

DDAS Accident Report

Accident details

Report date: 15/05/2006	Accident number: 210
Accident time: 11:30	Accident Date: 19/10/1998
Where it occurred: Vlasinje, Sahmani	Country: Bosnia Herzegovina
Primary cause: Management/control inadequacy (?)	Secondary cause: Inadequate training (?)
Class: Other	Date of main report: 23/10/1998
ID original source: DR/NH/KB	Name of source: BiH MAC
Organisation: Name removed	
Mine/device: PROM-1 AP Bfrag	Ground condition: rocks/stones route/path wet
Date record created: 15/02/2004	Date last modified: 15/02/2004
No of victims: 2	No of documents: 2

Map details

Longitude:	Latitude:
Alt. coord. system: XK 7738 2200	Coordinates fixed by:
Map east:	Map north:
Map scale: Jajce 25831	Map series: M709
Map edition: 6 DMA	Map sheet: WGS 84
Map name:	

Accident Notes

inadequate communications (?)
inadequate training (?)
safety distances ignored (?)
inadequate area marking (?)
protective equipment not worn (?)

Accident report

A Board of Inquiry report was ordered by the country MAC and carried out by representatives of the regional MACs and an ex-pat Technical Advisor. The report was made available and the following summarises its content. The original BoI report is reproduced under *Related papers* at the "Other documents" tab (edited for anonymity).

Work began at the site on 1st June 1998 and had progressed "slowly" - partly because of deteriorating weather. The site was more than 10km long on which "several" sites were being worked from a single Control Point. It was the first operational task for a team of recently trained deminers.



The photograph above shows the area of the accident.

The accident occurred on an overgrown and disused track between lines of trees. The ground was described as "rocky and broken". The area was being prepared for the use of dogs, so lanes were being cleared to make grids [providing safe lanes for the dogs in a manner that allowed more than one dog team to work simultaneously]. Three PROM-1 mines had been found in the area (two without fuses). Other mines found included PMA-3s and TMRP-6 & TMM-1 AT mines. The original minefield record indicated that the PROM-1 involved in this accident was the last remaining in the part of the site being cleared.

The demining group were ready to start work at 08:40 but bad weather prevented work until 11:30 when the teams deployed. The two victims left the rest area but "no witness was able to provide a clear indication of the[ir] intentions". It was thought likely that they had gone to carry out a reconnaissance of the area where new grids would be made for the dog runs. They appear to have walked directly to the accident site, stepped deliberately over the edge of lane markings and initiated the mine. Neither victim was wearing protective clothing.

At the time of the detonation, the nearest other working deminer was 150 metres away. The Team Leader was off-site collecting explosives. The ex-pat monitor/advisor usually at the site had just started his leave. No one saw what happened.

The baseplate of a PROM-1 was found at the bottom of a crater at the site. A tripwire was found going to the crater but the investigators could not determine whether the mine was set off by the tripwire or by direct pressure. A second, smaller crater at the accident site implied that a "small blast-type" mine may have also gone off in the accident. No parts of it were found.

The investigators noted that "witnesses were confused and unclear...documentary evidence and statements were not available" when wanted, and that the Team Leader was not available at the Task Site during the investigation.

During their inquiries they determined that while the marking in clearance areas was adequate, "marking at the site could be improved generally". The HF Codan radio could only

contact one other station. A sat-phone was on site, but no log of usage and communications conformation was available. The sat-phone was used to make the initial report of the accident.

A deminer stated that he heard the explosion and went to the assistance of the victims but had to return to the safe area for a prodder before checking around them. He thought they were breathing. Another deminer then helped him carry the victims to a safe area where a medic was waiting.

The medic said that when he arrived Victim No.2 was "bleeding very much". He had "no blood in his head". His pulse was weak and he was in "coma". "I give him rebreeding and he breed very slowly". His left hand was "really destroyed" so he bandaged it to try to stop the bleeding. He also tried to stop the bleeding on the victim's left leg but could not do so because the bleeding was "too strong". The medic went with him to the hospital and twice "gave him rebreeding" and he was alive on arrival. On his return he met the other vehicle with Victim No.1 but he was dead.

Another medic said that he treated Victim No.1. When he removed his overalls he found "big injuries" on his right leg and many on stomach". He was also injured on his arms and had a large "injury on left side of face. Within two minutes his heart stopped. The medic said he "tried with rebreeding" without success. Victim No.1 died at 11:50.

Conclusion

The investigators listed conclusions including many observations outlined above. Most significant were the conclusions that QA site visits were inadequate, and that discipline was "not of a high standard".

