

DDAS Accident Report

Accident details

Report date: 17/03/2007	Accident number: 442
Accident time: 08:40	Accident Date: 07/07/2004
Where it occurred: Periya Pullumaiai, Batticaloa	Country: Sri Lanka
Primary cause: Victim inattention (?)	Secondary cause: Field control inadequacy (?)
Class: Excavation accident	Date of main report: 08/07/2004
ID original source: MH	Name of source: Private
Organisation: [Name removed]	
Mine/device: P2Mk2 P4Mk1 AP blast	Ground condition: grass/grazing area
Date record created: 17/03/2007	Date last modified: 17/03/2007
No of victims: 1	No of documents: 2

Map details

Longitude:	Latitude:
Alt. coord. system: Not recorded	Coordinates fixed by:
Map east:	Map north:
Map scale:	Map series:
Map edition:	Map sheet:
Map name:	

Accident Notes

disciplinary action against victim (?)

metal-detector not used (?)

use of rake (?)

visor not worn or worn raised (?)

Accident report

A Bol report on this accident was made available in 2006. It is reproduced below, edited for anonymity.

Accident Investigation & Board of Inquiry: 8th July 2004

BOI Team Members: UNDP TA, [Other Demining Group] PM, Local Government Servant and National Advisor

Reference: Accident Investigation & BOI, 8th July 2004, [Demining Group] minefield site at Periya Pullumaiai, Batticaloa

References:

- a. Terms of reference for investigation of demining accident in Sri Lanka.
- b. Standard Working Procedures (SWP) For reporting and investigation of demining accidents and incidents of the Sri Lankan Mine Action Programme
- c. Standards Operating Procedures – [demining Group] for Mine Action

1. Introduction

This report presents the findings of the Board of Inquiry (BOI) into the circumstances and events of a mine accident, which involved [Demining Group] deminer [Name removed]. The accident took place on the 7th July 2004, during demining operations in a minefield known as Peray Pullumaiai in the District of Batticaloa.

a. History of the Minefield

This minefield is located in the area known as Peray Pullumaiai and is near the village of Peray Pullumaiai, in the District of Batticaloa. The minefield is bounded on the North and East by the Chenkalad Division, on the South by the Nuwaragala Forest Reserve and on the West by Ampara District. The minefield is on the Southern side of the Batticaloa to Badulla road, on the Southern edge of Pullumaiai.

[Demining Group] has been working on this site since 1st May 2004. During clearance operations a total of 64 P4-Mk1 anti personnel blast landmines were recovered at the site. Mines on this site have generally been laid in strips and sub surface laid to an approximately depth of 7cm. The deminer involved in the accident was in half section BD3, who had been working on community support clearance of a school and market. Half section BD3 started work on the site on the 10th May 2004, 7 days prior to the accident.



General view facing East along the safe lane where accident took place. Note yellow pickets denoting the location of previous days P-4 AP blast mine finds.

b. Investigation Team

Following the direction of [Name removed], Special Advisor to the SLNMASC, [Name removed] (Technical Advisor District Mine Action Office Vavuniya), [Name removed] (Programme Manager of a different demining group) and [Name removed], representative of the District Government Office were duly appointed to conduct this investigation under the authority of the BOI terms of reference. The members of the BOI made the investigation, conclusions and recommendations in accordance with the BOI terms of reference and in line

with the Standard Working Procedures (SWP) for the reporting and investigation of demining accidents and incidents of the Sri Lankan Mine Action Programme.

2. General Findings

The general findings of the BOI are listed below:

a. Details of the Accident

(1) The accident

On 7th July 2004, Deminer [the Victim], was continuing clearance on a one metre wide safe lane as detailed by his section leader at the 06.45hrs daily briefing. See Annex D-1 to D-4 "Statements of Concerned Personnel/eye Witnesses.

The lane followed a P4 AP blast mine strip where [the Victim] had found three mines the previous day. On the morning of the accident [the Victim] had worked one half hour shift from 07.30 hrs to 08.00hrs before having breakfast from 08.00 hrs to 08.30 hrs. [The Victim] then started his second half hour shift at 08.30hrs, with his half section BD3. The accident took place at 08.40hrs, ten minutes into [the Victim]'s second half hour shift. At the time of the accident [the Victim] was using a heavy rake on the first phase of the three phase raking drill.

(2) The Site

The site is on open ground with medium to long grass with some areas of dense undergrowth and sporadic bushes and trees. The site of the accident was medium length grass with no undergrowth. The site is on a slight rise on the Southern side of the site. The ground consists of loam fertile soil, with soft to medium/hard density depending on the moisture content of the soil.

