

# DDAS Accident Report

## Accident details

<b>Report date:</b> 15/05/2006	<b>Accident number:</b> 216
<b>Accident time:</b> 09:10	<b>Accident Date:</b> 23/04/1998
<b>Where it occurred:</b> Near Ljuninye, Republika Srpska	<b>Country:</b> Bosnia Herzegovina
<b>Primary cause:</b> Inadequate training (?)	<b>Secondary cause:</b> Unavoidable (?)
<b>Class:</b> Detection accident	<b>Date of main report:</b> 27/10/1998
<b>ID original source:</b> WEL/CS/BiH MAC	<b>Name of source:</b> BiH MAC
<b>Organisation:</b> Name removed	
<b>Mine/device:</b> PROM-1 AP Bfrag	<b>Ground condition:</b> agricultural (abandoned) electromagnetic rocks/stones
<b>Date record created:</b> 16/02/2004	<b>Date last modified:</b> 16/02/2004
<b>No of victims:</b> 3	<b>No of documents:</b> 2

## Map details

<b>Longitude:</b>	<b>Latitude:</b>
<b>Alt. coord. system:</b> GR: YH42068	<b>Coordinates fixed by:</b>
<b>Map east:</b>	<b>Map north:</b>
<b>Map scale:</b> Capljina	<b>Map series:</b> M709
<b>Map edition:</b> WGS 84	<b>Map sheet:</b> 2681 11
<b>Map name:</b>	

## Accident Notes

dog missed mine (?)  
safety distances ignored (?)  
inadequate training (?)  
inadequate communications (?)

## Accident report

The following is the full BiH MAC Accident report, edited for anonymity. The demining was being done by a joint commercial demining company – the lead partner being an ex-pat organisation.

## **INTRODUCTION**

1. A mine accident occurred on 23 April 1998 at a demining task site, approximately at Grid Reference YH420684 near Ljubinje, in the Republika Srpska. This accident involved members of Company Y; One man was killed, two other deminers were injured and a mine-detecting dog was killed. The company reported the accident to HQ MAC on 23 April 1998.
2. On the day of the accident HQ MAC appointed [Investigator No.1] as Chairman of a Board of Inquiry to conduct an investigation and report about the accident. [Investigator No.2], EOD coordinator at HQ MAC was appointed as a member of the Board.
3. HQ MAC issued Terms of Reference for the Board of Inquiry. These are shown at Annex A to this report.

## **CONDUCT OF THE INVESTIGATION**

4. The Board of Inquiry deployed to Company Y regional HQ at the Ljubinje hotel, from Sarajevo on the day of the accident and arrived at the hotel at approximately 1830hrs. [The Demining group]'s Operations Officer, [Investigator No.3] accompanied the Board of Inquiry team throughout the investigation and directed assistance to the team where required.
5. Shortly after arrival at the hotel, written statements were requested from all members of the team involved. Statements were provided the next day, these are shown at Annex B.
6. Members of the Board made a break in the journey from Sarajevo to [the Demining group]'s regional headquarters at approximately 1700hrs, in order to inspect the scene of the accident. At this time an assessment was made of the site layout and conduct of [the Demining group]'s operations. The site was re-visited the next day
7. Investigation lasted one day; this included interviews, writing of statements, visits to the site of the accident, inspection of documents & maps and of clothing and equipment used by the team.
8. The injured deminer still under treatment was interviewed in Trebinje hospital on 23 April 1998. All other personnel were interviewed either on the day of the accident or the day after.

## **GENERAL**

9. Personnel from [the Demining group] had been working at this task site for three days. This task was part of a large mined area that [the Demining group] have been working on for some weeks. RS PIU tasked the company to work in this area. HQ MAC holds minefield records and information for the site and surrounding areas and the team working in this area were in possession of this information as part of an HQ MAC target folder.
10. The team working the task was Survey Team S2. This team was structured in accordance with [the Demining group] regional structure and consisted of a local team leader, six deminers, a medic, two dogs and handlers and a driver. A PIU/World Bank monitor was also on the site.
11. [The Demining group]'s Survey Teams' Manager is responsible for three separate survey teams and visits the hotel and associated work-sites twice or three times each week, as part of his normal works schedule.
12. Mine involved in this accident was a PROM-1 bounding Anti Personnel fragmentation mine.

