

4-8-1999

DDASaccident208

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DDAS Accident Report

Accident details

Report date: 15/05/2006	Accident number: 208
Accident time: 16:20	Accident Date: 08/04/1999
Where it occurred: Between Burgici and Celarit, Nr Turija, Lukavac	Country: Bosnia Herzegovina
Primary cause: Unavoidable (?)	Secondary cause: Inadequate training (?)
Class: Excavation accident	Date of main report: 14/04/1999
ID original source: GR/RB/IP/MB/MF/NH	Name of source: BiH MAC
Organisation: Name removed	
Mine/device: PROM-1 AP Bfrag	Ground condition: agricultural (recent) bushes/scrub grass/grazing area trees wet
Date record created: 15/02/2004	Date last modified: 15/02/2004
No of victims: 1	No of documents: 2

Map details

Longitude:	Latitude:
Alt. coord. system: BQ 944 323	Coordinates fixed by:
Map east:	Map north:
Map scale: Gracanica WGS 84	Map series: M709
Map edition: 9-DMA	Map sheet: 2784 II
Map name:	

Accident Notes

inadequate training (?)
inconsistent statements (?)
partner's failure to "control" (?)
squatting/kneeling to excavate (?)

Accident report

The demining group involved in this accident were working in two-man teams using a one-man drill in which the same individual looked for tripwires, cut undergrowth, used the detector and excavated readings. The second deminer watched and "controlled" him, and after a set interval they changed roles.

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 demining site was a large area of agricultural land described as an area of "hilly meadowland with moderate slopes cut by several lines of trees and bushes". The vegetation in the meadows was very short (having died down for the Winter) and the ground wet with runoff from melting snow in places. The area had been burned in the previous year, and scorching of the trees was still in evidence. No records of known or recorded minefields in the area were available but a survey had shown that the area was mined. Work had started at the site in October 1998. Work on the task in hand began on 4th April 1999. The work had been done entirely by manual demining, although preparation for the use of Explosive Detecting Dogs had begun.

The accident occurred in an open corner of the site with a dirt road 100 metres to the North and a line of trees and bushes "directly adjacent". The weather was cloudy but dry and the temperature about 15°C. The victim was using a Schiebel AN 19/2 detector.



[The photograph shows the accident site.]

The site was supervised by an ex-pat field Manager controlling four teams of eight deminers who each had a Team Leader present while they were working. An on-site Monitor was provided for each team by the Federation PIU.

The victim was "a qualified and experienced deminer" [a certificate attached to the report shows that he qualified at the end of April 1996].

The start of work was delayed on the working day because of a shortage of pickets, and work started at 11:00. Prior to the incident, two PROM-1 mines were found in the working lane. Both were laid with their "fuse heads exposed approximately 5 cm". They had been clearly visible from a distance "of approximately six meters". There were burned off tripwire stubs attached to their fuzes. The demining group did not destroy mines in-situ because of the metal contamination that would render manual demining more difficult and the vapour contamination that could adversely affect the deployment of dogs. The Team Leader had "neutralised" the mines by fitting "clothes pegs" [plastic clothes-pegs as improvised safety clips] and removed them from the site.

The victim was wearing an RBR fragmentation jacket, an RBR helmet and 6mm thick visor in good condition [it was 5mm thick when inspected by the researcher]. The victim had the

following tools in the lane with him: two-handed shears, a prod, a tripwire feeler, a trowel, a hammer, pickets and tape.

At 16:10 the victim changed roles with his partner and began work. His partner withdrew 30 metres. His partner saw him work with the Schiebel An 19/2 detector, put it down and kneel to prod. Then he put the prod aside. About 30 seconds later, at 16:20 [ten minutes before work was to stop at 16:30], the victim initiated a PROM-1 mine which "appears to have exploded directly next to his head and chest". He had not told his partner that he had found a mine.

The victim "received extensive injuries in the head, left shoulder and left side of the chest". The mine crater was in front of his end-of-lane marker by a few centimetres. His helmet was torn from his head in the blast - "the chin belt was ripped" - and was found five metres away. The visor was penetrated in twelve places. The helmet was damaged. The frag-jacket "was completely torn" with "piercings in the shoulder and chest area".