(3) The Mine

The crater caused by the explosion was 30 cm wide and 9 cm deep. Investigation of the crater failed to provide any evidence of mine fragments, but the size of the crater is consistent with the blast one would expect from a P4 AP blast mine. This is also consistent with the fact that only P4 AP blast mines have been previously found on this site.

b. Sequence of Events

The table below presents the sequence of events from the start of demining operations on the morning of the accident, Wednesday 7th July 2004, until the arrival of the BOI team on the morning of Thursday 8th July 2004. All relevant eye witnesses' statements have been checked and confirmed during the BOI and are attached at Annex D-1 to D-4 "Statements of Concerned Personnel/eye Witnesses".

06.45hrs - All deminers attended the morning briefing given by section leader

07:00hrs - Half section started work. [The Victim] and his half section BD3 were resting during this shift.

07.30hrs - Half section changed over shift. [The victim] starts his 30 minute first shift of the day, with his half section BD3.

08:00hrs - Half section BD3, with [The victim] change shift and had breakfast.

08.30hrs - Half section BD3, with deminer [The victim] change shift and started work on second shift of the day.

08.35hrs - Section leader, [Name removed], visited deminer [The victim] as part of his supervisory duties. During this visit the section leader instructed the deminer, [The victim], to put his visor down as he was working with the visor up.

08.40hrs - Mine detonates. The deminer, [The victim], receives cuts to his face and left forearm. Section Leader calls medic and driver to Medical Station via radio and goes to scene of accident to find deminer [The victim], seated with his hands to his face.

08.45hrs - Deminer [The victim] walks to the Medical Station, with assistance from the Section Leader and driver [Name removed]. The injured deminer was moved some 100 metres from the accident site and given first aid treatment to cuts to his face. [The victim] was then dispatched to Chenkalady Hospital by the site ambulance.

08.50hrs – [Demining Group] District Office in Batticaloa is informed about the accident via radio.

09.15hrs - Deminer [The victim], arrives at Chenkalady Hospital and is treated for minor cuts and dirt in eyes. He is kept in hospital overnight for observation, due to concerns about the dirt in his eyes.

10:00hrs – [Demining Group] Technical Field Manager, [Name removed] arrived at accident site, and interviews witnesses and took written statements.

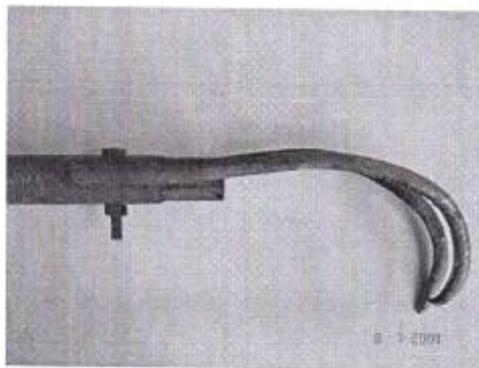
09.00hrs 18:00hrs - BOI team arrive at the [Demining Group] office in Batticaloa and received a briefing from [Demining Group] Technical Operations Manager [Name removed]. BOI Team Leader, [Name removed] gave a briefing on the objectives of the BOI. BOI team interview injured deminer at Chenkalady Hospital, then move to site to conduct investigation.

c. Injuries to Personnel

Deminer [the Victim] suffered minor injuries to his face and left forearm. The facial injuries although bloody proved to be superficial. Due to concerns over dust and foreign objects in [the Victim's] eyes, he was treated in the eye ward at Chenkalady Hospital, in Batticaloa and kept overnight for observation. The deminer is expected to make a full recovery.

d. Damage to Equipment

It is standard practice in [Demining Group] to wear protective clothing (PPE) and visor whilst operating in the minefield area. Therefore at the time of the incident, the injured deminer was wearing standard uniform long trousers, T shirt, work gloves, work boots (standard work issue - not designated as "mine boots"), personal protective equipment PPE (Kevlar body armour, protecting the soft and vital organs) and a safety visor and helmet.



Heavy rake showing minor damage to one of the two prongs.

The only damage to equipment was very slight blast damage to the point of one prong of the heavy rake and damage to the inside of the visor. The damage and blast marks to the visor could only have accrued if the visor was up at the time of the explosion.

e. Training and experience of personnel

(1) Deminer [the Victim] (injured deminer)

Graduated 10th March 2004 (Third Batticaloa Demining Class).

