

12-2-1997

DDASaccident220

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DDAS Accident Report

Accident details

Report date: 15/05/2006	Accident number: 220
Accident time: 15:50	Accident Date: 17/12/1997
Where it occurred: Gluva Smokva village, Route 20, Trebinje	Country: Bosnia Herzegovina
Primary cause: Field control inadequacy (?)	Secondary cause: Management/control inadequacy (?)
Class: Missed-mine accident	Date of main report: 20/12/1997
ID original source: PP/MA/DS	Name of source: BiH MAC
Organisation: Name removed	
Mine/device: PMA-2 AP blast	Ground condition: building rubble electromagnetic residential/urban
Date record created: 16/02/2004	Date last modified: 16/02/2004
No of victims: 1	No of documents: 2

Map details

Longitude:	Latitude:
Alt. coord. system: GR: BN 743 291	Coordinates fixed by:
Map east:	Map north:
Map scale: Dubrovnik	Map series: M709
Map edition: 6-DMA	Map sheet: 2780 111
Map name: 1:50,000	

Accident Notes

inadequate metal-detector (?)
inadequate equipment (?)
mine/device found in "cleared" area (?)
partner's failure to "control" (?)
inadequate area marking (?)
no independent investigation available (?)

Accident report

The demining group was running two-man teams operating a one man drill in which one deminer worked while the second "controlled" him.

A Board of Inquiry report was ordered by the UN MAC and carried out by representatives of the QA group, an ex-pat Technical Advisor and UN MAC representative. Effectively, the report was ordered by the MAC on one of its own operations and so no truly independent report was made. The report was made available and the following summarises its content. The full BoI report is under *Related papers* at the "Other documents" tab.

On the day of the accident it was cold and cloudy with little wind. The mine in the accident was under the corner of a cement doorstep. According to the SOPs in force "doorways" were house clearance and should be done by EOD teams, not area clearance teams. The distinction was blurred. The team were clearing the yard of the house. Stone walls and a "paved road" marked the extents. The stones in the ground were described as ranging in size "from small pebbles to the size of a house".

At 15:50, while preparations were being made to stop work but while the victim should have been "controlling" his partner, he left his observation position on the road and went to the rest area to start tidying equipment, then went to urinate in "a private corner" of the cleared area where he stood on a mine. A witness stated that he saw the victim "flying in the air". He was attended quickly and evacuated by ambulance to Trebinje hospital, arriving within 15 minutes of the detonation.

The investigators decided that the mine have been a PMA-2 at a depth of 6cm [by inference]. The concrete doorstep slab over the mine was 4cm thick and had been broken. If it had been square, the mine could have been placed beneath it. If it had been rounded, the fuse could have been exposed.

The investigators found that access lanes for the control of movement were not being used, that supervision was less than required, and that proper rest and equipment areas were not used with respect to house clearing restrictions. The team's rest area was within two metres of an uncleared area (on the patio of the house) and there was no access lane through the cleared area.

They found that the MD-8 detector and the prodder did not "function effectively" in the ground at the site. The group should have been excavating but were using prodders. Other tools available were bayonets, "trowels, field scissors.. [and].. small saws".

Conclusion

The investigators concluded that the accident was "preventable". The mine should have been found during excavation but the appropriate SOPs were not being used. Supervision was inadequate and the control of movement in cleared areas was not in accordance with SOPs.

Recommendations

The investigators recommended that the platoon be retrained with emphasis on supervision and excavating drills. That the appropriate SOPs be re-emphasised to every demining group in the country, that the Technical Guides have Page numbers "adjusted" [presumably that were wrong] and that a system for ease of reference be devised. They added, "since mine detectors exist which do work in metallic soil, they should be procured". The deminers should have been using an excavation technique, "in accordance with Technical Guidelines".

Victim Report

Victim number: 284

Name: Name removed

Age:

Gender: Male

Status: deminer

Fit for work: not known

Compensation: not made available

Time to hospital: 15 minutes

Protection issued: Frag jacket

Protection used: not recorded

Helmet

Short visor

Summary of injuries:

INJURIES

severe Leg

COMMENT

No medical report was made available.