After the accident the victim was recovered by a medic and his partner and taken to an adjacent safe area. They treated the victim and called for the second medic who arrived five minutes later. The victim showed no sign of life. He was taken to the hospital at Tuzla and arrived at 17:00. "It is declared that he died at 16:20."

The investigators found that the site was adequately marked but found some shortcomings in its layout because the scrap metal pit was alongside the explosives store "which was freshly dug". The QA site Monitor considered discipline at the site to be "high".



[The photograph shows the victim's helmet. The picture below shows the victim's body armour.]



There were no up to date copies of either of the demining group's SOPs on the site in the Bosnian language. The deminers had a "handout" of an earlier version in their language.

The investigators found that the victim's detector was working properly. His tools and the end-of-lane marking stick were undamaged. The investigators could find no evidence of a tripwire but the mine's baseplate, "black powder bouncing charge tube" and initiation wire were

recovered from the crater. The mine had been in line with the previous finds in the lane. The cylindrical impressions left by these mines showed that they had not been excavated or remotely "pulled" prior to picking them up - and this was in breach of National Technical Standards. The mines were not destroyed at the end of the working day, but were stored in the explosives store with the "mine bodies and detonators together in the same box", which was another breach of National Technical Standards.

The Field Manager said that the demining work began at 10:30.

The Site Monitor said that demining work began at 11:00. Two teams were working at the time of the accident about 80 metres apart. The other two teams had stopped working because safety distances could not be maintained.

The Team Leader said that work started at 10:25.

The victim's partner said that work started at 10:45.

The medic said he started work at 10:30. When the accident occurred he attended the victim in the safe area and used "two packs of first aid bandages" to strap his head but knew that the victim "was already dead".

Conclusion

The investigators concluded that discipline of the "site management" and the Monitoring "should be improved" because several regulations from the National Technical Guidelines were "violated".

They found that the communications systems (based on "hand-held radios" and mobile telephones) worked well. They decided that it was possible that the victim had attempted to expose the mine by hand and that it had been rendered unusually sensitive by the burning or by climactic conditions. They recognised that it was also possible that he had tried to "neutralise or remove" the mine in breach of SOPs.

Recommendations

A lengthy list of the investigators' recommendations include advice to reconsider the BH MAC guidelines with regard to the neutralisation of the PROM-1 and of the stance in which it should be attempted when necessary (they recommended lying prone). They also recommended that the "Field Manager be retrained in his responsibilities", that the team involved should have a day of retraining, that the Monitor should be retrained and that deminers should communicate with their partner as they work.

Victim Report

Victim number: 268	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: DECEASED
Compensation: not made available	Time to hospital: 40 minutes
Protection issued: Frag jacket Helmet Short visor	Protection used: Frag jacket, Helmet, Short visor

Summary of injuries:

INJURIES

severe Chest

severe Head

severe Shoulder

FATAL

COMMENT

See medical report.

Medical report

No formal medical report was in the Accident file. The investigators described the injuries as "extensive injuries in the head, left shoulder and left side of the chest". The cause of death on a Death Certificate was translated loosely as "explosive destruction of head".

Analysis

The primary cause of this accident is listed as "*Unavoidable*" because it seems likely that the victim was working according to his SOPs when the accident occurred. Many (perhaps most) demining groups disarmed PROM-1s at the time, and the group intended to use dogs on the area so had a reason to want to avoid contaminating the area with metal fragments by detonating in-situ.

It is possible that the demining group was using inappropriate methods, which would have been a "*Management/control inadequacy*".

The secondary cause is listed as "*Inadequate training*" because the investigators recommended retraining for field management and the QA, implying that they felt there was a significant field management and QA failing. The posting of a permanent QA who then risks becoming "one of the boys" was criticised by some in the field.

Related papers

Other documents in the MAC file include a map of the working area and photographs of the accident site - showing the victim's helmet perhaps seven metres off to the right. The victim's tools are shown lying behind the end-of-lane marker. Among the tools were a sledge hammer and long handled shears.

Other photographs showed the crater in detail - with the base-plate visible and a picture of stored PROM-1s with their fuses separated in a sandbox. Pictures of the protective equipment showed the severely damaged helmet and a visor with at least 12 penetrations. The PPE was made available for inspection by the researcher.