(2) Section Leader, [Name removed]

Graduated 20 November 2003 (First Batticaloa Demining Class).

f. Timings (Daily work schedule)

[Demining Group] deminers work a shift system of 30 minutes on, 30 minutes off. At the time of the accident the deminer was 10 minutes into his second 30 minute shift of the day, following a 30 minute rest period for breakfast. The normal daily routine is listed below.

06.45 hrs Daily briefing

07.00 hrs Work starts, 30 minute shift system

07.30/08.00hrs 30 Minute Break for Breakfast, depending on shift

11.00 - 14.00 hrs Lunch break

14.00 - 18.00 hrs Work restarts until end of day

g. Leave and rest periods

The deminer had taken 8 days leave, 18 days prior to the accident from 12-20 June 2004. The deminer had a 30 minute break approximately ten minutes prior to the accident.

h. Internal Quality Assurance

No written records are kept regarding internal Quality Assurance (QA) checks. The [Demining Group] QA policy is outlined on page 45 of their SOP [Name removed]. Regular QA checks are performed each day as a matter of course by the Section Leaders. The [Demining Group] TA carries out QA and QC checks as part of his technical support to four [Demining Group] sites.

The deminer received a QA check from his Section Leader 5 minutes before the accident. The Team Leader [Name removed] stated to the BOI that he had verbally warned the deminer [the Victim], "more than once" to work with his visor down.

i. External QA

No external QA has taken place on this site.

j. PPE and other equipment

(1) PPE

Although the deminer [the Victim] was wearing the required PPE in accordance with his organisation's SOPs, his visor was up at the time of the explosion. This breach of SOPs led directly to the injuries to his face, which would have otherwise been prevented had his visor been in the correct position.

(2) Metal detector

Metal detectors are not used as part of the raking clearance drill. However, metal detectors are used by the TA as part of the QC checks.

k. Refresher Training

The majority of [Demining Group] deminers graduated on the 10th March 2004 (Third Batticaloa Demining Class). The majority of senior deminers graduated on the 20th November 2003 (First Batticaloa Demining Class).

l. Medical Support

The level of medical support and evacuation available on the day of the accident was appropriate to the needs and in accordance with the organisation's SOP. There had been a formal medical CASIVAC evacuation practice on the 10th May 2004 and regular internal QA of the medical support was carried out every month. The medic and all those involved should be commended for implementing rapid and effective medical treatment and evacuation of the casualty. This resulted in the casualty receiving first aid treatment within five minutes and arriving at the hospital within 30 minutes.

3. Cause (or Contributing factors) of the Injury

(1) SOP of the organisation.

There is no indication to suggest the accident was caused by an error or oversight of the organisation's SOP. Section leaders and overall supervisors appeared to be good, however the deminer involved in the incident was warned previously by the section leader for working with his visor up. The BOI recommend that the organisational SOPs be reviewed for possible improvements. One possible area for amendment could be additional drills for misted visor procedures.

(2) Application of SOP by the deminer involved.

The BOI could not establish conclusively why the accident took place, as no eye witnesses saw the incident at the time of the explosion. However, it was obvious that the deminer had his visor up at the time of the explosion. Damage and blast marks to the inside of the visor could not have accrued if the visor was down at the time of the explosion. The deminer insisted that the visor was down at the time of the explosion but could give no explanation to how the accident took place. It is the opinion of the BOI that the injuries to the deminer's face were a direct result of the deminer's failure to follow the organisation's SOPs. The deminers lack of attentiveness may also have been a major contributing factor to the accident.

(3) Command and control structure imposed by the agency.

There is no evidence to suggest that a failure in the command and control structure of the organisation led to the accident. However, the fact that the section leader had reprimanded the deminer for working with his visor up, 5 minutes prior to the accident, may mean that more serious discipline action should have been taken, rather than a verbal reprimand.

(4) Environmental conditions

There had been heavy rain the night before the demining accident that may have softened the soil to such an extent that the deminer used to the previous days conditions was using too much force when raking. The deminer involved stated that the conditions were different due to the heavy rain the previous night. However, this explanation seems unlikely as the deminer had already worked a complete 30 minute shift that morning; therefore he had more than sufficient time to notice the changed soil conditions. An attentive deminer would immediately compensate for such changing soil conditions automatically.