Analysis

The primary cause of this accident is listed as a "*Field control inadequacy*" because the victim was in breach of several rules and his errors were not corrected. Also, the field controllers were apparently using the wrong clearance technique.

The investigators recognised that a "doorstep" is "house clearance" and should be cleared by an EOD (or Battle Area Clearance) team, yet blamed the deminers for not clearing it. The doorstep was flush with the ground and covered with earth in places. The deminers were presumably supposed to clear up to it, but not on or under it. The "grey area" represents a failing of the UN MAC's Technical guidelines. Accordingly, the secondary cause is listed as a "*Management/control inadequacy*".

Related papers

Other documents in the accident file included witness statements and photographs of the accident site showing the shell of a two story concrete house. The photographs made it clear that the "doorstep slab" was not raised, but at ground level and not immediately distinguishable from the ground. The blast crater, appeared to be very shallow, barely as high as the mine.

There were also several sketches of the site, one showing that the victim had left the clearance area and walked some distance around a corner to a doorway not adjacent to the rest area "patio" when the accident occurred.

Photographs and sketches were not made available for copying.

Original Bol report

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

REPORT OF THE BOARD OF INQUIRY ON THE UNITED NATIONS MINE ACTION
CENTRE MINE ACCIDENT IN TREBINJE AREA 17 DECEMBER, 1997

Dated 20 Dec 97

A. INTRODUCTION

1. A Board of Inquiry was convened by the United Nations Mine Action Centre on 17 December, 1997 to investigate the circumstances of a mine accident which occurred in the Trebinje area, grid reference BN 743 291, 15:15 hours, 17 December, 1997. The Board was convened on the authority of the [Demining group] Mine Clearance and EOD Operations Technical and Safety Standards Guidelines, Annex A to Chapter 2, dated 1 Dec 97. A copy of the convening order is attached as Annex A.

2. The Board comprised:

- a. Chairman Regional Mines Officer, [Demining group] Mostar
- b. Member Technical Advisor, [Demining group] Mostar
- c. Member Operations Assistant, [Demining group] Mostar

3. The Board was assisted at the mine accident site on 18 Dec 97 by Maj [name excised], an EOD expert from [Demining group], Sarajevo head office. Local assistance was provided by [name excised] of [Demining group] Banja Luka Office throughout the field investigations and interviews. The Board was assisted at the mine accident site on 20 Dec 97 by [name excised], an EOD expert from [Demining group] Mostar.

4. The Board conducted its field investigation and interviews on 18 Dec 97, and did follow-up investigation by phone on 19 Dec 97, and on-site on 20 Dec 97.

B. SEQUENCE AND DOCUMENTATION OF TASKING

5. In accordance with the winter plan organized by the [Demining group] Regional Mines Officer (RMO) for Banja Luka Region, [name excised], the Banja Luka Demining Platoon, the Minefield Marking and Survey (MMS) Team, and an office of three staff deployed to the Trebinje region to conduct demining operations. This was to continue for the period of December 97 to March 98 approximately, while there was too much snow and bad weather to demine in the Banja Luka region.

6. The recce team deployed on 1 Dec 97, followed by the demining platoon on 3 Dec 97. The minefield incorporating the area of grid reference BN 743 291 was located with the help of local knowledge, and was discovered to have many mines, mostly PMR-2A and PMA-2. The minefield encompassed several houses, the approach to a village and church, and two power lines. The villagers did not stay overnight in their village, due to lack of security, but spent the days there working on making their homes and fields safe for normal work. The demining operation was assisting in increasing local security, so was of sufficient priority for clearance.

C. SOPS AND TECHNICAL GUIDELINES

7. [Demining group] SOPs and technical guidelines were used and were being followed in general, but with some specific discrepancies which are discussed in detail in following sections. In brief, these are:

- a. access lanes for control of movement were not being used.
- b. supervision was not up to the level required by SOP/Technical Guidelines.
- c. proper rest and equipment areas were not being enforced.
- d. section operations were not observing SOPs with respect to house clearing restrictions.

8. The location of the mine which caused the accident was under the corner of a cement doorstep. This introduces a problem, as the SOPs state that doorways are to be part of house clearance operations, not area clearance operations. SOP 3.18 states that building clearance operations are only to be handled by specialized EOD personnel. Neither the SOPs nor the Technical Guidelines state exactly where area clearance ends and house clearance. It should be made clear in the SOPs exactly where the boundaries are between area clearance and house clearance.