The file also included a very detailed sketch of the accident site, a death certificate, statements from witnesses, and a crater examination report.

Original Bol report (prior to final edit)

Original Bol report marked up for final editing (and with names removed).

14 April 1999

REPORT OF BOARD OF INQUIRY INTO ACCIDENT 08 APRIL 1999

References:

A. Map, Series M709, Sheet 2784-II, WGS 84 Edition 9-DMA - GRACANICA

- B. MAC Technical and Safety Standards dated 17 June 1998
- C. BH MAC SOP No. 9 Render-Safe Procedures
- D. BH MAC SOP No.13 Accident Investigation
- E. [Demining groups' SOPs]

INTRODUCTION

1. As a result of a mine accident on 08 April 1999 a Board of Inquiry was convened by the Director of the Bosnia and Herzegovina Mine Action Centre (BH MAC) to conduct an investigation on behalf of the government, in accordance with the National Technical Guidelines. The initial report of this accident was received by telephone on 08 April 1999 at 16.45 hrs. An initial report in writing was not sent to the MAC.
2. The accident involved a de-miner of a [Demining group collaboration – two commercial companies working together, one ex-pat, one National] de-mining team who was conducting manual mine clearance on a [Demining group collaboration] task site near the village TURIIJA, municipality LUKAVAC. The de-miner died as a result of the accident.
3. The Board comprised:
 - Chairman (Fed MAC)
 - Member (BH MAC)
 - Member (Fed MAC)
 - Member (Fed PIU)
 - Assistant to the Board (Fed MAC)
 - In attendance (BH MAC)
 - Mr. [name excised], representing [Demining group collaboration] was present throughout the Board of Inquiry investigation including all interviews and visits to the task site on 09 April 1999.
4. The Terms of Reference of the Board are shown at Annex A.

SEQUENCE, DOCUMENTATION AND PROCEDURES OF TASKING

5. [The international demining company] was engaged to clear this site through a contract with the Federal Project Implementation Unit (Fed PIU) financed by the World Bank. [The local demining company] was a subcontractor of UXB.
6. The site comprises a large area of agricultural land. Work on this site started initially in October 1998. A Task ID number was requested by [Demining group collaboration] and the Fed MAC issued a Red Task Folder on 16 October 1998. The Task ID number given to this task is 1694.
7. The Red Task Folder did not contain any minefield records of the task area. The folder shows no known minefields in this particular part of the site. The folder was available on the site, in the possession of the field manager.
8. Through level 1 survey of the area it was known to the PIU that mines had been laid in this area.
9. The work on this particular part of the task site started on 04 April 1999.
10. Currently clearance is being done with manual de-miners only. The de-miners are preparing boxes for Explosives Detection Dogs (EDD). EDDs have not worked on this part of the task site yet.
11. There were no up-to-date [demining group] SOPs in Bosnian language on the site. The de-miners had a handout of an earlier version of the SOPs in Bosnian language.

GEOGRAPHY

12. The task site is located between the hamlets BURGICI and CELARI, 4 Km west of the village TURIJA, Municipality LUKAVAC. Grid Reference BQ 944 323.
13. The area consists of hilly meadowland with moderate slopes and cut by several lines of trees and bushes. The grass and vegetation on the meadows is down to ground level, in accordance with the time of the season. At places the ground is very wet, due to melting snow and poor drainage.
14. The area had been burned last year, fire marks are visible on the trees in the area.
15. The location of the accident is situated in the north-west corner of the task site, in an open area, bordered by a dirt road on the north, a line of trees and bushes containing several defense works and bunkers on the west, a small river to the south and a line of trees and bushes to the east. The area declines slightly from north to south towards the small river. The accident location is about 100 metres south of the dirt road, directly adjacent to the line of trees and bushes on the east side.
16. An overview of the site location is shown at Annex B.
17. Photographs of the area are shown at Annex C.
18. The weather at the time of the accident was cloudy but dry. Temperature was approximately 15 degrees Celsius.

