

DDAS Accident Report

Accident details

Report date: 19/05/2006	Accident number: 351
Accident time: 07:50	Accident Date: 27/07/1999
Where it occurred: Obodni Kanal-S.Brod, Krecane village, east of Bosanski Brod	Country: Bosnia Herzegovina
Primary cause: Field control inadequacy (?)	Secondary cause: Management/control inadequacy (?)
Class: Missed-mine accident	Date of main report: 08/08/1999
ID original source: DG/AS/NH/R	Name of source: BiH MAC
Organisation: Name removed	
Mine/device: PROM-1 AP Bfrag	Ground condition: agricultural (abandoned) bushes/scrub grass/grazing area metal fragments soft
Date record created: 21/02/2004	Date last modified: 21/02/2004
No of victims: 3	No of documents: 1

Map details

Longitude:	Latitude:
Alt. coord. system: GR BQ 73509560	Coordinates fixed by:
Map east:	Map north:
Map scale: JNA	Map series: 3753
Map edition:	Map sheet:
Map name: 1:50,000	

Accident Notes

safety distances ignored (?)
vegetation clearance problem (?)
inadequate communications (?)
mine/device found in "cleared" area (?)
pressure to work quickly (?)

inappropriate vegetation cutting tool (?)

protective equipment not worn (?)

visor not worn or worn raised (?)

Accident report

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

INTRODUCTION

1) As a result of a mine accident on 27 July 1999, a Board of Inquiry was convened by the Bosnia and Herzegovina Mine Action Centre to conduct an investigation on behalf of the State and Entity governments, in accordance with the BiH National Technical Guidelines. The initial report of this accident received on 27 July 1999, is attached at Annex H. [Not made available.]

2) The accident involved the first of a three-section clearance demining team operation under the Pale-based [Demining partnership between an International and a local commercial] company. The demining site is situated in the village of Krecane, approximately twelve kilometres east of Bosanski Brod, and the operation had been initiated on 5 July 1999, its priority established at the request of the local community. The project was generated under the auspices of the World Bank.

The Board of Inquiry comprised:

- a. Chairman – QA Advisor BH MAC
- b. Member – Co-ordination Office BH MAC
- c. Member – Co-ordination Office BH MAC
- d. Member – QA Inspector RSMAC

A copy of the Board's Terms of Reference is attached at Annex A. [Not made available.]

SEQUENCE, DOCUMENTATION AND PROCEDURES OF TASKING

5) The [Demining partnership] demining team was on an authorized task assigned to them in accordance with a contract with the Federal PIU. The task Red Folder, MAC ID Number 1000141, was received on 22 June 1999 and work on the site started on 5 July. On the morning of July 27th, the clearance demining team was involved in clearing the general area between the southern edge of the minefield and the Sava River, at the location Obodni Kanal-S.Brod. The team was working in a general south-to-north direction towards the river, with Section No 1 operating at the eastern edge and Section No 3, the western side.

6) At 0550 hours on the 27th of July, the entire team (consisting of three sections of two deminers each, one paramedic, drivers and one Team Leader) had assembled and, according to the various written statements (included as annexes [not made available]), had received the safety brief in accordance with the main contractor's SOPs. The team then departed for the demining site and, following a verification of the equipment, it was ready to start work at around 0600 hours.

7) The clearance demining team worked between 0600-0730 hours, at which time team members were given a 15-minute break. Clearance demining work resumed at 0745 hours, and it was during the following four or five minutes that the demining accident occurred.

GEOGRAPHY and WEATHER

8) The accident occurred at the location Obodni Kanal-S. Brod, in the village of Krecane, 12 kilometres east of Bosanski Brod, on the southern side of the Sava River. The demining site is located at Grid Reference BQ 73509560 and is 50 meters in depth. General location maps of the accident site and area can be found at Annex B [not made available].

9) The area is covered with vegetation and partly contaminated with metal. There is a coffee bar in the near vicinity, which was under reconstruction at the time of the accident. The ground declines towards the Sava River, situated approximately 50 meters away from the accident site. Along the river there are trees 10 meters high. The ground is often flooded, therefore it is soft and humid, suitable for prodding work. The climate was sunny and clear on the morning of the accident.