9. It should also be noted that neither the MD-8 metal detector nor the prodder function effectively in the type of soil found at this demining site. The soil is too metallic for the metal detector, and is extremely rocky, meaning that every probe of a prodder encounters an object, which in turn means that excavation must be done to discover and remove that object. The end result is clearing almost totally by excavation. The SOPs address this problem and describe approved methods of dealing with it.

10. The demining section should have been using excavation as a clearing method in the areas where the rocks were too many or too large for the prodder to be effective. Paragraph 20 of the Synopsis of the Technical Guidelines covers this and also recommends extra supervision in such instances.

D. GEOGRAPHY

11. The location of the accident site is on Route 20, 11 km South West from the centre of the city of Trebinje, on the West side of the road. (The city hospital is at this centre of Trebinje.)

Map Sheet: Dubrovnik, Croatia, Former Yugoslavia, 1:50,000; Edition 6-DMA, Series M709, Sheet 2780-III. Grid Reference: BN 743291. Location: at rear of house on West side of road.

12. The weather on the day of the accident was cloudy with no rain, and cold. There was little wind.

13. The soil is metallic in content, causing the MD-8 mine detector to signal detection of metal on a continuous basis. The deminers were therefore using only prodders for demining.

14. The local terrain at the accident is shown on the sketch at Annex B. The area being cleared is the yard of a house, delineated clearly by a paved road and stone walls. The ground is extremely difficult for demining, being extremely rocky, with very thin soil. Rocks vary in size and shape from small pebbles to the size of a house. Most of the rocks in the area of the accident were irregular in shape and varying from the size of a coin to the size of a football. The density of rocks and their size makes it difficult for the prodder to get between them, or to move them easily.

E. SITE LAYOUT AND MARKING

15. The sketch of the site at Annex B shows the site to be a house and its surrounding yard. This task was given to one section. The section divided responsibilities between the three teams of two persons each, keeping 25 metres safety distance between team lanes. The sketch shows direction of clearing.

16. Each team marked its progress by moving parallel to the demarcation tape and unrolling a tape to mark the 1 metre lane as they cleared. In most areas, the new lane was to the left of the previous one, so the minetape was being unrolled on the left side. As each lane was finished, the demarcation safety tape was rolled up and then used to mark the new side of the new lane.

17. Cleared areas and uncleared areas were clearly marked using blue mine tape. The demarcations of the property site were obvious to see and were marked: the road, the house itself, the stone walls surrounding the property. All entrances to the house were blocked by mine tape.

18. Within the cleared areas there were no marked visitor or access lanes. The entire cleared areas were being used as access areas by the section. Proper rest and equipment areas were not being enforced.

19. The section should have had clearly marked access routes, and equipment and rest areas the correct safety distance – 100 metres - from the nearest mined area.

F. SUPERVISION AND DISCIPLINE ON SITE

20. Supervision on the site was adequate in general, but inadequate at the section site where the accident occurred, in that persons moved from their supervisory locations. The overall platoon site was in two separate locations with approximately 1 kilometre between them. Two of the sections of the demining platoon were at a site to the southwest of the accident site, and the third section was at the site where the accident occurred. The platoon headquarters and the ambulance were centrally located near the T- junction (black road with red road on the map) at grid reference BN 735 287, a distance of 1.2 km by road and two minutes in time.

21. The section commanders were with their sections at all times. The platoon commander and his 2IC alternate staying at the platoon headquarters location and moving

from section to section. On the afternoon of the accident, the platoon commander had gone with the RMO to the demolition site to destroy live mines, leaving the platoon 2IC in charge.