## **GEOGRAPHY**

13. The area that [the Demining group] is operating in is inside the Zone of Separation, approximately 6 kilometres south of the town of Stolac.
14. The task site area is approximately three kilometres from the nearest surfaced road. The area is very rough ground, rocky and difficult to travel or walk over. Vegetation is sparse. No local residents were observed anywhere near to this site. Priority for the task was determined by the RS PIU.
15. [The Demining group] personnel live in and deploy from [the Demining group]'s local Headquarters at the Ljubinje hotel, Grid Reference BN623597. All local employees live at the hotel.
16. Task site from [the Demining group]'s location at the Ljubinje hotel is approximately 15 Kilometres, travelling time is approximately twenty minutes.

## **SITE LAYOUT**

17. The area of the task site, including the Control Point is marked and taped-off. Marking on the site and in the clearance lanes is adequate. Control Point is in a cleared area of rough ground, approximately 350 metres from the scene of the accident.
18. The area where the accident occurred is within the triangular-shaped area of ground at the corner of two dry-stone walls. The area between the point of detonation and the base line is divided into 10 metre by 10 metre "boxes" that had been cleared prior to the accident. The area where the accident occurred is within the final 10 metre by 10 metre "box" to be cleared before the walls are reached
19. When the accident occurred, Team leader and one other deminer were working at approximately 30 metres distance from the explosion, in areas that had been previously cleared.

## **SUPERVISION AND QUALITY ASSURANCE**

20. Supervision of survey teams in this [Demining group] region is provided, in the first instance, by team leaders, in this case the team leader was a local national. The next line of supervision is provided by visits to the sites by the [Demining group] Operations Officer. At the time of the accident the Operations Officer was in Pale. Team Manager visits approximately every two days. A Quality Assurance Officer also inspects the team and the site approximately once each week. [The Team Manager and QA officer] were in the local area but not on site when the accident occurred.
21. An RS PIU monitor is on the site at all times. [He] states that clearance operations on the site at that time were normal and no safety points were at issue.

## **COMMUNICATIONS**

22. [The Demining group] communications to anywhere outside the region is generally by HF radio. This set-up allows HF communications to [Demining group] HQ in Pale and elsewhere. Communications have been improved since [the lead Demining group]'s earlier accidents.
23. Communications between the site and Pale are reported as usually good. On the day of the accident, communications between the task site and Pale were poor, probably due to atmospheric conditions.
24. Communications between the team on the site are by means of hand-held VHF radios.

25. Operations are commanded and controlled from a field level. Co-ordination is from [the lead Demining group]'s HQ Pale and through the Field Operations Manager.

### **MEDICAL**

26. A comprehensive medical kit was on site at the time of the accident. Medic was stationed at the Control Point, approximately 350 metres from the scene of the accident. Ambulance was on the site.
24. The nearest hospital to the accident site is at Stolac, approximately 10 Kilometres, travelling time is approximately 15 minutes. [The Demining group] state that this hospital has been evaluated and was assessed as not being capable of dealing with traumatic injuries caused by mine accidents.
25. The injured deminer was taken to the hospital at Trebinje, approximately 73 kilometres; travelling time is approximately 70 minutes.
26. The explosion occurred at 0910hrs. Ambulance arrived at Trebinje hospital at 1045hrs. Injured Dog Handler [Victim No.1] died at the hospital ten minutes after arrival. The hospital was ready for casualties to arrive because the Team Manager travelled ahead of the casualties in order to ensure that preparations were being made for the arrival of the ambulance.
27. The injured deminers. Inspection of the deceased's flak jacket showed nine perforations caused by entry of fragments from the mine. A significant area of the flak jacket was blasted away, at the base of one side of the jacket.
28. Team Leader [Victim No.2] was slightly injured only and was released from hospital on the day of the accident.
29. Deminer [Victim No.3] sustained shrapnel injuries to the back of his right knee. It is anticipated that he will be released from hospital by 28 April 1998.
30. The mine detecting dog, [name excised] was also killed in the blast from the mine.
31. All [Demining group] personnel at this site are familiar with CASEVAC procedures and the route to Trebinje hospital.
32. Survey Team S3 were working near this general area and arrived to assist with the CASEVAC after hearing the explosion.

### **PERSONALITIES**

33. Survey Team S2 and personnel directly involved are as follows.

Team Manager, Survey Teams S1, S2 & S3

Team leader Survey Team S2

Deminer

Deminer

Deminer

Deminer

Deminer

Deminer – Injured in blast from mine.

Dog Handler

Dog Handler – Killed in blast from mine.

Team Medic

Driver

PIU Monitor at the site.

## **DOGS**

34. Dogs involved at this site were as follows

[Dog A] - Handler was Killed in blast from mine.

[Dog B] - Handler was [name excised].

35. No problems were reported with either of the dogs on the day of the accident or on recent days prior to the accident. Both dogs were fully trained and experienced. Both came from the USDCC/RONCO demining programme in BiH 1996/1997.

