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DDAS Accident Report

Accident details

Report date: 29/12/2019	Accident number: 829
Accident time: 11:55	Accident Date: 06/02/2018
Where it occurred: Task no. MF-1115, Team MAT 2 Blue Line Area, Meiss Al Jabal Village	Country: Lebanon
Primary cause: Victim inattention (?)	Secondary cause: Field control inadequacy (?)
Class: Handling accident	Date of main report: None
ID original source:	Name of source: LMAC
Organisation: [Name removed]	
Mine/device: No.4 AP blast mines and charges	Ground condition: demolition site (explosives)
Date record created:	Date last modified: 29/12/2019
No of victims: 1	No of documents: 1

Map details

Longitude:	Latitude:
Alt. coord. system: UTM Easting 735716 Northing 3671170	Coordinates fixed by:

Accident Notes

visor not worn or worn raised (?)

victim ill (?)

Accident report

A report of this accident was made available by the national mine action authority in 2019. Some of the original formatting has been removed but the original report is held on file. The substance of the report is reproduced below, edited for anonymity. Text in square brackets [] is editorial.

REGIONAL MINE ACTION CENTRE - NABATIYEH (RMAC-N)

BOARD OF INQUIRY (BOI) INVESTIGATION REPORT Ref No. 2 / 2018

Report Category: Accident DEMINING MINE

Cause: Uncontrolled detonation of mine/UXO by: Human

Report Compiled By: [Name removed], RMAC-N Chief of QA

Location: Meiss Al Jabal **Date:** 6th of February 2018

Casualty(s): Human

Agency Involved: [International demining organization]

1. Introduction

In accordance with National Mine Action Standards (NMAS), the Chief of RMAC-N [Name removed] issued a Verbal Convening Order on Tuesday the 6th of February 2018 for an accident investigation Board of Inquiry (BOI).

The board members are [Name removed] RMAC-N Chief of QA, QA officer [Name removed], QA officer [Name removed], QA officer [Name removed], QA officer [Name removed], QA medic [Name removed] and RMAC-N CLO [Name removed].

This is a comprehensive report by the Board of Inquiry (BOI) into the [International demining organization] MMC Accident that occurred on the 6th of February 2018 which is based on the RMAC-N investigation, statements from [International demining organization] personnel involved in the accident and evidence from the accident site.

The accident occurred at 11:55hrs (local time) on the 6th of February 2018 in Blue Line Area , MF-1115, Coordinates 735716-3671170 which is located in Meiss Al Jabal village.

The BOI is an impartial investigation conducted by the RMAC-N on behalf of the Lebanon Mine Action Centre (LMAC). The primary objective of the BOI is to examine evidence in order to conclude the cause of the accident and make recommendations for the prevention of further accidents.

2. Executive Summary

On the 6th of February 2018 at [International demining organization] task MF-1115, an uncontrolled detonation of 2 No 4A AP mines occurred while [International demining organization] MAT 2 Site Supervisor [the Victim] was preparing for demolitions.

The injuries sustained by [the Victim] resulted in: Amputation for both hands at forearm level, loss of left eye and some damage to the right eye without knowing if can see with it or not, fractures in the jaw, swelling and small bleeding in the brain, severe wounds and fractures in the face, and partial lung rupture caused by blast-wave but no fragmentations, shrapnel or even wounds in the chest that was protected by the vest.

Based on all available evidences, the BOI team concludes that the accident occurred with the site supervisor while he was laying out his demolition charges to destroy the first set of 7 x No 4A AP mines out of 5 serials (total of 29 No 4A AP mine).

Although there is conclusive evidence to suggest that incorrect procedures were applied and that SS [the Victim] was not working in accordance with [International demining organisation] Lebanon SOP and National Mine Action Standards (NMAS) at a certain point, but there is no evidence to suggest that the accident (detonation) was caused by an SOP breach.

3. Location of Accident: Task no. MF-1115, Team MAT 2 Blue Line Area, Meiss Al Jabal Village, UTM Easting 735716 Northing 3671170

4. Date and Time of Accident: 6th of February 2018, 11:55hrs (local time).

5. Reported By: [Name removed], Technical Operations manager

6. Reported To: [Name removed], Chief of RMAC-N

7. Person(s) Involved: [the Victim] [International demining organization] Site Supervisor

8. Investigation Team

[Name removed], RMAC-N Chief of QA
[Name removed], RMAC-N QA officer
[Name removed], RMAC-N QA officer
[Name removed], RMAC-N QA medic

[Name removed], RMAC-N QA officer
[Name removed], RMAC-N QA officer
[Name removed], RMAC-N CLO

9. Date and Time of Investigation: 6th of February 2018, 12:50hrs (local time).

10. Execution of the Investigation

Approach to Site

The accident site is located at IMSMA Task number MF-1115 which is located in Meiss Al Jabal village.