22. At the site where the accident occurred there were some discrepancies from the discipline procedures given in the Technical Guidelines and the SOPs. There were no common access routes from the road, through the recently cleared areas, to the areas of current work. This resulted in the section moving from the safe area on the road, indiscriminately through the cleared area, to reach the area of current work. The following discrepancies from a disciplined site were observed on the visit on 18 Dec:

a. Although the control point was on the paved road, and well-marked, the section had taken shortcuts in procedures for convenience. Section rest breaks were taken on the patio adjacent to the southwest wall of the house, and stores and equipment were also stored there. This resulted in an increase of traffic from clearance lanes to the house for breaks or for equipment, as opposed to going from clearance lanes out to the road. The Technical Guidelines require a secure area and recommend near the control point for stores. The Technical Guidelines also call for designated access routes of two metres width into demining areas for the specific purpose of imposing control over movement and reducing the indiscriminate movement over broader areas than necessary.

b. Rest areas are to be a minimum of 100 metres from the uncleared areas. The section was resting on the patio, with the nearest uncleared area only one to two metres away.

c. Although the WC/toilet area was designated near the control point, and out on the road where it was safe, the deminer [victim] had gone to the section rest area on the patio, near the uncleared area, to get his equipment. He felt an urgent need to go to the toilet, and moved into a private corner for this purpose, and stepped on a mine. Although the area was previously cleared where he stood, and was marked clear, it was also a violation of Technical Guidelines for him to have been taking his break there, storing his equipment there, and going to the toilet there.

d. The accident occurred at 1515 hours, nearing the end of the working day, as light begins to fade. The section leader had moved to the northeast side of the house and had started the measuring of his square metres for the day. Deminer [the victim] decided to go up to the patio early to collect his kit while his partner was clearing in the lane. The Technical Guidelines call for one deminer of a team to be working in the lane, while the other monitors and supports.

23. Supervision is required at all times, meaning that supervision is all that the section leader should have been doing while clearing was going on. No deminers should have left his partner unsupported, as [the victim] did.

G. QUALITY ASSURANCE/QUALITY CONTROL

24. Quality Assurance was addressed initially by the process of ensuring that each deminer was put through the [Demining group] training course and that the SOPs and Technical Guidelines of the [Demining group] were in place for the platoon working in Trebinje. The Technical Guidelines state that QA when using prodding and excavation techniques without mine detectors is difficult, and can only be met by additional supervision. Close supervision is emphasized repeatedly by the Technical Guidelines. Close supervision was not strong for the Trebinje operation in that only the section leader was available to supervise during the day of the accident, and he divided his time between supervision and other tasks which he needed to do, such as measuring his square metres cleared for his daily report.

25. Mine detectors are an item of detection equipment. Use of mine detectors provides better QC and safety than use of prodders alone. By definition, use of mine detectors and prodders together is more effective than use of prodders alone. Since the MD-8 detector does not work in the metallic soil found in much of Herzegovina, the safety risk is increased to deminers in metallic soil areas. Since mine detectors exist which do work in metallic soil, these should be procured. Not doing so is adding to the safety risk.

26. There was a lack of discipline, whereby there were deviations from the standard control procedures laid down by the Technical Guidelines. These will be elaborated in conclusions.

27. The demining platoon and section should have known from the planning and survey phases of the operation that the mine detector would not work effectively, and that they would have to use prodding and excavation to do clearance. The Quality Control on prodding is the distance, depth and method of prodding. When the prodder hits a hard object, or cannot penetrate the soil, the Technical Guidelines stipulate that excavation techniques must be used, and describes these techniques in detail. The deminers should have been using excavation techniques in accordance with the Technical Guidelines. Deminers who were not excavating in the rocks where prodders did not work were not demining to humanitarian standards.

H. COMMUNICATIONS

28. Communications at the time of the accident were normal for the site and were working well. VHF hand-held radio was used to call for the ambulance and the call received immediately. The office in Trebinje monitored the call and called the hospital immediately, then used office communications to call SFOR to arrange helicopter transport in case it was needed.

29. Communications from the Trebinje field office to the offices in Sarajevo and Mostar do not work well. It is difficult to get calls through via PTT lines. The satellite telephone works but it is often in transit and not receiving calls. HF radio does not work well, likely from siting of antenna, but this did not affect the emergency.