10) Photographs of the area are shown at Annexes C and D. [Not made available.]

PRIORITY OF TASK

11) The priority for this task had been established through the normal process, i.e., initiated by the municipality and approved at entity level. The rationale for establishing the priority was 'agricultural', given the commercial vocation of the area immediately south of the minefield and the propensity of the Sava river to overflow in the springtime. In light of the height of the vegetation present in the area, it was identified as 'C' category of ground (see comment on 'productivity' under "Additional Site Investigation Information"). Work on the demining site was of course interrupted immediately following the demining accident, to allow time for re-training of personnel.

SITE LAYOUT AND MARKING

12) A detailed plan of the site and its access is attached at Annex C. [Not made available.]

13) The marking was in accordance with BH MAC Technical Standards; it was generally well maintained and suitably identified the cleared and uncleared areas.

14) The Control Point was located on the other side of the access road leading to the demining site. It was adequately organized, with clearly identifiable areas for EOD disposal and visitors' parking, and included special space for the ambulance vehicle.

SITE SUPERVISION AND DISCIPLINE

15) The [Demining partnership] demining team has several levels of supervision, consisting of a Site Monitor, Team Leader, Section Leaders and deminers supported by a paramedic. In addition, the MAC Regional Office and RS MAC inspectors carry out regular visits to the site. The Site Monitor was a recent arrival on the task, having started work on 22 July 1999.

16) The MAC RO inspectors visited the site twice (13, 26 July), and the RS MAC inspectors once (14 July), since the beginning of the mine clearance operation on 5 July. There were no adverse comments made on any of the three visits.

17) The spacing between section members, as determined by BHMALC during their visit to the accident scene, was not in accordance with relevant SOPs, at least as concerns Section No 1 which incurred the accident (eight metres only between Deminers No.1 and No.2, as compared to the required 50 meters).

18) The paramedic was at the Control Point at the time of the accident and capable of moving quickly to the medical point to receive casualties.

QUALITY ASSURANCE

19) Internal quality assurance is assured by the Site Monitor and the World Bank programme staff. RS MAC and MAC RO Banja Luka inspectors also carry out formal inspections of all sites. There were no relevant faults found during the three inspections.

20) On his arrival 22 July 1999, the Site Monitor had admittedly had to stop work because of a recognition of vertical cutting on the task. He stated that on resumption of work on 23 July, all was done iaw MAC SOPs, i.e. horizontal cutting only. This is highly arguable, however, as Board of Inquiry members evidenced signals of fresh vertical cutting on inspecting the site.

21) The previous Site Monitor did not report the presence of mines (including PROM-1s) in the Red Folder in the course of handing over to his successor.

22) The recorded productivity rate of some 68 square meters per day is significantly higher than the productivity norm promulgated by the BH MAC for Category C terrain.

REPORTING and COMMUNICATIONS

23) Communications on the site were assured using hand-held Motorola VHF radios and are deemed adequate; two radios are used by the clearance demining team, and one is held in the vehicle.

MEDICAL

24) The demining accident involved the team's No 1 Section (eastward lane). [Victim] No1 took the full blast of the PROM-1 mine on his face and died on the spot. [Victim] No 2, who had been standing approximately eight meters from his section co-worker, received heavy fragmentation from the mine on his throat and suffered heavy bleeding. He was given emergency first aid and transported to the ambulance for evacuation to the nearest emergency health care facility (Brod) and hospital (Doboj). He died of bleeding a few kilometres from Brod.

25) The injured Team Leader, [Victim No.3], suffered minor injuries to his back from the fragmentation of the mine. He was given first aid treatment and was later evacuated to the hospital in Doboj in the second vehicle. It has since been established that he was able to go home within 48 hours.

26) The accident occurred at approximately 0750 hours. A discussion with the paramedic led to the conclusion that he is a competent person who performed very effectively immediately following the accident (see Annex H). The CASEVAC also appears to have been conducted in a professional manner. The 85 kilometre drive to Doboj was accomplished in 55 minutes.