PRIORITY OF TASK

19. The Tuzlansko-Podrinjski-Kanton and the World Bank prioritized clearance of this site. The land is vital to the local population for agricultural reasons.

SITE LAYOUT AND MARKING

20. The marking of the area consists of 1.2 metre high wooden pickets with red tops, connected by double red minefield tape, one just above ground level and one on 1 metre high.
21. Control point and medical area are clearly marked. The central rest area is located just outside the task area, the visitors parking and ambulance parking are also located here. A separate CASEVAC lane, marked with white (red cross) tape connects the medical area and the ambulance parking.
22. Some shortcomings in the site layout were noted. (There were no metal collection and explosive storage points) was replaced with "The metal collection point and the explosives storage point were on the same location". The explosives storage point was located in a hole in the ground, which was freshly dug. Overnight the explosives were stored in the rest area.
23. Locations of previously found mines were marked with yellow pickets.
24. Sketches of the site are shown at Annex D.

SUPERVISION AND DISCIPLINE ON SITE

25. On the accident site a de-mining team consisting of eight de-miners was at work, supervised by a team leader, [name excised]. The team leader is on the site whenever members of his team are at work. A field manager, [name excised] supervises the four teams at work on the task site. The field manager was present at the site at the time of the accident.
26. The company management considers discipline on the site very high. The de-miner involved was considered one of the most reliable of the team. The PIU site monitor confirms that discipline on the site was of a high order.
27. It is the opinion of the Board that discipline of the site management and site supervision should be improved. It is noted that several regulations from the National Technical Guidelines have been violated.

QUALITY ASSURANCE

28. In accordance with normal practice a Fed PIU site monitor was attached to each team on the site. The site monitor is present at the site every day when the team is at work and monitors the performance of the team on a daily basis. The monitor attached to this team is [name excised].
29. Fed MAC Regional Office TUZLA has inspected this team on this site six times in 1999. No inspection has taken place after the opening of this particular part of the site (04 April 1999). The inspection reports show that marking of the working lanes was not always up to standard, but in general there were no serious safety faults noticed.

COMMUNICATIONS

30. The on-the-site communications network consists of hand-held radios. The network is checked every morning before start of the work and regularly during the day.
31. The outside communications are covered by mobile telephone. Lines are checked every morning before start of the work.
32. Both communication systems worked well on the day of the accident. The field manager made all necessary contacts immediately after the accident.

MEDICAL

33. On the task site, two medics and two ambulances are deployed. One medic, [name excised] was situated in a medical area, about 100 metres away from the location of the accident. A CASEVAC lane connects the medical point and the ambulance parking, near the rest area, about 300 metres away from the medical point. Medic No. 2 was situated in support of another team on the opposite side of the task area.
34. The last CASEVAC exercise on the site was held on 02 April 1999.
35. On the occurrence of the accident de-miner No. 2, [name excised] and the team leader instantly moved to the place of the accident and recovered the victim from the working lane where he lay to the safe area directly behind it. Here the medic No. 1 arrived seconds later and started to apply first aid. Medic No. 2 was called in and arrived some five minutes later.
36. The victim received extensive injuries in the head, left shoulder and left side of the chest. He gave no sign of life after the explosion.
37. The mine appears to have exploded directly next to his head and chest.
38. He was recovered from the site and taken to hospital in TUZLA. He arrived at the hospital at. He was declared dead by at [sic].
39. A statement from the hospital and a copy of the Death Certificate is shown at Annex E.

PERSONALITIES INVOLVED

40. Personnel directly involved in the accident are members of the [Demining group collaboration] de-mining team involved and site management, as well as the PIU site monitor.
 - Field manager
 - PIU site monitor
 - Team leader
 - De-miner No. 2
 - Medic
41. Written statements of the persons involved are attached at Annex F.
42. The victim was a qualified and experienced de-miner. His certificate is attached as Annex G.

EQUIPMENT AND TOOLS

43. The team used a SCHIEBEL AN 19/2 mine detector in the lane. The detector has been removed from the site after the accident. The detector was checked before starting the works every day and regularly during the day. Testing by the Board confirmed that the detector was operational and that the use of detectors was possible on this location. It is noted that [the local demining company] only has six detectors for currently eleven teams at work, of which three were said to be deployed with this team.
44. Equipment found in the lane was: a prodder, two-handed shears, a tripwire feeler, a trowel, a hammer, pickets and tape. All equipment was located behind the de-miner on the moment of the explosion. All equipment was in good condition.
45. The working lane was marked with tape attached to the base stick, which was in place, undamaged.

