire hour during hot and humid weather, where the ground is very metal and mineral contaminated, not to mention different debris. In such conditions, BH MAC Technical and Safety Guidelines suggest that reduction of work (more frequent shifts) must be done and more supervision as well. Neither International nor BH MAC Standards do stand for this schedule of working hours (max work time in the minefield is 30 minutes), which also is not stated in the [Specialist NGO] SOP.

57. As for the principle of **one-man system** done by the [Specialist NGO], deminer 1 is in the minefield, while the deminer 2 rests at the CP – it is not clearly defined in the [Specialist NGO] SOP. It cannot be allowed for a deminer 1 to work in the minefield without an immediate supervision and support provided by deminer 2.

58. It is not acceptable to use metal detector in such a minefield since it is heavily metal contaminated both in the ground and on surface. It is needed for all the metal to be removed from both the ground and the surface. "Metallic content of soil" – metal detecting procedure must be removed from demining in such cases and replaced by prodding and excavating only. That is clearly stated in the [Specialist NGO] SOP.

59. [Specialist NGO] Supervisor has no knowledge of BH MAC recommendation that a PROM mine is to be destroyed in situ as well as with the procedure of how to do it. This is the fault of the organisation's management that obviously received this letter or recommendation from BH MAC.

60. All the metal from the "cleared" area is to be removed, and the area checked by the supervisor, as stated in [Specialist NGO] SOP.

61. BH MAC Coordination Department issued their remarks on [Specialist NGO] SOP to be implemented in order to get accredited by BH MAC. No corrections were done up to this moment.

Annexes: [Not made available – some photographs were.]

- Annex A - Terms of reference
- Annex B - Initial Report
- Annex C - Sketch and map of threat estimation for the mine situation
- Annex D - Photographs of the site
- Annex E - Inspectors' Reports
- Annex F - Autopsy Report
- Annex G - Photographs of the equipment after the accident

Signed: entire Investigation Board:

The observers sign that they were present at the site during the investigation. Comments on any aspect of this report, if they have their remarks, can be added under their signatures.

DISTRIBUTION

BH MAC Director, for approval and information
Fed MAC director, without Annexes
Coordination Department BH MAC, completed file
Sarajevo Police (bilingual), without Annexes
[Specialist NGO] organisation – Without Annexes

Victim Report

Victim number: 439	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: DECEASED
Compensation: not made available (insured)	Time to hospital: 35 minutes
Protection issued: Frag jacket Helmet Short visor	Protection used: Helmet, Short visor, Frag-jacket

Summary of injuries:

INJURIES

severe Eye

severe Face

severe Leg

severe Neck

AMPUTATION/LOSS

Leg Below knee

Leg Below knee

Fingers

FATAL

COMMENT

Victim died on arrival at hospital. No medical report was made available.

Analysis

The primary cause of this accident is listed as a "*Field control inadequacy*" because the victim was working with a metal-detector in an area heavily contaminated by metal scrap and was not removing all the scrap as he worked. The secondary cause is listed as a "*Management/control inadequacy*" because it was a management decision to oblige deminers to work for an hour between breaks (against national standards) and this may have been a contributory cause of the accident.

The investigators criticised the one-man drill that is used widely around the world and is found to be cost effective, but gave no real explanation of what was wrong with it (adequately supervised and with frequent breaks). The Specialist NGO's failure to comply with the MAC's requirements with regard to written SOPs was, however, a significant management failing. It was a significant "Field control" failing that clearance was not been carried out in accordance with the group's own SOPs. The secondary cause is listed as a "*Field control inadequacy*".