Recommendations

The investigators recommended that site discipline should be improved, that deminers at the site should undergo a period of retraining, that protective equipment must always be worn "when forward of rest areas", that an experienced supervisor should be at the site, QA visits should be increased, marking should follow SOPs and the information from the MAC database should be used properly.

Victim Report

Victim number: 270	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 55 minutes
Protection issued: Frag jacket	Protection used: none
Helmet	
Short visor	

Summary of injuries:

INJURIES

severe Arms

severe Body

severe Chest

severe Face

severe Leg

FATAL

COMMENT

See medical report.

Medical report

A brief medical report from a British Army hospital stated that Victim No.1 had arrived at the hospital at 12:25. "He had suffered penetrating chest and abdominal injuries, extensive injuries to his right femur, both right tibia and fibula were exposed and obviously shattered. He had also sustained injuries to his left lower leg and left arm. Resuscitation was not appropriate therefore not commenced."

Death was confirmed at 12:30. The certificate issued did not attribute a particular cause.

The site medic made a statement in which he wrote:-

"When I heard tha somebody has accident I took my medical equipment and run to the place of accident. The bring first [Victim No.1] I start with help. I took off his overall and I have seen big injuries on right leg and many on stomach. He has injuries on arms and big injuryies of left side of face and fragment ws on a way to the brain. I see all this in two minutes. His heart has stopped and eyes have no reaction. I tried with rebreeding but nothing. [The Victim] die 11:50."

Victim Report

Victim number: 271	Name: Name removed
Age:	Gender: Male
Status: supervisory	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 40 minutes
Protection issued: Frag jacket	Protection used: none
Helmet	
Short visor	

Summary of injuries:

INJURIES

severe Arm

severe Body

severe Eyes

severe Legs

AMPUTATION/LOSS

Arm Below elbow

Eye

FATAL

COMMENT

See medical report.

Medical report

A brief medical report from a British Army hospital stated that Victim No.2 had arrived at the hospital at 12:10. "On arrival he had suffered a penetrating injury to his left orbit. Amputation of his lower left arm, severe injuries to his femur and groin area. On examination he was not breathing. He had no cardiac output and had obviously suffered massive blood loss.

Resuscitation was commenced immediately. IV access and intubation were attempted without success. The Heartstart Monitor showed Asystole, three shocks were given 200kj, 200kj, 360kj, with no change in rhythm. CPR was continued for fifteen minutes. His pupils remained fixed and dilated throughout."

Death was confirmed at 12:25. The certificate issued did not attribute a particular cause.

Analysis

The primary cause of this accident is listed as a "*Management/control inadequacy*" because the group's management allowed work to continue without adequate supervision.

The most senior supervisor left on the site was one of the victims, and he was in breach of several basic SOPs. The secondary cause is listed as "*Inadequate training*" because the group's management had not ensured that the sub-contracted supervisors were adequately skilled or appropriately trained.

Related papers

A letter from the Federal MAC observed how the lack of discipline was a contributory factor and called it a "soft" operation, suggesting that more "purposeful" visits enforce discipline.

Other documents in the Accident file included a site plan, detailed sketch map, highly detailed reference maps, some statements without translations, photographs of the site and crater, past monitoring reports and the relevant (detailed) database and GIS information. The sketch map appeared to show that the victims were only just outside the cleared area. The past monitoring reports indicated that heavy rain reduced productivity, along with previous "false reporting".

Original Bol report

What follows is the original Bol report, edited for anonymity.

REPORT OF BOARD OF INQUIRY INTO ACCIDENT 19 OCT 1998

23 October 1998 [Annexes were not made available.]

References:

Map WGS 84 2583-1 M709 Edition 6-DMA – Jajce.

MAC SOPs dated June 1998.

MAC Technical and Safety Standards, to amendment No. 4 Dated 27 June 1998.

INTRODUCTION

1. As a result of a mine accident on the morning of Monday 19 October 1998, a Board of Inquiry was convened by the Bosnia and Herzegovina Mine Action Centre to investigate the accident on behalf of the Government and in accordance with the National Technical Standards.
2. The Board comprised:
 - a. Chairman - BH MAC.
 - b. Member – Senior Technical Adviser, Federation MAC.
 - c. Member – Leading supervisor, Norwegian Peoples Aid.
 - d. Member – Ops Officer, Fed MAC Regional Office Sarajevo.
 - e. [Name excised], representing Federation MAC Regional Office Mostar was present throughout the Board of Inquiry investigation and interviews. Interviews were conducted at the task site and at the UNHCR office Jajce.
3. This report is written in compliance with the instructions contained in the Terms of Reference provided by BH MAC, from the National Technical Guidelines. A copy of the Board's Terms of Reference is attached at Annex A.
4. The Board of Inquiry experienced some difficulty in gaining a clear picture of the circumstances of this accident. Witnesses were confused and unclear in their responses to the Board's questions. Documentary evidence and statements were not available until the Inquiry was almost completed and the Team Leader was not available to the Board during the inquiry at the task site.