PERSONALITIES INVOLVED

27) The Project Manager is [name excised] and the QA Officer, [name excised]. The PIU Site Monitor is [name excised] and the Team Leader (Demining Team C-1), [name excised]. The other personnel directly involved in this task were:

- a. Deminer No 1/Section No 1, killed by activating the mine
- b. Deminer No 2/Section No 1, killed from fragmentation
- c. Deminer No 1/Section No 2
- d. Deminer No 2/Section No 2
- e. Deminer No 1/Section No 3
- f. Deminer No 2/Section No 3
- g. Paramedic
- h. Driver

28) Upon verification of the Log Books, it appeared that all members of the [Demining partnership] demining team, as well as the paramedic, had much experience in their respective trades. They had been trained in their duties on formal courses run by RS MAC in Banja Luka.

EQUIPMENT AND TOOLS

29) The equipment and tools used by the demining team, as shown to Board members on site, consists of a metal detector (type EBINGER 420, accredited), prodder, trowel, shears, helmet and visor, and protective jacket. It is deemed adequate (the detector worked fine on inspection), however, it appears evident that the personal protective equipment (PPE) was not being worn at the time of the accident, for reasons which are explained further down in the report.

30) Moreover, with regard to tools, the police report (see Annex L) indicates that next to the deceased Deminer No 1 were, amongst others, a damaged metal detector; a prodder and; shears for cutting vegetation. The Board did not find the shears, however, but only the tools described on the blast site sketch and accompanying photographs (see Annex D) [not made available]; this would indicate that the site had been tampered with prior to the Board's arrival. Finally, there was clear evidence of recent vertical cutting of branches, which indicates that a small hatchet was still being used for vertical clearing at about the time of the accident.

DETAILS OF MINE INVOLVED

31) The mine involved in the death of the two deminers was a PROM-1, bounding anti-personnel fragmentation mine. It was possible to recover the base plate and the black-powder fuse rod in the course of the site investigation work. These items were bagged and are presently held in the AD Co-ordination Office at BHMIC Sarajevo.

EVIDENCE OF RE-MINING

32) The full mine pollution threat picture in the Bosanski Brod region is difficult to determine, however, there was no evidence or suspicion of re-mining at any part of the area. There are no minority returnees in the area whose presence might be objected to by the majority population.

DRESS AND PERSONAL PROTECTIVE EQUIPMENT

33) As mentioned at paragraph 29 above, there was clear evidence that deminers' PPE, while available in sufficient quantities, had not been worn by the two deceased deminers at the time of the accident. As can be seen at Annex D, both the protective jacket and the helmet/visor were found intact at the blast site by the Board, which would indicate that they were placed there after the fact.

DETAILED ACCOUNT OF ACTIVITIES ON DAY OF ACCIDENT

34) The following summarises the events on 27 July 1999, as understood at the time of writing the report and as reinforced by individual statements found at Annexes F, G and H:

- a. 0550 hours. The [Demining partnership] team was assembled in the Control Point area of the site location Obodni Kanal – S.Brod, situated in the village of Krecane, 12 kilometres east of Bosanski Brod; at this time, a detailed safety brief was conducted, detectors were tested and daily taskings were issued.
- b. 0600 hours. The demining team's three sections of two deminers each arrived at the task site, presumably donned their PPE and work commenced. Demining continued for 90 minutes, with the Team Leader visiting each section two or three times during that period.
- c. 0730 hours. A coffee break is called for a duration of 15 minutes. During that time, Deminer No 2 of Section No 1 informs his Team Leader that the area which the section is working in is heavily polluted with metal content. The Team Leader advises both deminers of that first section to pay particular attention to any signal and conduct careful verification with the detector, prodder, all the while keeping an appropriate distance between deminers.
- d. 0745 hours. Work resumes in all three lanes. The Team Leader recalls that in the following two or three minutes, he was particularly involved with the supervision of Section No 1; he claims that he forgot his measuring tape, went to retrieve it, came back to the site and saw Deminer No 2 of Section No 1 heading towards his PPE (presumably to put it on).
- e. 0748 hours. A detonation is heard; the Site Monitor recalls that he verified his watch which indicated this time precisely. The explosion resulted from the activation of a PROM-1 mine in lane (Section) No1. Deminer No 1 took the full blast of the mine in the face and died instantly. Deminer No 2, standing approximately eight (8) meters away from the blast, takes heavy fragmentation from the mine into his throat and neck area, resulting in profuse