(5) Security of the minefield

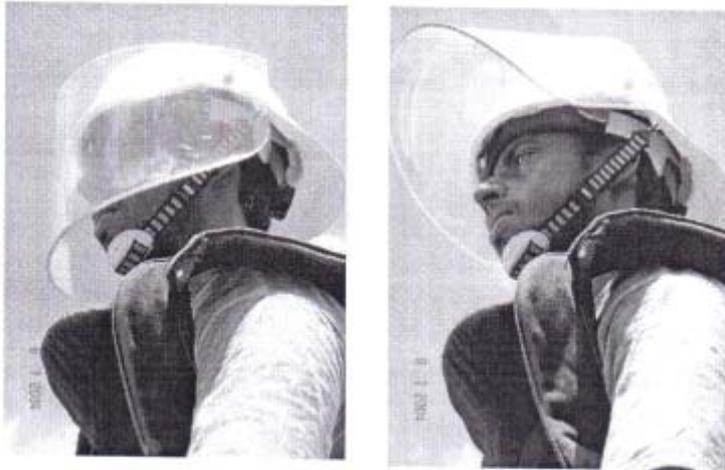
Control of access to and security of the minefield itself is adequate. The location of the explosion was consistent with the strip of mines that had previously been cleared. The moving or relaying of the mine that caused the explosion is not suspected.

5. Conclusions

The BOI considers three possible scenarios for the cause of the accident, all of which are related to the attentiveness of the deminer. These are:

(1) Option 1 - Lack of attentiveness

The physical evidence proves that the deminer visor was up at the time of the explosion. However, the deminer denied that he was working with the visor up, but could give no plausible reason for the accident. A definitive cause of the accident could not be found as the deminer was the only eye witness at the time of the explosion, but his statement contradicts the physical evidence. This contradiction combined with the Section Leader's statement that the deminer was reprimanded for working with his visor up, just minutes before the accident, leads the BOI to deduce that the deminer was not attentive at the time of the accident. Although [Demining Group] has been using the rake method since they started demining operations this is the first reported accident during raking demining operations. Therefore an error in drills due to a lack of concentration, seem the logical cause of the accident.



Mines eye view showing deminer with visor up and down. The blast pattern on the deminers helmet indicated that the deminer had the visor up and was looking to the right, as demonstrated in the photo above.

(2) Option 2 - Change in soil & Environmental Conditions

As previously mentioned, heavy rain the night prior to the accident had softened the soil and increased the humidity at the site. The deminer stated that the rain had changed the soil conditions. However, if the deminer had noticed the change in soil conditions then he should have automatically made allowances for the changed conditions. The increase in humidity may have led to misting of the visor causing the deminers to lift and wipe the visor. This was the case on the morning of the accident and may have been why the deminer working with his visor up.

(3) Option 3 - Inappropriate raking drills

The deminer involved in the accident had found 3 P4 AP blast mines the day before the accident and was within 5 metres of reaching the adjacent safe lane. As no mines had be found following the previous mine in the strip the deminer may have been under the impression that the mine strip had finished and no further mines would be found. This may have caused the deminer to rush and using inappropriate careless raking drills.

4. BOI Findings

It is the unanimous opinion of all of the members of the BOI that option 1, is the most likely scenario for the cause of the mine accident, with possible contributing factors from option 2 and 3. Namely that the deminer, [the Victim], was not sufficiently attentive, which led to the initiation of the mine. In addition, his breach of the organisation's SOPs led to his injuries being worse that they would have been. Although the Section Leader did give [the Victim] a verbal reprimand more severe disciplinary action would have been appropriate as [the Victim] had worked with his visor up on a number of occasions.

6. Recommendations

a. Refresher Training

[Demining Group] should conduct short refresher training to highlight the issues raised in this report and to reinforce the importance of following the agencies SOPs.

Base on the BOI initial findings the [Demining Group] has already taken action to implement a system of regular monthly refresher training. They are also considering implementing a full refresher training course.

b. Discipline Action

The agencies involved should consider taking appropriate disciplinary action against the deminer, as they deem fit.

Base on the BOI initial findings the [Demining Group] convened a Section Leaders' tribunal. The result of the tribunal was the deminer [The Victim] was issued a formal written warning. The tribunal also recommended that a blanket verbal warning be issued to all deminers.

c. Supervision

Team leaders should be reminded of the importance of not only supervising the deminers but also the importance of taking appropriate disciplinary action when deminers fail to follow SOPs. The Team Leader supervising the deminer involved in the accident had already warned the deminer, "more than once", to put his visor down whilst working. However, at the time no further discipline action was taken other than verbal warnings.