36. [The lead Demining group]'s dogs receive continuation training on a regular basis and are formally retrained and evaluated monthly. [The dead dog] was evaluated within the last month as part of the routine programme of continuation training.

37. The dead dog was found with its leash close to but unattached to its collar. It may be possible that the leash may have been removed during the blast from the explosion. It is normal practice for [the Demining group]'s dogs to be deployed either on a leash or free-running, depending on the nature of the ground and the Dog Handler's evaluation of the work required.

## **EQUIPMENT**

38. The Board carried out an informal test on a metal detector used at the site. It was found that the detector could be used only with difficulty due to the high mineral or metal content of the rock that forms most of the ground in this area.

39. Hand tools used by the demining team were standard prodders, trowels and garden pruning shears. These were used in the normal manner, approved by MAC Technical and Safety Guidelines.

## **DRESS**

40. Protective clothing and headgear is available for all vulnerable personnel in [the Demining group]'s demining operations. Industrial working boots are issued to all demining personnel.

41. All protective clothing provided by [the Demining group]'s to demining teams is designed to provide a minimum protection to the wearer against 1.1g fragments travelling at a velocity of 450 metres per second.

42. Every deminer in every team is issued with a helmet fitted with a visor. Survey Team S2 and attached personnel were all wearing correct Individual Protection Equipment at the time of the accident.

## **DETAILED ACCOUNT OF ACTIVITIES ON 23APRIL1998**

43. This account is taken from written statements and from formal and informal interviews and statements from all personnel involved. Most interviews took place through interpreters.

44. Survey Team S2 departed [the Demining group]'s local headquarters at Ljubinje Hotel as normal at around 0730hrs. They started work at the task site at around 0800hrs, as

normal. A daily briefing from the team commander is normally given to the team, covering points relating to safety and the day's anticipated activities. This briefing is part of daily routine activity, as per [the Demining group]'s SOPs.

45. The Team Leader was aware that the stone walls that surrounded the teams work area could be suitable places for Anti Personnel mines to be laid.
46. Deminers were deployed to their places of work. This involved marking lanes with paint and with tape markings, or preparing wooden pickets to be used as markers. Team Leader states that some deminers were also employed prodding cut lines already cleared by the dogs.
47. Dogs are normally deployed one at a time, as one dog completes a work cycle the second dog starts work. On this day Dog Handler [Victim No.1] started work first, with his dog. They were deployed to clear an area furthest from the Control Point. Team Leader observed the dog and handler at work from a distance of approximately 30 metres. He states that they were working in a normal manner.
48. Team Leader was observing the dog at work from a distance of approximately thirty metres.

#### **THE MINE**

49. Mine involved was a PROM-1 bounding Anti Personnel fragmentation mine. The base plate, of the mine was discovered at the bottom of the resulting crater. No evidence of the use of a tripwire was found during the investigation on site.
50. When a dog makes a "find", it is normal for the animal to turn to face its handler and then sit down. Tufts and strands of dog hair were distributed around the crater for approximately 450 millimetres. The dog's tail was approximately three metres from the crater. The dog's back legs were approximately three metres from the crater, each leg in a different direction.
51. The dog's body was approximately six metres from the crater, at the base of a stone wall. The Board of Inquiry considered it apparent that the dog had been thrown against the wall by the blast from the mine and had then fallen to the base of the wall.

#### **TASKING**

52. Tasking came from RS PIU, in the normal manner.
53. UN MAC holds information about this task site and related areas. A task folder was prepared and issued from UN MAC Information department. Team on site was in possession of this information.

#### **SUMMARY**

54. This team was demining in an area of very difficult terrain. Dogs were the best solution to the problem at hand. Correct drills were being employed. Supervision and Quality Assurance measures were entirely sufficient. Evidence suggests that the dog sat on the mine, causing the mine to detonate. Three personnel were injured by one mine. Evacuation time was one hour and thirty-five minutes from the time of detonation to arrival at the hospital.

#### **CONCLUSIONS**

55. The mine was very probably detonated because the dog sat on it, possibly during the act of signalling its "find" to the handler.

- 56. Evacuation time was marginally longer than would normally be anticipated in this theatre. This was probably due to the distance between the task site and the hospital.
- 57. Some personnel were working too close to each other, for operations in an area where fragmentation mines were known to have been laid.