I. MEDICAL

30. The deminers have had first aid training, and all carry a field dressing in their pocket. The deminer nearest to the casualty was on site in a matter of seconds, and had a bandage on the wound area within a minute. The next deminer on site assisted, and the deminer was bandaged and carried to the road side within three minutes. A call for medevac was made within 10 seconds of the explosion

31. The platoon medic is experienced and trained, and was sitting in his ambulance monitoring the radio when the call for assistance was made. His ambulance was properly equipped and in good mechanical shape. He was approximately two minutes drive from the accident site, as he was covering two section clearing sites in the same vicinity. The ambulance reached the roadside at the accident site within 2-3 minutes of the explosion, and was waiting as the deminers carried the casualty to the ambulance. The medic checked and reinforced the bandages as the ambulance drove to the hospital.

32. It is roughly 10 minutes by road to the hospital. The [Demining group] office had called the hospital, and the ambulance was met at the door by the duty doctor, staff and a gurney. The casualty was operated on immediately and his left foot was amputated. A medical report is attached as Annex E.

33. The platoon had not carried out medevac rehearsals in the three weeks that they had been in Trebinje. The Supervisor, the Platoon Leader, the Deputy Platoon Leader and the medic had done reconnaissance and knew where the hospital was and the location of its emergency entrance.

J. PERSONS INVOLVED

34. The key persons involved in the demining operation where the accident occurred are:

Casualty (team 3 member)

RMO

Deputy Demining Platoon Leader

Demining Section Leader

Team 1 member

Team 1 member

Team 2 member

Team 2 member

Team 3 member
Operations Assistant

K. EQUIPMENT AND TOOLS

35. Metal detectors were not used in this demining site as the only detectors available were the MD-8, which do not work in the metallic soil. No mine detectors which would work in metallic soil were available.

36. The primary piece of equipment for clearing in this minefield was the prodder. There were not enough prodders for everybody in the platoon, so some were using bayonets. The section at the demining site was using prodders and excavating trowels, but not mine detectors. To support the prodder and bayonet when in rocky soil, each demining team had trowels as well as field scissors and small saws.

L. DRESS AND PERSONAL PROTECTIVE EQUIPMENT

37. The protective vest, helmet, and visor issued by [Demining group] were worn by all members of the platoon when required. No other special demining protective equipment such as boots or gloves were available. Some members have [Demining group] issue coveralls, and some do not, due to the garments wearing out.

M. DETAILED ACCOUNT OF ACTIVITIES

38. The following account summarizes the responses to questions and statements by the members of the [demining group] Banja Luka demining platoon who were involved in the mine accident on 17 December, 1997. The persons whose statements are involved are those listed in Section J – Persons Involved. Statements are attached at Annex F.

39. This chronology of events is best read in conjunction with the Field Sketch, Annex B. The site has three gates, and each section was assigned a clearance area through one of the gates. As the house is faced from the road, Team 1 started on the right extreme edge of the clearance area when commencing clearing operations, Team 2 started opposite the middle of the house, and Team 3 started on the left flank. As one lane was cleared, the new lane was started on the left of the old one, so the cleared area was growing towards the left.

40. In the two weeks of demining before 17 Dec, Team 1 had cleared up to the house, then in the back of the house as far to the left (South) as the South-West corner of the protruding back room of the house. On 17 Dec, they were started on a set of lanes to the south of their previous work, clearing from West (# 10 on the sketch) to East (house wall near # 1). They were working backwards (West to East) from their normal direction (East to West) because if they worked from this direction, they would be beyond 25 metres from the nearest deminer of Team 2, and this would enable both teams to work concurrently.

41. In the two weeks preceding 17 Dec, Team 2 had progressed quickly from their starting lane along the stone wall joining the North East corner of the house to the road. The short lanes meant that they were soon at the 25 m distance from Team 3 to their left. The section leader directed that they move to the rear of the house, clear a 1 metre lane along the back of the house, then clear towards the rear of the property, shifting right as each lane was completed. The 1 metre lane was cleared five or six days before 17 Dec, along the West side of the main part of the house, parallel to the stairs. This is shown clearly on the large-scale sketch, Annex C. When Team 3 had cleared enough lanes to put them more than 25 metres to the left of Team 2, the Section Leader directed Team 2 back to the main part of the yard. On 17 Dec, Team 2 was clearing from # 8 on the sketch towards # 7 on the sketch.

42. In the two weeks before 17 Dec, Team 3 (which included the mine casualty) had cleared lanes starting roughly at Gate 3 and moving steadily left. On 17 Dec, they were approaching # 3 on the sketch.