bleeding. Neither deminer was wearing his PPE at the mine of the explosion; both were in the presumed 'cleared' area, more than likely proceeding to put on their personal gear and start work following the break. The Team Leader his back facing the blast site, takes some fragmentation in his lower back.

f. 0749 hours. Within the next minute, the paramedic reaches the blast site, ascertains that [Victim No.1] is dead and, having been notified verbally by [Victim No.3] that his injuries are not overly serious, turns his immediate attention to [Victim No.2]. The latter is given first aid and is quickly transported to the ambulance for evacuation to Brod (emergency health care) and Doboj (hospital care). A few kilometres from Brod, [Victim No.2] dies (from excessive bleeding) in the ambulance in the company of [the paramedic].

g. 0810 hours. The Site Monitor, having assured himself that CASEVAC procedures are effectively underway, orders all work on the demining site to be stopped and calls the police.

h. 0830 hours. BH MAC is informed of the accident, first by telephone and, briefly thereafter, by fax (Initial Report).

i. 1050 hours. BH MAC Board of Inquiry leaves Sarajevo for accident site.

j. 1445 hours. Board of Inquiry, having been met in Bosanski Brod by RS MAC Inspection Team/Board member, proceeds to accident site.

k. 1505 hours. Board of Inquiry arrives at accident site and begins investigation.

SUMMARY

35) Every circumstance surrounding this accident would seem to indicate that it was caused by the fact that Deminer No 2/Section No2, who had been last to work in the working lane before the break, failed to discover a PROM-1 mine while working with a metal detector and a prodder. The mine had been completely covered with soil (silt/sediment from the nearby Sava River). Deminer No 2 told his Team Leader during the break that the soil was polluted with metal, in response to which the latter had reminded his Section No 1 to be extra careful with procedures.

36) A failure to find the PROM-1 mine before the break proved fatal for both deminers, as the new No 1, who had been No 2 prior to the break, more than likely stepped on the mine unknowingly, in the presumed 'cleared' area, while both deminers were probably about to don their PPE before start of work.

37) There was a clear failure by Deminer No.2 to keep an appropriate distance ,i.e. at least 25 meters, from Deminer No.1.

38) It is obvious that, following the break, both killed deminers had entered the working lane without their PPE. They would have taken it off and left it near the working lane as they headed for coffee. Had Deminer No.2 been wearing his PPE, his life might have been saved (even at such a short distance from his section mate).

39) As mentioned earlier, there is evidence that, contrary to MAC SOPs, some site alteration had occurred between the time of the accident and the arrival of the Board of Inquiry. The tool list as described in the police report does not correspond to what the Board found on arrival. Parts of the equipment described in Annex L as having been used by the killed Deminer No.1, and specifically the shears and small hatchet for cutting vegetation, was absent and had presumably been removed from the site.

CONCLUSIONS

40) From the Board's findings, there is evidence that several actions contrary to normal and safe procedures were permitted to take place on this demining site and operation which, had they been stopped at an early stage, might well have served to prevent this tragic accident from happening. Namely:

a. There was a clear failure to keep appropriate distancing between deminers of the same team from the moment of entrance into a working lane.