**RECOMMENDATIONS**

- 58. The demining team involved in this accident should undergo a minimum of one day's retraining.
- 59. [The Demining group]'s senior dog handler should evaluate current training regimes for all dogs.
- 60. [The Demining group]'s National Operations Manager should re-visit the hospital at Stolac and confirm their earlier evaluation on whether this would be a viable alternative for use by teams operating in this region.
- 61. The minimum safety distance between personnel required by MAC Technical Guidelines is 25 metres. This distance should be extended to 50 metres, subject to ground and cover, in areas where PROM-1 mines are anticipated.

Signed: EOD Coordinator, Coordination Advisor

**Distribution**

Programme Manager HQ MAC  
 World Bank  
 PIU Republika Srpska  
 [The Demining group]

**Victim Report**

<b>Victim number:</b> 278	<b>Name:</b> Name removed
<b>Age:</b>	<b>Gender:</b> Male
<b>Status:</b> dog-handler	<b>Fit for work:</b> DECEASED
<b>Compensation:</b> not made available	<b>Time to hospital:</b> 1 hour 35 minutes
<b>Protection issued:</b> Frag jacket	<b>Protection used:</b> Frag jacket, Helmet, Short visor
Helmet	
Short visor	

**Summary of injuries:**

INJURIES  
 severe Arms  
 severe Body  
 severe Legs  
 FATAL  
 COMMENT

See medical report.

### Medical report

The field medic reported briefly that "after bandaging and infusion we evacuated the injured".

Another stated (with similar brevity that "we removed his clothes and flak-jacket, gave him infusion and continued with bandaging and immobilisation of his broken extremities". [This implies severe arm and leg injuries.]

Victim No.1's body armour was penetrated in nine places with the lower part of it "blasted away". [This implies severe body injuries.] He died ten minutes after arrival at hospital, one hour and 45 minutes after the accident occurred.

### Victim Report

<b>Victim number:</b> 279	<b>Name:</b> Name removed
<b>Age:</b>	<b>Gender:</b> Male
<b>Status:</b> supervisory	<b>Fit for work:</b> yes
<b>Compensation:</b> not made available	<b>Time to hospital:</b> 1 hour 35 minutes
<b>Protection issued:</b> Frag jacket	<b>Protection used:</b> Frag jacket, Helmet, Short visor
Helmet	
Short visor	

#### Summary of injuries:

COMMENT

No medical report was made available. The victim suffered "slight" fragment injuries and was released from hospital on the day of the accident.

### Victim Report

<b>Victim number:</b> 280	<b>Name:</b> Name removed
<b>Age:</b>	<b>Gender:</b> Male
<b>Status:</b> deminer	<b>Fit for work:</b> presumed
<b>Compensation:</b> not made available	<b>Time to hospital:</b> 1 hour 35 minutes
<b>Protection issued:</b> Frag jacket	<b>Protection used:</b> Frag jacket, Helmet, Short visor
Helmet	
Short visor	

#### Summary of injuries:

INJURIES

severe Leg

## COMMENT

See medical report.

## Medical report

The field medic reported briefly that "after bandaging and infusion we evacuated the injured". Victim No.3 sustained fragment injuries to the back of his right knee and was expected to be released from hospital on 28th April 1998.

## Analysis

The primary cause of this accident is listed as "*Inadequate training*" because the dog apparently sat on the mine, raising questions about its training and whether sitting to indicate in this way was appropriate. The secondary cause is listed as "*Unavoidable*" because the way of using the dog was approved, and the dog may have been acting exactly as trained (and there is no general agreement on what "good" dog training is).

There was a significant "*Management/control inadequacy*" because it seems that the secondary victims were more than the recommended distance away – but that the recommended distance was inadequate.

The investigators claimed that all protection used met a 450m/s STANAG standard. The 5mm polycarbonate visors in use by the group did not (270-280m/s). The use of 5mm thick visors was (and is) common throughout humanitarian demining operations globally.

The time taken to reach a surgical facility was too great (in a region where MEDEVAC is relatively easy). There are also suggestions that the communications system (criticised in previous incidents involving this demining group) was not working well on the day of the accident.

## Related papers

A second version of the MAC's accident report was made available. This version varied only by concealing the name of the commercial demining partnership whose deminers were involved in the accident. The partnership was referred to as "Company Y". The lead demining group had been involved in several incidents and is believed to have been very "sensitive" about bad publicity. It seems that a "friend" at the MAC sought to protect them.

A mine-dog instructor's report observing that dogs trained on surface mines tend to scratch the ground when they find a buried mine was in the Accident file. A dog evaluation report on the dead dog was included - indicating that the dog had "a very high forward drive which makes him a little more difficult to handle". The handler was assessed as of a "high standard" and the combination approved.

The dog's rabies certificate and "K-9 Field Record" was also in the file, along with it's handler's certificate of training.