SEQUENCE, DOCUMENTATION AND PROCEDURES OF TASKING

5. This team were tasked by [name excised], through the MAC Regional Office in Mostar. This Task was MAC Number 1409.
6. Tasking from the Mostar Regional Office to the team was formalised by an undated operations order from Regional Office Mostar.
7. MAC holds information for this area and for areas close to this task site. MAC Information shows evidence of mined areas and of PROM-1 mines laid within the area of this task site. The team had this information at the task site and some aspects of it were transposed to maps and diagrams displayed on the wall in the site office.
8. The team started work at this site on 1 June 1998. Progress at the site had been slow, in part the result of deteriorating weather.

GEOGRAPHY

9. Accident occurred near the village of Sahmani, at Grid Reference XK 7738 2200.
10. The task site is inside the zone of separation, between SFOR Routes Hornblower and Bluebird, approximately 9 Kilometres from Mrkonjic Grad. Access to the area is from Route Hornblower.
11. The task site encompasses several task areas, all of which are controlled from one Control Point. The total minefield task is more than four kilometres long and includes at least ten recorded mined areas. A sketch plan of the site is shown at Annex B. Photographs of the site are shown at Annex D.
12. The part of the task area where the accident occurred is on what used to be an unmade road, between two lines of trees and now completely overgrown. The ground is rocky and broken. The surrounding parts of the task site are sloping, grassed areas, interspersed with bushes and trees.
13. The part of the task site where the accident occurred is marked as "Detail C" on the sketch that was part of the original minefield laying record. This is shown at Annex G.

PRIORITY OF TASK

14. Priority for clearance in this area is high due to the number of displaced persons and refugees returning to the village of Sahmani. The area is a [demining group and UN] priority.

SITE LAYOUT AND MARKING

15. A plan of the site is attached at Annex B showing the areas of clearance. Marking in clearance lanes was adequate. Marking at the site could be improved generally.
16. The nearest clearance lane to where the accident occurred is 31 metres away from the point of explosion. The nearest working deminer at the time of the explosion was approximately 150 metres away.
17. Members of the Board noted the absence of disturbed vegetation in the uncleared areas of the site, except for the line of trodden grass made by personnel involved in the evacuation of the casualties.
18. Clearance areas nearest to the point of explosion were being cleared in preparation for the arrival of dogs at the site. This meant that the area was being divided into gridded areas, with one-metre wide clearance lanes between each gridded rectangle.
19. The Control Point for the team is situated approximately four hundred metres from the site of the accident, this is the closest road access to the clearance lanes. The CP is on the outskirts of the village. The clearance areas are on agricultural land associated with the village.
20. Part of the Access Route from the Control Point to the clearance lanes is along a road through one side of the village.
21. Marking of the area between cleared and uncleared areas is by use of red-topped stakes. Plastic minefield marking tape is fixed between the stakes.

SUPERVISION AND DISCIPLINE ON SITE

22. The Team Leader, [name excised] was not at the task site at the time of the accident because he was at the local SFOR base, collecting explosives.
23. Senior Technical Adviser from MAC Regional Office Mostar, [name excised] states that he or the Regional Manager visited the site approximately once per week. His last recorded visit to the site was 13 October 1998.
24. An International (Netherlands) Supervisor, Warrant Officer [name excised] is normally at the site during working hours. [The Warrant Officer] was not at the site on the day of the accident because he departed for leave on 10 Oct 1998 and will return on 26 Oct 1998.
25. No diary or logbook was available to record visitors at the site.

QUALITY ASSURANCE

26. Part of the Quality Assurance process at this site is the presence of an International Site Supervisor, as stated above. The role of the International Supervisor is to ensure that the team carries out the work to MAC standards, particularly with respect to working methods, safety and effectiveness.
27. A total of four MAC monitoring visits have been reported to this site during the last five weeks. No demining was taking place during a visit at 1515hrs on 15 October 1998 because the team was not at the site. No demining was taking place due to adverse weather conditions during visits on 14 September and 14 October.

COMMUNICATIONS

28. When at work on the task site area, each Section Leader has a hand held VHF radio and is able to speak direct to the Team Leader. A total of ten Motorola VHF radios are on the site for this purpose.