DETAILS OF THE MINE INVOLVED

46. The mine involved was identified as a PROM-1. The mine was laid in a regular way. Tripwires might have been connected to the mine, but no remnants of tripwires were found on the spot. The base plate and other parts of a PROM-1 were recovered from the crater during the investigation.
47. Earlier two PROM-1 were found in the same lane in a regular pattern. The location of the mine involved is in line with the other ones. On the other mines remnants of tripwires were found, showing signs of burning.
48. On this site [Demining group collaboration] does not destroy PROM mines in situ, in order not to contaminate the area with shrapnel and explosives vapour. It is noted that the policy on the site is not to destroy mines in situ, unless they cannot be rendered safe. This is in contradiction with the National Technical Guidelines.
49. The earlier found PROMs were neutralized and removed from the minefield by the team leader. The team leader is the only person in the team that carries a safety clip for PROM mines.

The following was excised: "The Board suspects that, in violation with [demining group] SOPs not only the team leader but also the de-miners removed mines from the minefield".

50. Cylindrical impressions of the other two PROMs in the ground in the same lane indicate that they were not excavated, nor remotely pulled before removing, which is ["also" was deleted] in violation with the National Technical Guidelines.
51. The mines were not destroyed at the end of the working day. They were stored in the explosives storage point, mine bodies and detonators together in the same box. This is also a violation of the National Technical Guidelines.
52. The de-miners were aware of the possibility of finding another PROM-1.
53. [Name excised] (Fed MAC) made a crater examination. A report is attached at Annex H.
54. Photographs of the crater and the remnants of the mine are shown at Annex I.

EVIDENCE OF RE-MINING

55. There is no evidence or suspicion of re-mining at any part of this area. The mine involved exploded in front of the base stick, in the uncleared area. The line of PROM's is obviously related to the line of defensive positions on the west side of the field.

DRESS & PERSONAL PROTECTIVE EQUIPMENT

56. The de-miner involved wore a Kevlar helmet with visor, a Kevlar flak jacket, hand gloves and boots. The equipment was of good quality and had been in good order before the accident.
57. In the blast the helmet was torn off the victim's head, the chin belt was ripped, the visor was pierced on two spots and the helmet showed several impacts of which one had caused damage on the inside of the helmet. The helmet was found 5 metres away from the place of the accident.
58. The left shoulder of the flak jacket was completely torn, showing several piercings in the shoulder and chest area.
59. The gloves and boots were undamaged. It is unlikely that the victim wore the gloves at the time of the accident.
60. Photographs of Personal Protective Equipment are shown at Annex J.

USE OF EXPLOSIVES DETECTION DOGS

61. EDDs were to be applied on this site, but on this part of the site only preparations for dog use were ongoing at that time. EDDs had not worked on that part of the site prior to the accident, but had proven successful on other parts of the task site where they found several UXOs.

DETAILED ACCOUNT OF ACTIVITIES ON DAY OF ACCIDENT

62. The team had not worked the day before the accident.
63. The day of the accident commenced normal until the time of the accident.
64. At 08.30 the team meets at the base, where they have breakfast, check the equipment and communications and get their orders and the safety briefing. That day the team leader addressed the team about the probability of finding PROMs.
65. Normally the work on the site starts at 09.30, but this day the work did not start until 11.00 because there were no pickets available on the site. It is reported that this did not cause the team to hurry in order to make up for lost time. The work tempo was said to be normal.
66. At about 12.15 a PROM-1 was found in the working lane and was removed by the team leader.
67. The work was about to stop at 16.30.
68. At 16.20 the victim was at work in his lane. He had changed over with de-miner No.2 10 minutes earlier. De-miner nr.2 was located 30 metres behind the victim. He saw that the victim worked with the detector and then put the detector aside. After that he knelt down and he took the prodder and worked with it, and put it aside. After that some 30 seconds elapsed before the explosion occurred. There was no communication between the victim and the No. 2 de-miner to indicate that he had located a mine or what he was doing directly prior to the explosion.
69. Because the victim had placed the detector aside and had worked with the prodder it is assumed that he had located the mine. Possibly the victim felt his way to the mine with his hand, or he removed vegetation or earth from around the mine. In doing this he might have disturbed the mine or the detonator, which already might have been unstable because of the burning of the area or climatic influences. Previously found mines had been clearly visible from a distance of approximately 6 metres. The team leader had visually searched the area, using binoculars, at a distance of approximately 5 metres from the mine but had not seen it. There is no evidence that the de-miner tried to neutralize or remove the mine or that he deliberately touched the detonator, although there is a possibility that he might have manipulated the mine.

