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DDAS Accident Report

Accident details

Report date: 10/03/2004	Accident number: 403
Accident time: 09:12	Accident Date: 05/03/2001
Where it occurred: Veli village, municipality Berkovii, Nr Stolac	Country: Bosnia Herzegovina
Primary cause: Field control inadequacy (?)	Secondary cause: Management/control inadequacy (?)
Class: Missed-mine accident	Date of main report: 09/03/2002
ID original source: VMM, RB	Name of source: RS MAC BiH
Organisation: Name removed	
Mine/device: PROM-1 AP Bfrag	Ground condition: rocks/stones grass/grazing area
Date record created: 06/03/2004	Date last modified: 09/03/2004
No of victims: 1	No of documents: 1

Map details

Longitude:	Latitude:
Alt. coord. system: GR: y=98602 x=65335	Coordinates fixed by:
Map east:	Map north:
Map scale: not recorded	Map series:
Map edition:	Map sheet:
Map name:	

Accident Notes

inadequate area marking (?)

visor not worn or worn raised (?)

protective equipment not worn (?)

Accident report

What follows is the original Board of Inquiry report, edited for anonymity.

BOARD OF INQUIRY REPORT - DEMINING ACCIDENT MARCH 5th 2001 March 9th 2001.

References: RED FOLDER ID 1000367, BH STANDARD

INTRODUCTION

1. In regard of the demining accident due to which a deminer [the Victim] got killed on the task Velis ID 1000367 where NGO [Demining group] conducted demining. A Board of Inquiry was convened on behalf of the BH MAC to state the circumstances of the accident. The accident occurred March 5th 2001 in the vicinity of the Veli village, municipality Berkovii. First phone report was received from Mr. [name excised], RS MAC operations, March 5th 2001 at 10,15 hrs, while the Initial [Demining group] Report was not delivered to MAC but taken directly from [Demining group] facility from the site supervisor Mr. [Site Supervisor], March 8th 2001.
2. In relation with ID 1000367 – Veli location, [Demining group] Pale team started to work on February 2nd 2001. They have started operations from the N/E. In the part of the landmark toward the T2 (shown on the sketch) the task to be cleared is bordering with previously cleared task ID 1000244, which was also cleared by [Demining group] Pale team during February and March 2000. There was a leave within the team from February 23rd until March 1st, when the team came to Veli and commenced operations as usual.
3. The members of the Investigation Board were as follows:
 - a. Chairman - BHMAL QA officer
 - b. Member - BH MAC
 - c. Member - RS MAC Inspector
 - d. Member - RO F MAC Mostar Inspector
4. The Board of Inquiry joined together March 6th 2001 at 10,30 at location Velis , ID 1000367.

SEQUENCE, DOCUMENTATION AND PROCEDURES RELATED TO THE TASK

5. Regarding RS MAC Pale, the Velis ID 1000367 has been re-opened on March 23rd 2001 while the works started on February 2nd 2001. It is a continuation of the task that has been closed and a new one is opened. Three sections of [Demining group] Pale team worked on this task, including 18 deminers, three team leaders and a supervisor. The work continued until February 23rd when the [Demining group] team got their leave. The work continued after the leave on March 2nd.
6. The Red folder contents and the General survey report contain a minefield record with three rows of PMRA-2A and PROM-1. The team mentioned already found and destroyed in situ one PROM-1 mine in the year of 2001. The conductor of works was familiar with all the mentioned documentation.

GEOGRAPHY AND WEATHER

7. The accident occurred on the area within the task ID 1000367, village Velis location, municipality of Berkovii. It is an area close to the IEBL (Stolac town). Landmark grid references were y=98580 x=65206, datum point grid references were y=98602 x=65335. Task sketch for the grids of all the turning points is provided in Annex B.
8. The area is rock-strewn (Herzegovina conditions), with fallen grass between stones, including variations in the area slopes (shown at photographs in Annex C). Annex B also

contains the sketch of the task and the place of the accident, as with conditions found by the BH MAC Bol. [Annexes were not made available but some pictures were.]