Base on the BOI initial findings the [Demining Group] held a Section Leaders' meeting where the authority and responsibilities of the section leaders was reiterated.

d. Review of SOP

It is recommended that the [Demining Group] SOPs are reviewed to see if additional procedures are required. Base on the BOI initial findings the [Demining Group] are implementing a review of the SOPs.

f. External QA & PC

The DMAO should implement a programme of external QA, and QC should be planned and implemented in support of demining operations in Batticaloa.

7. Summary

In summary the BOI team were unanimous in it's conclusion that the logical cause for the explosion was due to operator error with possible contributing factors caused by a change in soil and environmental conditions, due to heavy rain the previous night. The extent of the injuries to the deminer were however directly related to the failure of the deminer to follow the organisational SOP, i.e. working with his visor up.

The organisation and medical evacuation drills were excellent, this was due in no small part to the focus and importance places on medical support and casualty evacuation drills by {Demining Group} TA, [Name removed], which led to the rapid and effective treatment of the casualty. The site medic should also be commended for dealing with the situation in an effective and professional manner.

The BOI were also unanimous in their appreciation of the professional attitude and open manner of the representative of [Demining Group] in assisting the BOI enquiry. The member of the BOI wish to thank everyone involved with supporting the investigation, at short notice.

Dated: 18th July 2004

Signed: Board of Inquiry Team Leader District Mine Action Office Vavuniya UNDP Technical Advisor

Attached Annexes: [Some held on file]

- Annex A. Terms of reference for investigation of demining accident in Sri Lanka
- Annex B. Casualty report deminer Mr. K. Jeykumar, 7th July 2004
- Annex C. [Demining Group] Organisation initial investigation report
- Annex D. Statements of concerned personnel/eye witnesses
- Annex E-1. Site sketch map
- Annex E-2. Photos of accident site, PPE and equipment damage

Victim Report

Victim number: 589	Name: [Name removed]
Age:	Gender: Male
Status: deminer	Fit for work: presumed
Compensation: Not mde available	Time to hospital: 30 minutes
Protection issued: Frontal apron Short visor	Protection used: Frnta apron, Short visor

Summary of injuries:

INJURIES: minor Arm, minor Eyes, minor Face

COMMENT: See Medical report.

Medical report

The following medical details are combiend from the report and annexes made available.

Injuries: Slight cuts to left cheek and bruising to left side efface. Blast abrasions to the left forearm, with dust and dirt particles in both eyes. The Doctor's prognosis is that he will make a full recovery.

Chenkalady Hospital, Batticaloa. Hospital reached within 30 minutes.

MINE ACCIDENT- INITIAL REPORT: 8th July 2004

Description of injuries: Small cut on left cheek and left elbow. Dust in one eye

Treatments given: Medic conducted initial treatment, cleaned wounds on site and then the deminer was taken to nearest hospital. He was examined by doctor and no treatment given but referred to eye hospital to ascertain if there was any damage to the eye. Eye was examined and cleaned at the eye hospital. The eye was covered with a bandage and he was retained at the hospital for further observation.

Current condition of casualties: No pain, resting comfortably in hospital.

Analysis

The Primary cause of this accident is listed as "*Victim inattention*" because the Victim was apparently working in breach of SOPs despite being warned not to. The secondary cause if listed as a "*Field control inadequacy*" because the investigators identified the fact that the Team Leader should have had more control over the Victim – ensuring that he acted as instructed.

Statements

Introduction:

Initial hand written statements were taken by [Demining Group] Technical Field Manager, [Name removed], on the day of the accident. These hand written reports where then translated and typed up at [Demining Group]'s office in Batticaloa. In all 7 statements were written by [Demining Group] staff, 4 of these statements were discounted as [Names removed], could only confirm hearing the explosion but were not eye witnesses and were some considerable distance from the site of the accidents.

The 3 remaining statements are attached below. One statement is from the injured deminer [Name removed], with comments from BOI interview and two statements are from section leader [Name removed]. During the BOI, the statements of the relevant personnel were confirmed and expanded on during interviews. BOI comments and additional information, where relevant, is included at the end of the individual's statement.

Victim Statement

As usual today morning I went to do my demining work with all instruments and tools. Normally we follow all the rules and regulations for deminers, which include the safety measures also. I have started my work around 7.30 a.m. After I had my breakfast at about 8.00 a.m. I have restarted my work at 8.30 a.m. When I was doing mines clearing work on my lane I have seen a small lump in my clearing lane. When I try to shape the lump by using heavy rake a mine set-off. After the mine explode I have feel that it was bleeding on my face and my forearms, I covered my face by fingers and sat down on the spot, team leader took me to the medic spot which is situated in the main lane. Medic gave me some first aid and took me to the Chenkalady Hospital within 30 minutes. To check my eyes I have admitted at Batticaloa base Hospital. More than this the team leader [Name removed] checked me around 2 to 3 minutes before the accident. When the accident took place I had my helmet and visor in the proper way.