- b. There was also a clear failure to enforce the procedural regulation requiring deminers to wear personal protection equipment (PPE) from the time of entrance into a working lane.
- c. There is evidence that vertical cutting of vegetation was allowed to take place until very recently.
- d. The accident resulted from a 'missed' PROM-1 mine, which henceforth lay in the 'cleared' area of the minefield. Given that the detector in usage was probably in good working order, it would appear that either the rate of productivity was too high under the circumstances, or that the warning during the break regarding the significant level of metal pollution in the accident area was not heeded appropriately.
- e. The acknowledged productivity rate for this demining operation was indeed significantly higher than that recommended for Category C (high grass) ground.
- f. There had been two RO MAC and one RS MAC Quality Assurance inspections of this site since the beginning of the demining operation, i.e. 5 July 1999, and none of the follow-up reports reported any procedural discrepancies from MAC SOPs. While this is plausible in light of the manner in which demining operations are allowed to anticipate inspections, it is difficult to rationalize why at least the concerns related to productivity and vertical cutting would not have been picked up as noteworthy.
- g. There was evidence from the police report of site alteration between the time of accident and the arrival on site of the Board of Inquiry.

RECOMMENDATIONS

- 41) Following from the above conclusions, it is recommended that:
- a. Given that the flagrant disregard of such a fundamental and common-sensical procedural regulation as the appropriate minimum distancing between deminers constitutes in the Board's view a gross deficiency in supervision at all levels (in this case being the direct cause of a second death), the concerned company be given a written and recorded notification of dissatisfaction in that regard.
 - b. The concerned company, in the letter referred to above, be also reminded that the issue of the wearing of protective equipment is also fundamental and common-sensical, and that it must apply to anyone entering a 'working' demining lane, whether "at work", "preparing for work " or otherwise.
 - c. The utilization of vertical cutting tools for mine-clearance related purposes be discouraged aggressively as part of Quality Assurance (QA) inspections at all levels, whether Regional, Entity or National.
 - d. In light of the endemic nature of the 'productivity' issue, which can only get worse with the declining economic rewards associated with demining operations, consideration be given to educate more specifically and formally all concerned within the demining community as to the dangers of dissociating productivity from quality and safety.
 - e. The QA inspectors' community be strongly encouraged to adopt a more forceful and precise attitude in the deliverance of their responsibilities and, as a corollary, it be given the necessary authoritative clout to make this possible.
 - f. After an accident, the site be immediately closed and no one be permitted to approach it until requested to do so, or following clearance of the site, by the investigation team.
 - g. Finally, in light of the above, the concerned company be made aware of BH MAC's general dissatisfaction with its modus operandi on this site and, failing rapid and noticeable improvement, the question of its continued and/or renewed accreditation be presented to the company's attention as a reminder of that dissatisfaction.

Signed by all BOI members

Victim Report

Victim number: 446	Name: Name removed
Age:	Gender: Male
Status: dog-handler	Fit for work: DECEASED
Compensation: not made available (insured)	Time to hospital: not recorded
Protection issued: Frag jacket Helmet Short visor	Protection used: none

Summary of injuries:

INJURIES

severe Face

severe Head

FATAL

COMMENT

Victim died immediately. No medical report was made available.

Victim Report

Victim number: 447	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: DECEASED
Compensation: not made available (insured)	Time to hospital: 55 minutes ?
Protection issued: Frag jacket Helmet Short visor	Protection used: none

Summary of injuries:

INJURIES

severe Neck

FATAL

COMMENT

Victim died in the ambulance on the way to hospital. No medical report was made available.

Victim Report

Victim number: 448	Name: Name removed
Age:	Gender: Male
Status: supervisory	Fit for work: yes
Compensation: not made available (insured)	Time to hospital: 55 minutes ?
Protection issued: Frag jacket Helmet Short visor	Protection used: not recorded

Summary of injuries:

INJURIES

minor Back

COMMENT

No medical report was made available.

Analysis

The primary cause of this accident is listed as a "*Field control inadequacy*" because the investigators found that basic safety procedures were being breached at the site with the knowledge of the field controllers.

The secondary cause is listed as a "*Management/control inadequacy*" because there seems to have been pressure to work quickly and break the MAC's rules regarding the use of axes, PPE and safety distances. Senior management should have been aware of this and must be held responsibly for the adequate direction of field supervisors.

Although the ground was metal contaminated, the PROM-1 mine is a large target for both detector and prodder and could not have been missed if appropriate procedures had been properly enforced.

The poor quality and/or lack of the authority of the independent QA inspectors in this theatre had been frequently raised in accident investigations at this time.