43. On 17 Dec, Team 1 was clearing from West (#10 on the sketch) to East towards the back of the house, ending each lane at the 1 metre lane along the back of the house which had been cleared by Team 2. After the first of these West to East lanes (from # 10 to # 1 on the sketch), they did a right turn (to the South) and cleared one lane at right angles to their initial lane, and parallel to the 1 metre clear lane along the back wall of the house, thus making the clear lane along that back wall 2 metres wide. They then returned to doing West

to East lanes. The clearing deminer had nearly finished the second lane towards the house when they stopped for the Section mid-afternoon break at 1440 hrs. At 1500 hrs, when the break was over, Team 2 finished the second lane, gathered their materials, and moved to start the third lane. The deminer [name excised] was making his entry into the third lane, at # 4 on the sketch, and was facing South, when he heard the explosion and turned his head to see a man flying in the air. His team-mate was 25 metres to his North, monitoring his work, but in a position where he could not see the area of the explosion.

44. On 17 Dec, Team 2 was clearing lanes from East to West, and were near the end of a lane when they stopped for Section break at 1440 hrs. At 1500 hrs, they returned to their lane, finished it and began to collect their tools and roll up the mine tape in preparation for starting the next lane. They were working at # 7 and # 8 on the sketch when they heard the explosion.

45. On 17 Dec, Team 3 was working on the far left, clearing lanes. They continued this after the end of Section break at 1500 hrs. [Name excised] was clearing, at # 3 on the sketch, and [the victim] was monitoring from the road 25 metres distant, # 2 on the sketch. [Name excised] had his back to the road. He saw [the victim] on the road, but for the five minutes before the explosion, he had not looked that way, nor had he any reason to think [the victim] had moved. When he heard the explosion he thought it was another team in trouble.

46. [The victim] had walked from his monitoring position, # 2 on the sketch, probably through gate number 2, and up to the concrete patio. He said that it was nearing the end of the day and he was going to pick up some of his equipment which had been left there during the break. He could see his team-mate clearly from all points on his walk from the road to the patio. Team 2 were both on their hands and knees working in their lane area, and did not see him. [Name excised] of Team 1 was just starting to clear into a new lane. He was to the West of the explosion site, facing South, # 4 on the sketch, and he did not see [the victim] moving around near the house. [Name excised] was further North, monitoring his partner from 25 metres away, and the back of the house and the patio were not in his view. He did not see [the victim]. The section leader was around the North end of the house and could not see the back of the house. He did not see [the victim] moving around.

47. [The victim] said that he felt an urgent need to go to the toilet while he was at the patio, # 9 on the sketch. He descended the steps from the patio, turned left in the cleared lane, now 2 metres wide, and approached the privacy of the corner (# 1 on the sketch). At the corner of the concrete slab outside the door to the back room of the house, he stepped on a mine.

48. At the sound of the explosion, deminer [name excised] turned his head to see a man "flying through the air". He ran to assist, pulling his field dressing from his pocket, and applying it to [the victim]'s left leg immediately. [Name excised] arrived running and calling for the ambulance on the radio. [Name excised] also arrived within seconds and they all applied first aid, and with the aid of the other members of the section, carried [the victim] immediately to the road. The ambulance arrived at the house as [the victim] was brought to the road, a time of approximately two minutes. They loaded [the victim] in with the medic and headed to the hospital in Trebinje.

49. Predrag was in the [Demining group] office in the Leotar Hotel when he heard the call for medevac on the HF radio. He immediately called the hospital and alerted them. When the ambulance arrived, within approximately ten minutes, the duty doctor was waiting at the door, and took [the victim] direct to the operating room. Predrag had also called SFOR and arranged for a helicopter in case one was needed.

N. DETAILS OF THE MINE INVOLVED

50. The evidence at the blast site is consistent with a PMA-2. The dimensions of the crater as taken by Maj [name excised] are listed below and shown on the sketch attached as Annex G:

surface diameter:
30 cm
bottom diameter
05 cm

depth

16 cm

depth of black ring caused by explosive

06 cm

soil and rocks were scattered around in no apparent pattern

51. Maj [name excised] stated that the black ring of explosive in the dirt could indicate the top of the mine; if so, then this indicates a mine buried at 6 cm depth.