9. After the leave, the work continued March 2nd 2001. Weather was windy and rainy prior to the accident, which resulted in stopping the works. On the day of the accident the weather was bad with a very strong wind.

10. The photographs of both the area and the site of the accident, with all the tools and equipment found near the accident site, are attached as Annex C and were all taken by the Board of Inquiry. There are no police photographs taken on the site.

PRIORITY OF THE TASK

11. Setting priority for this task has been conducted using the usual procedure, i.e. from the municipality upwards to the Entity levels. Minefield continuously stretched between the FWF. Parts of this minefield were cleared before by both commercial organizations and NGOs. The priority to this task was given by RS MAC with the aim for encouraging the return of refugees and displaced persons as well as diminishing mine threat for the inhabitants of Velis village.

TASK SITE LAYOUT AND MARKING

12. Task site layout with all the administrative areas is set according to the BH Standard. Access lane leading between the administrative areas and the datum line is marked with 1.2 m white tipped pickets with no tape attached (access lane through cleared / safe area). The place in the working lane that was reached the previous day is marked with crossed 0.5m white tipped pickets. This marking is in accordance with [Demining group] SOP but not with the BH Standard.



[The picture shows the mined area being worked on.]

QUALITY ASSURANCE

13. Internal quality assurance on the task was conducted through the visits of the program manager in SOP defined time schedule (at least once in every 7 days). These visits encompass the observations about the task, which is in accordance to the organisation's SOP. Programme manager was introduced with the hard working conditions on the site (both geography and weather), but he did not recommend cutting the working hours on the site. Internal Control documentation from the site is attached in Annex D. There are no data in this documentation about quality control checks on the cleared areas or about programme manager and supervisor visits to the site / lanes.

14. RO RS MAC had conducted external quality control inspections. There are documents proving two inspections conducted. First one occurred February 2nd 2001 when the activities commenced and when the company was introduced with the task. Second

inspection occurred February 7th 2001. From the documentation dated February 7th, it has been noted down that 5 PME-2A were found, as well as 1 PMA-3 mine and 1 MTKM 60P1.

15. It has been stated from the site diary that internal and external quality control checks found no faults or remarks related to the compliance to the [Demining group] SOP and BH Standard (Annex D). Metal detector check was conducted regularly (Annex D). [Photographs showed that the detector was the Guartel MD8.]

TASKING, REPORTING AND COMMUNICATION NETWORK

16. The task was issued to the [Demining group] demining company at their own request for deployment of their personnel in Southern parts of RS, since the conditions for work were much better during winter period, since the weather actually forced them to stop their task at the area of 'Djukisa potok ID 1000328 – Srpsko Sarajevo.

17. Reporting was conducted according to [Demining group] SOP; communication system was controlled and did function on the moment when the accident occurred.

MEDICAL COVERAGE

18. First day after the leave (March 2nd 2001) a MEDEVAC exercise was conducted at 10,00 hrs. During the activities, the medic on the site was located as close as possible to deminers in their working lanes, outside the control point, all in order to satisfy the condition that he can reach every deminer within maximum 5 minutes (control point did not allow this condition to be fulfilled).

19. The accident occurred at 09,12 hrs, while the medic was at the accident location within two minutes. The severely injured deminer was in a state of coma, with numerous severe injuries, with practically no breathing and very weak pulse. After resuscitation was conducted (releasing the mouth and tongue, very weak breathing, just as a result of a reflex), the medic tried to stop bleeding, put bandages and immobilize him. All this was ineffective since the injured deminer died at 09,28 hrs.

20. Annex E contains the medic's statement and the statement of the Trebinje hospital doctor about the injuries found. [This annex was not made available.]

21. Medical coverage suited the task and could not possibly do anything more in this case.

PERSONNEL INVOLVED

22. The deminer [the Victim] from [Demining group] team T-6-DS-1 Pale got killed in the accident that occurred at Velis site ID on March 5th 2001.

23. There were no other injured personnel.

EQUIPMENT AND TOOLS

24. The deminer who got killed had in his working lane the following tools and equipment (found by the board): metal detector-MD-8, prodder, grass scissors, garden shears, hammer, base stick and a protective jacket that was found, damaged by explosion as well as a helmet with a visor. One shrapnel broke through the visor. The Board of Inquiry found no spade amongst the tools.