Signed: [the Victim]

BOI Interview:

The following observations were made during an interview of [The Victim] by the BOI team at the Batticaloa Hospital on the 8th July 2004. The BOI confirmed the written statements taken by [Demining Group], the previous day. The following questions and answers should be seen as an amendment to the initial statement of the individual.

BOI: How long have you been working as a deminer and which method do you use?

Deminer: Six (6) months - rake method.

BOI: How many mines have you cleared so far?

Deminer: Four or five.

BOI: Could you explain to me how you use the rake, what is your normal body and head position?

Deminer: My left foot and arm are in front and my head and eyes are focused to the place where I'm raking.

BOI: Did you find mines in that working lane before?

Deminer: Yes, I found 3 P4 in the same lane the day before.

BOI: How deep were these mines were buried?

Deminer: Approx. 7cm

BOI: And the mine which caused the accident?

Deminer: When the detonation happened I had reached approx 7cm.

BOI: Which position was your visor when the accident happened?

Deminer: I had the visor down.

BOI: Can you give any reason why the accident took place?

Deminer: No I can give no reason.

BOI: Were any conditions different, which may have effected the demining?

Deminer: Yes, it had been raining the night before so the soil was heavier to work.

BOI: Were you under the influence of alcohol or any drugs when the accident took place?

Deminer: No.

Section Leader Statement

I, [Name removed] called all deminers at 6.45 a.m. in the morning and briefed them as usual and took to the demining site and asked them to work and also I visited the places where they were working. At about 7.30am I changed duty to the other deminers and I was on duty. At about 8am I took them for their breakfast who were resting and I too had breakfast. At about 8.30am I changed the shift and allowed them to go for their breakfast and this was when the incident took place and I was about 300 metres away supervising the other deminers. It was about 8.40 I heard a blast and came back to the location and I saw smoke coming up and also I noticed [the Victim] was seated on the ground, I realised that an accident had taken place. While proceeding to the incident site I informed the medic and driver to proceed to the incident site, I also called [Name removed] and took him to assist me. I saw [the Victim] was having injuries on his cheek and elbow I with [Name removed] took the injured man to the place where the medic was. After he was treated by the medic the medic and [Name removed] (driver) took the injured to hospital.

Signed [Name removed]

Amendment to Section Leader Statement

[The Victim] of Section A-03 met with an accident in the demining field at about 8.40 in the morning. I, [Name removed] was away about 300 metres from the blasting place. When I was only I heard the blasting noise and turned back saw [the Victim] laying down on the ground immediately I informed the medic and the driver and rushed to the place. When I with [Name removed] took the injured to a safety place where the medic was. Later he was then to hospital at about 8.45 with the medic [Name removed] in the vehicle of [Name removed]. Later on I went to the place of the incident where the blast took place and closed the road of the deminers area and brought all the deminers to the camp.

Signed [Name removed]

BOI Interview:

The following observations were made during an interview of [Name removed] by the BOI team at the demining site on the 8th July 2004. BOI confirmed the written statements taken by [Demining Group]. The following questions and answers should be seen as an amendment to the initial statement of the individual.

BOI: Arriving at the accident scene and noticing the type of injuries in the deminer's [the Victim's] face, what were your first thoughts?

SL: [The Victim] did not work with his visor down. Just five minutes before the accident I visited [the Victim] on site, told him to keep the visor down and to go slow since the visor would get covered in damp more quickly.

BOI: Did you observe other deminers in your section working "visors up" before?

SL: Yes, on several occasions during the last couple of weeks.

BOI: How did/do you react?

SL: I order them to put the visor down and give them a warning.

BOI: Did you observe Jeyakumar working "visor up"?

SL: Yes, several times.

BOI: Why do you think the deminers sometimes do work "visor up"?

SL: In the area we are working now, early morning before the sun is really heating up the ground and air, the deminers face the difficulty that their visors on the inside are getting covered with damp - so they can't see properly.

BOI: And what are they doing?

SL: They lift the visor and wipe the damp off.

BOI: From your perspective, what could have caused the accident?

SL: The ground condition compared to the day before the accident occurred were slightly different - since it has been raining heavily the night before. The ground was softer than the day before.