52. The soil is mixed rock and earth. A similar hole dug nearby confirmed that this was consistent in the immediate area. The concrete doorstep slab which was over the mine was 4 cm thick, and had been broken by the mine blast, leaving clean, newly-broken pieces at the edge of the mine blast debris.

53. The concrete slab was reassembled as best possible, revealing that the location of the mine crater was centred under the South West corner of the concrete slab. Some of the corners of the concrete slab are square, but it is possible that the corner in question was chipped off or rounded. If it was square, then the mine was under the concrete. If it was rounded, the mine fuse may have been under earth only, at the corner of the slab. Either way, it indicates a carefully placed mine which could have been difficult to detect. Since this mine was used in a doorway, it can also be considered a booby-trap of a part of a building, which brings the problem into the realm of house clearance rather than area clearance. (See sketch at Annex D).

N. SUMMARY

54. The area where [The victim] was walking when he stepped on a mine had been cleared earlier in the same day. A one metre lane cleared 5 or six days earlier adjacent to the back of the house was expanded on 17 Dec to a two metre lane. After each lane was cleared, the entire section had been using it to traverse the back of the house if they had needed to move there. [The victim] stepped on a mine that was missed by clearance.

55. The mine was likely a PMA 2, likely buried at about 6 cm under the corner of a concrete slab doorstep, and missed by the clearance deminer.

56. Medevac procedures worked very well.

57. SOP procedures to maintain a disciplined control of movement were not being followed thoroughly. These would have had no impact on whether the mine was missed or not, but would have reduced the traffic over the missed mine.

58. Supervision and monitoring were not at 100%. More effort should have been put into supervision in accordance with the SOPs and Technical Guidelines. It is possible that increased supervision may have observed a fault in clearing around the doorstep where the mine had been placed, which in turn may have led to the discovery of the mine.

O. CONCLUSIONS

59. This was a preventable accident.

60. The mine was missed by the by Team 1 early on 17 December, 1997, while clearing around the back doorstep of the house in their task area. The mine was probably buried with the top of the body of the mine at about 6 cm, with the top of the plunger about 3 cm below the ground. It should have been found by prodding/excavation.

61. The SOPs for supervision emphasize the increased need for supervision and monitoring when mine detectors are not being used. This was not done at this site during the day of the accident, and could have contributed to the mine being missed.

62. The SOPs for control of movement require access routes and controlled movement through a minefield, including the cleared area. This is for the purpose of reducing movement over indiscriminate areas, and should have been in effect at this accident site.

63. Clearance procedures are well described in the Technical Guidelines. If the mine detector does not work effectively, then manual prodding is to be used. When the prodder hits a hard object, or when it cannot penetrate the soil, then excavation is the technique to be

used. When using a prodding or excavating technique, the supervision should be increased. These Technical Guidelines must be followed.

P. RECOMMENDATIONS

64. That the Banja Luka platoon undergo a retraining period which will emphasize the procedures for constant supervision and monitoring of prodding and excavation drills. This should include emphasis on a standardized prodding and excavating drill for clearing in rocky metallic soil, which will accept that speed will be slow, but that clearing will be sure.

65. That the procedures given in the [Demining group] SOPs and Technical Guidelines for safe and thorough clearing, for constant supervision and monitoring, and for control of movement in a demining site be re-emphasized to all demining agencies in Bosnia and Herzegovina.

66. That the Technical Guidelines have the page numbers in the "Contents" adjusted, that the "Synopsis" be edited to reduce the possibility of safety misunderstandings, and that a detailed numbering system be adopted for ease of reference.

67. No disciplinary procedures are recommended.

Signed: Regional Manager, Operations Assistant, Technical Adviser

ANNEXES: (not made available)

- Annex A. Terms of Reference of Board of Inquiry
- Annex B. Sketch of section clearing site where accident occurred
- Annex C. Sketch of back of house where accident occurred
- Annex D. Sketch of doorway where accident occurred
- Annex E. Medical report on [The victim]
- Annex F. Statements of witnesses
- Annex G. Sketch of crater measurements