25. The sketch in the Annex shows the exact location of each and every piece of equipment. [Not made available.]

26. Grass scissors and garden shears were in the working lane but there was no cutting vegetation to 5 cm or lower (photographs at Annex C). Vegetation did not disturb the work of the metal detector because it was mostly on the ground. During its search, the detector could locate at even less than 5 cm above the ground.

DETAILS ON EXPLOSIVE DEVICE INVOLVED

27. Mine that caused the accident was a PROM-1P, of a kind with a symmetric plate, which was found at the location of the explosion. Mine PROM-1P is a bounding fragmentation mine, which activates when it bounds about 20 cm above the ground.

28. Stepping on it with left foot activated mine. There was not even a crater, except for the part where the plate was found, since the explosion threw back the stones at the place of the bouncing. Only the powder tube is visible from the ground. Photo attached in Annex C.

29. The mine bounded under the angle of 80⁰ towards the cleared part of the working lane.

30. The mine itself was very well hidden between the stones. The same deminer worked in the parallel lane and he would have noticed it then since the vegetation was low on the ground.

EVIDENCE OF REMINING

31. There is no evidence on remining since it says in the minefield record (though not very precise one) that PROM mines were laid in rows.

CLOTHES AND PERSONAL PROTECTIVE EQUIPMENT

32. Upon entering the site the deminer had his protective equipment along with the helmet with a visor. The visor was transparent and new. The helmet and the visor were not on the deminer's head when the accident occurred (the Board of Inquiry found it in the cleared part). Only one shrapnel went through the visor, while the head has several injuries (3-4 shrapnels). The helmet and the visor had neither blood on them nor pieces of the cap the deminer had on his head. The cap was torn with several shrapnels and soaked with blood at the front part.

33. The right boot was torn from the inside with one shrapnel, at the very top of the boot. Though the Board did not see the left boot, as stated by the medic, the damages were done mostly to the toe part and leather part above it.

34. The protective jacket shows transparent holes at the upper chest part as well as at the left neck protection part. Crotch protection also contains visible shrapnel holes. (Photographs shown in Annex C).



[The picture shows some damage to the neck of the Victim's armour apron.]

DETAILED ACCOUNT OF ACTIVITIES ON THE DAY OF THE ACCIDENT

35. The weather on the site was windy. As stated during internal quality control checks conducted by the programme manager, breaks during operations were given more often due to bad weather and complicated terrain. The deminers led by the team leader [name excised] worked at the final location in pairs (3 deminers in working lanes, three deminers at the control point. First group worked from 08,00 to 09,00 with 5 minutes break on the cleared

area. There was a shift of deminers in the working lane at 09,00 hrs. As shown on the sketch, [deminer 1], [the Victim] and [deminer 2] entered the working lanes.

36. There was a 250 m distance from the control point to the working lane where the accident happened. Having into consideration the weather, the hard conditions on the ground and the distance, the deminers' shift could not have been performed but within the time scope of 5-7 minutes. Deminers started to work at 09,07 hrs. As to the written statement of the medic, the accident happened at 09,12 hrs. The medic's obligations on the site are defined in the sense of timing, which makes him more reliable person from the moment of the accident to his arrival to the hospital. The deminer who was located closer to the datum line was out of the working lane 'resting' when the accident happened. (09:12 hrs)

37. The injured deminer stepped on a PROM-1P mine at about 3.60m from the beginning of his lane, which indicates that he had 'cleared' about 4 square metres since he started to work.

38. The medic was on the accident spot within two minutes since he was located at the safe area, at the approximate distance of 100 m from each of the deminers in their lanes (that is why he was not at the control point because that would enable him to reach every deminer within 5 minutes). The medic stated death at 09:28 . The killed deminer was transported to the emergency hospital in Trebinje, where Dr. [name excised] prepared the death report.



[The picture shows the accident site. Photographs showing the victim's boot and what appear to be bits of the victim's leg were also made available.]