70. A copy of the team Logbook from 04 April 1999 on is attached at Annex K.

SUMMARY

71. This accident happened under normal working conditions, in an area where the de-miners were likely to find PROM-1 mines. There are indications of safety rules having been violated, but these may not have had a direct relation with the cause of the accident. The victim died as a result of the accident. Actions taken after the accident were appropriate and sufficient.

CONCLUSIONS

72. The accident happened under normal working conditions. There are no indications of any unusual influences or stress-factors.
73. The de-miners knew that they could expect to find a PROM-1. PROM-1s had been found in the same lane earlier.
74. The de-miner involved was qualified and experienced.
75. The mine involved was a PROM-1, placed in the field in a normal manner.
76. There is no proof of any safety rule having been violated by the victim, although there is a [the word "suspicion" was removed] possibility that the victim has, contrary to the SOPs attempted to neutralize or remove the mine.
77. The site management and supervision failed in their responsibility to maintain the technical and safety standards on the site.
78. Previously found mines were removed without excavating and remote pulling [the phrase "and probably without neutralization" was removed].
79. Mines were stored in an unacceptable way and were not destroyed at the end of the working day.

RECOMMENDATIONS

80. After an accident written initial accident report should be sent to the MAC, in accordance with the National Technical Guidelines.
81. The PROM –1 is one of the most difficult mines to neutralize. It is strongly recommended to destroy this type of mine in situ, unless local conditions prevent this. BHM MAC SOP-9 (Render-safe Procedures) should be reconsidered on this point.
82. Personnel neutralizing and removing mines in the minefield should always do this in a prone position, as far away from the mine as possible (at arm length). This prevents the personnel from bending over the mine and maximizes the chances of surviving an explosion. BH MAC guidelines should be reconsidered on this point.
83. No. 1 de-miners should communicate with No. 2 de-miners about their findings, during the de-mining in the working lane.
84. Only qualified personnel should be allowed to manipulate mines or UXOs in the minefield, in accordance with the company's SOPs.
85. Mines or UXOs removed from a minefield should always be neutralized, excavated and remotely pulled before removing, in accordance with the National Technical Guidelines and the company's SOPs.
86. Mine bodies and fuses should be stored separately and should be destroyed at the end of the working day, in accordance with the National Technical Guidelines.
87. The BH MAC has not accredited the SCHIEBEL metal detectors. It is recommended to use metal detectors accredited by the BH MAC.

88. Current company's SOPs should be available on every site.
89. The team involved should undergo a day of retraining. Special attention should be paid to safety rules and procedures after finding a mine. The team leader should undergo retraining in render-safe and demolition procedures. The site manager should be readdressed about his responsibilities for the organization and safety on the site.

Signed:

Technical Advisor Officer	Operations Coordination	Regional Manager	Regional
Supervisor Fed MAC	BH MAC	Fed MAC	Fed PIU

Annexes:

- Annex A: Terms of Reference
- Annex B: Overview sketch of site
- Annex C: Photographs of the area
- Annex D: Sketch of the site
- Annex E: Medical declarations
- Annex F: Written statements
- Annex G: Certificate of qualification
- Annex H: Crater examination report
- Annex I: Photographs of crater and mine
- Annex J: Photographs of PPE
- Annex K: Team logbook

DISTRIBUTION

- Director BH MAC
- Chief Technical Advisor BH MAC
- Director Federal MAC
- [International demining group]
- [National demining group]