29. A vehicle-mounted Codan HF radio is at the site. This radio is used only to speak to the [demining group] team at Vitez. Team members state that it has not been possible to communicate with any other station using the Codan radio.
30. A satellite telephone is at the site. This is checked daily by a call to Mostar Regional Office. No communications log was available at the site to confirm communications checks or traffic.
31. The accident was reported to MAC Regional Office Mostar over the satellite telephone. Regional Office Mostar informed the medical centre at the local British SFOR base that casualties would initially be evacuated there.

MEDICAL

32. A medic was at the site at the time of the accident, equipped with a comprehensive medical and trauma kit. An ambulance vehicle was also at the site.
33. Deminer [Victim No.1] died from injuries sustained in this accident. It is reported that he sustained substantial injuries to his limbs and penetrating injuries to his upper body. Death occurred very shortly after the explosion.
34. Section Leader [Victim No.2] died from injuries sustained in this accident. Injuries were to his left arm, left leg and to his groin area.
35. Medical reports are shown at Annex I.
36. Casualty Evacuation after the accident was reported as successful. Both deminers were accepted into the nearest medical facility and attended by a doctor within one hour of the time of the explosion.
37. No ambulance was at the site during the Board of Inquiry. A demining vehicle was substituted for the ambulance during the clearance of areas required for the Board of Inquiry.
38. The date of the last CASEVAC rehearsal is not clear. Team personnel estimate it to have been six to eight weeks ago. No formal record of CASEVAC practices was available at the task site or at the Jajce office. A MAC monitoring visit report on 14 September recommended that, due to the known presence of PROM mines on the area, CASEVAC should be practised once per fortnight rather than the normal once per month stated in SOPs.

PERSONALITIES INVOLVED

39. Team involved in the accident was Team No. [demining group] Team 2. Demining team personnel involved in this accident are shown below.
 - a. Team Leader (Appointed August 1998)
 - b. Section Leader Deceased.
 - c. Deputy Team Leader
 - d. Survey Deminer
 - e. Survey Deminer
 - f. Deminer on hill
 - g. Deminer
 - h. Deminer
 - i. Deminer Deceased.
 - j. Medic
 - k. Medic

EQUIPMENT AND TOOLS

40. The two personnel involved were not carrying or using any tools at the time of the accident.
41. Metal detectors used in other areas of this task site are Guartel MD-8. Some problems near rocky outcrops were reported but otherwise metal detectors work well at this site. No detector was carried or used by the two personnel involved in this accident.

42. A PROM-1 mine could easily be found in this area using the available metal detector.

DETAILS OF MINE INVOLVED

43. It is possible that two mines were involved in this accident. The primary cause of the death of the two persons involved was a PROM-1. A smaller crater next to the PROM-1 crater suggested that a small blast-type anti personnel mine was laid next to the PROM-1. No debris from the suspected second mine was found by the Board. A diagram of the craters is shown at Annex F
44. The confirmed mine involved was a PROM-1, bounding Anti Personnel fragmentation mine. This was proved by the discovery of the mine's base-plate in the bottom of the crater. Photographs of the crater are shown at Annex E.
45. Three previous PROM-1 mines had been found at this task site, two without fuzes and the most recent found on 15 September. PMA-3 anti personnel mines, TMRP-6 and TMM-1 anti-tank mines had also been found by the team in this area.
46. Eight PMA-3 mines at this part of the task site were reported on the original minefield record.
47. The mine was laid vertically, in a conventional manner. A conventional tripwire, of the type issued with PROM-1 mines was laid next to the crater. It is the opinion of the board that this tripwire was originally laid with the mine. It is not clear whether the mine was activated via the tripwire or directly through pressure on the top of the fuze.
48. According to the record of mines laid in this area, most of the mines laid in this part of the task site had been cleared and this was the only remaining PROM in this part of the task site. The minefield record shows a further PROM in the adjacent sector at a distance of approximately 13 metres from the point of explosion.
49. All deminers in the area were aware of the existence of these mines on the minefield record. Minefield record is shown at Annex G.

EVIDENCE OF RE-MINING

50. There was no evidence or suspicion of re-mining at any part of the task site.

DRESS & PERSONAL PROTECTIVE EQUIPMENT

51. The deceased deminers were not wearing any personal protective equipment. No helmet or fragmentation-protective clothing was worn at the time of the explosion by either of the two personnel killed.
52. Each member of the Demining Team was issued with a helmet with a visor attached and a ballistic jacket.
53. Photographs of the Personal Protective equipment issued to the deceased deminers are shown at Annex H.

USE OF DOGS

54. No dogs had been used at any part of this task site. Preparations were being made for the use of dogs at the site in the near future.