DEMINER'S ACTIVITES PRIOR TO THE EXPLOSION

39. Deminer had searched the working lane with his metal detector, having clearly marked the reached right border of his working lane. However it is obvious that he did not mark the left border of his working lane, i.e. he did not follow the metal detector search progress. He most probably had in mind to additionally mark the reached or 'searched' area. After searching the mentioned area with the metal detector without any signal that would indicate the presence of metal, he went back to the beginning of his lane, left the detector there, took two pickets, hammer and the base stick and went on marking the lane that was supposed to be 'searched' by the metal detector. The first picket marking the progress in the lane is 1.25m to the opposite one on the right side, which indicates that the base stick was not used, since the base stick is dimensioning the length of the working lane. He took with himself the second picket and the base stick. Prior to flushing the second stick into the ground he left his base stick in front of him. The area he was standing on was not searched. While flushing the second picket, the deminer stepped with his left foot on a PROM-1P mine. It is clear from the death records and the statements of the medic (they thoroughly examined the entire body), the deminer was in a position for flushing the 0.5m – 0.6m picket into the ground.

40. All these assumptions were motivated by the short period of time from when his work commenced until the moment of explosion, in comparison to the area searched. Metal detector was supposed to locate PROM according to the [Demining group] procedure. Then the mine was supposed to be identified by the prodder and the spade, as enough as sufficient to identify it. Then the team leader should have been notified about it and destroy it. (The prodder was not at the spot of the accident, but approximately 1.6m in front of it.) All the indications show that the PROM was not found, metal detector was not used within the lane, prodder was not close to the explosion site, and neither there was a spade in the working lane. Bad weather and the possibility to rest when they decide may diminished the caution.

The accident happened during marking procedure (flushing the picket in the working lane, no tape attached from the left side of the lane).

SUMMARY

41. The working lane where the deminer got killed was 3.60m long from its beginning towards the place of the accident. The right side of the working lane was properly marked with short pickets and the tape at the ground level. The tools found around the explosion spot are shown at the sketch in Annex B with drawn distances from the explosion spot.

42. Vegetation cutting tools were not used during the work in the lane (photographs in Annex C).

43. Marking of the left side of the working lane was not conducted in accordance with either BH Standard or [Demining group] SOP. When entering the working lane, it is spotted that the pickets were flushed at the exact distance of 1 m between them (the width of the lane), while the next picket on the left side is flushed at the width of 1.25m between them. The following left side picket was thrown from its original position by the explosion for about 2.1m into the contaminated part of the lane. The accident happened during the marking procedure of the working lane. The tape on the left side of the working lane is not damaged by shrapnels and it is probable that it was not in the lane when the explosion occurred.

44. In the very moment of the explosion, the killed deminer was holding in his hands the hammer and the picket and was positioned to flush the picket into the ground. This conclusion was extracted from the position of the body after the accident, the place of the picket, base stick, thrown picket and the analyses of the injuries.

45. Mine was activated by pressing the left foot on the PROM-1P mine fuse. The mine activated just above the ground level. The position of the leg torn by the explosion indicates that the mine exploded right behind the left leg (left boot damaged). The body was in the position for flushing the pickets into the ground (left hand holding the picket – 2nd and 3rd finger of the left hand amputated, while the hammer was in his right hand), which is indicated by the reports of both the medic and the doctor at the emergency hospital in Trebinje. In the moment of explosion, the base stick was placed in front of the deminer (in front of the mine that exploded – while the mine remained in the cleared area) at probably at the left leg boot. The location of where the base stick parts were found as well as the leg torn by the explosion stands for this fact.

46. All these facts indicate that the deminer was in front of the mine with both his feet and that the mine was skipped.

47. The time deminers spent working in his lane and the operations he was supposed to conduct according to the [Demining group] SOP indicate that the deminer was not working in compliance to the [Demining group] SOP procedures for work in the working lane.

CONCLUSION

48. The killed deminer did not comply to the procedures of searching the working lane with the detector and locating the given signal using his prodder and the spade. Metal detector is damaged (a shrapnel over the detector's halo head), but it was operational. It could have been quite efficiently used at this site. Provided it had passed over the mine with the halo head, it would have surely signalled the presence of the metal.

49. This all stands for the fact that the PROM was not located and the detector was not used in the working lane. There is no prodder nearby the accident site or a spade in the working lane (there is not a single deminer who would locate a PROM and leave it be for 20 seconds, forget it and then step on it.) Bad weather, possibility of taking breaks more than usual could have diminished the caution of deminers in the lanes.

50. The marking procedures were not conducted in compliance to the procedures of neither the [Demining group] SOP nor BH Standard. The marking is to be conducted during the search; it is not supposed to be conducted after the search. Provided the marking was conducted according to the procedure, the picket in the working lane could not have been

1.25m from the opposite one, since the base stick is the measure for the width of the lane and placing pickets. If the base stick was used, deminer would not have left it in the unclear area for flushing the picket into the unclear area.

51. In such conditions, having in mind the difficult terrain (huge rocky obstacles, slopes), bad weather, (strong wind), it is not efficient letting deminers rest as they wish in the cleared area instead of the area designated and marked for resting. It is not appropriate not to cut the working shift for the deminer but persistently leave him in the lane for entire hour.

52. If the team leader could see the deminer, he would have probably stopped the way he worked. He was supposed to organise his activities and location in order to have all his deminers on sight.

RECOMMENDATIONS

53. It is very often that the breach of procedures leads into an accident. Metal detector should be used in two sweeps over the ground without touching it, progressing for the half of the halo head.

54. Working lane marking is to be conducting during the searching procedures. The base stick is the border between the searched and unsafe area and is to be moved forward onto the area that is searched in accordance with the procedures. After two metres of search, short picket is flushed inside the searched area (the overlap).

55. Demining procedures are monotonous. It is very hard to keep a deminer concentrated for an entire hour without a break. At such hard areas and under such hard weather conditions it is not possible to either concentrate for an hour, let alone rest or move without the order given by the team leader.

56. (The rest upon deminer's decision). Five minutes break indicates that the time a deminer is spending in his working lane or operational part of the site should be shorter. The team's leadership allowed such way of conduct without cutting the time a deminer spends within the lane or the operational part of the site. [Demining group] is to comply with BH Standard request for the maximum of 30 minutes of work per deminer in the working lane (even less if necessary) and ensure each deminer a rest at the control point or area designated for rest.

57. This team has a supervisor and three team leaders regarding its managerial personnel. The BoI think that it is necessary to divide the operational and the supervision function over this team.

58. It is necessary to re-train the team regarding the basic procedure in the working lane, especially at area similar to the one where this task was conducted.

59. The access lane marking and the points of progress within the working lane are to be marked in compliance to the BH Standard.

Annexes: [Not made available.]

- A - Board of Inquiry convened
- B - Sketch of the site and the location of the accident
- C - Photographs
- D - Quality control reports
- E - Medical reports
- F - Initial report on the accident
- G - Statements of the team members

Signed: all members of the Board of Inquiry

Victim Report

Victim number: 520	Name: Name removed
Age:	Gender: Male
Status: deminer	Fit for work: DECEASED
Compensation: not made available	Time to hospital: not recorded
Protection issued: Frontal apron	Protection used: frontal apron
Helmet	
Short visor	

Summary of injuries:

INJURIES

minor Genitals

severe Chest

severe Head

severe Neck

AMPUTATION/LOSS

Fingers

Leg

FATAL

COMMENT

No medical report was made available. The victim died 16 minutes after the accident.

Analysis

The primary cause of this accident is listed as a "*Field control inadequacy*" because the investigators determined that the victim was working without wearing helmet and visor, breaching procedural and marking SOPs, and working far too quickly to be thorough. The field supervisors were not able to check on the deminers regularly and presumably the victim knew this, so chose not to use his metal detector and not to wear his helmet and visor as he marked the ground.

The secondary cause is listed as a "*Management/control inadequacy*" because the group's SOPs did not match the MAC's requirements, and also because senior managers must have decided what was an appropriate level of field supervision and training to apply.