DETAILED ACCOUNT OF ACTIVITIES ON DAY OF ACCIDENT

55. The following account summarises the responses to questions by members of the Board, directed to Supervisors, Team Leader and team members. Statements are shown at Annex C.
56. After a normal morning muster routine and daily briefing at the office yard in Jajce, the team arrived at the task site at approximately 0840hrs. Commencement of operations was delayed due to inclement weather and work did not begin until shortly before 1130hrs

57. [Name excised] was working in a clearance lane less than 100 metres from where the PROM was laid up to about ten minutes before the explosion occurred. At that time, Section Leader [Victim no.2] called [name excised] to the rest area.
58. After 2 or 3 minutes [Victims 1 and 2] left the rest area and moved forward, towards the area being gridded for dogs. They were not wearing any protective clothing or equipment at this time.
59. Deputy Team Leader was approaching the rest area and spoke to the two deceased deminers as they were leaving the rest area to move forward, towards the uncleared areas of the site. The issue of wearing Personal Protective Equipment was not raised. After speaking to them he moved in to the rest area.
60. No witness was able to provide a clear indication of the intentions of [the Victims] when they left the rest area. It was suggested that they could have been intending to carry out a reconnaissance of the area where new grids would be prepared as part of the future operations with dogs.
61. Timings indicate that it is likely that the deceased walked directly to the point of explosion, having apparently stepped over the marking tape indicating the line between the cleared and uncleared area at the edge of a clearance lane.
62. Team Leader arrived at the Control Point at approximately 1100hrs. He was at the site for about thirty minutes and left at 1130hrs to collect explosives from the storage at SFOR base Mrkonjic Grad.

SUMMARY

63. This accident happened at the beginning of a working week in an area where the team had been demining manually for more than four months. This was the first operational task for the team and immediately followed basic demining training. The area concerned is a very large minefield that requires substantial organisational and technical skills to be exercised by field managers and supervisors. Marking on the site was assessed by the Board as being no more than adequate. Management visits to the site were maintained at normal levels during the absence on leave of the International site supervisor. Information that shows PROM-1 mines had been laid in this area was available at the task site. Two trained deminers, one a section leader, stepped over a marking tape, into an uncleared area and walked unprotected and without technical equipment into an area that was known to contain a PROM mine, which caused their deaths.

CONCLUSIONS

64. Complacency may have been a contributing factor.
65. The two deceased deminers did not wear Personal Protective equipment and were not carrying any technical equipment.
66. Supervision at the site was the minimum for a task of this size.
67. Marking at the site should have been better.
68. QA visits to the site were insufficient and lacking due to poor timing or adverse weather conditions.
69. Available information about mines in the area was disregarded or used incorrectly.
70. Discipline at the site was not of a high standard, indicated by the failure:
 - a. To comply with SOPs such as standards of site marking and maintenance of a logbook.
 - b. To wear Personal Protective Equipment forward of a rest area.
 - c. To remain within marked cleared areas.
 - d. Of the Section Leader (Deceased) and Deputy Team leader to ensure that Personal Protective Equipment was worn.
 - e. To professionally manage post-accident activities.

RECOMMENDATIONS

71. The following recommendations are made from the Board of Inquiry.

- a. An improved disciplinary regime should be established on the site. All personnel appointed to positions of authority should be aware of their responsibilities and fully capable of carrying them out.
- b. The team should receive a minimum of one day's retraining in accordance with Standing Operational Procedures. At least the following subjects should be covered.
 - (1) Marking.
 - (2) Personal Protective Equipment.
 - (3) General safety rules.
 - (4) Leadership and discipline.
- c. All personnel should wear helmets and Personal Protective Equipment when forward of rest areas or whenever within the safety distance of operations.
- d. An experienced supervisor should be at the site to assist in the management of the task.
- e. Formal Quality Assurance visits to the site should be increased.
- f. Marking at the site should be in accordance with SOPs. The site should be re-established and all marking in all areas should be confirmed.
- g. Information from the MAC database should be used correctly.

Signed: Board members

ANNEXES (not made available)

Annex A	–	Terms of Reference.
Annex B	–	Sketch map of site.
Annex C	–	Statements of team members.
Annex D	–	Photographs of site.
Annex E	-	Photographs of crater.
Annex F	-	Diagram of crater.
Annex G	-	Information from MAC Database.
Annex H	-	Photographs of Personal Protective Equipment.
Annex I	-	Medical Reports.

DISTRIBUTION

Director BH MAC

Director Federation MAC

[Demining group]

MAC Regional Office Mostar