[International demining organization] MAT 2 started clearance at MF-1115 on the 20th of October 2017, cleared to date 2,363 m² out of 13,150 m² and destroyed 229 No 4A AP mines.

The RMAC-N BOI team arrived to the accident site at 12:50. RMAC-N CLO [Name removed], and QA medic [Name removed], met the casualty at Meiss Al Jabal Hospital.

After a site briefing and arrival formalities, the team began the investigation. The BOI team approached the accident location and met [International demining organization] TOM [Name removed], at the site.

Process: Visual, Verbal, Instrument: Mine Lab F3 detector.

11. Evidence

11.1 Ground

Accident Site

The location of the accident was on the north side of MF-1115. The area consists of flat area to be used for agriculture, once clearance on the site is completed. (see picture 1) [No pictures were made available.]

The accident was located at the first cleared lane during that day where, 7 x No 4A AP mines were found and marked for demolition later on, by the site supervisor. (see picture 2) [No pictures were made available.]

When the site supervisor [the Victim] approached that lane to place the charges next to the mines for demolition, the accident occurred. (see picture 3) [No pictures were made available.]

Marking: Marking in general on the task was in accordance with NMAS and [International demining organization] SOP.

Crater: The 2 craters that resulted from the 2 mines that exploded were not very different in dimensions (approx. 20 cm in depth and 45 cm in diameter) and about 70 cm away from each other. (see picture 4) [No pictures were made available.]

11.2 Vehicle(s) and Equipment: Ambulance

One ambulance and medic was located at MF-1115 at the time of the accident.

Site Supervisor's Tools

- The MineLab F3 detector is used for sub-surface search down to 20 cm depth, calibrated to an MUV 9 fuse placed in 1m x 1m metal free test pit; as per clearance plan.
- The detonators box was found 10 meters behind the lane where the accident occurred.

- The rest of the charges that were to be used for the rest of the mines were found about 5 meters behind the accident location in a safe area.
- The exploder (mini shrike) was found right at the location of the accident which means it was on the site supervisor during the whole process.
- The injured supervisor's mobile phone was found in the vicinity of the explosion point (which he should not have on him when conducting demolitions; all mobile phones and radios should be 25 meters away).

Items damaged: The only item that was damaged due to the explosion is the PPE vest.

Personal Protective Equipment (PPE)

The site supervisor's PPE was damaged as follows:

- The PPE vest was severely damaged having taken all the immediate blast, however doesn't seem to be penetrated by any shrapnel. (see picture 5) [No pictures were made available.]
- The helmet was found just behind the explosion, with no damage. (see picture 6) [No pictures were made available.]

11.3 Explosive Ordnance involved in accident

The type of explosives involved in the accident is believed to be 2 x No 4A Israeli AP mines and 4 x 100g charges of C4 plastic explosives, each charge linked to a 1m of det cord and all connected to a 9m long det cord main line laid along the mine row; the No 4A AP mine is an Israeli anti-personal blast mine with a plastic body containing 188g of TNT as a main charge fitted with an MUV9 pressure fuse. (see picture 7) [No pictures were made available.]

11.4 Casualty Information

Casualty's position: Site Supervisor [the Victim]

The casualty was found lying on his back, having fallen backwards. He was in a state of semi-consciousness and did not seem to have any breathing problems at the time.

Description of Injuries: Site Supervisor [the Victim].

1. Bilateral forearm amputations.
2. Airway compromised due to multiple facial fractures.
3. Complete loss of left eye.
4. Damage to right eye and socket.
5. Skull fracture.
6. Swelling and small bleeding in the brain.
7. Right eye has some shrapnel in the globe. But is possibly salvageable.
8. Left eye globe completely ruptured.
9. Chest bruising - had protective vest so no further injury noted.
10. Several severe wounds and fractures to the face.
11. Left jaw fracture.
12. Nasal bone fracture.
13. Partial lung rupture caused by blast-wave.

11.5 Interviews

The following [International demining organization] personnel were interviewed by the RMAC-N BOI team on the 6th of February 2018 at MF-1115.

[Name removed], [International demining organization], MAT 2, Team Leader

[Name removed], [International demining organization], MAT 2, Medic

[Name removed], [International demining organization], MAT 2, Senior Medic
[Name removed], [International demining organization], MAT 2, Searcher
[Name removed], [International demining organization], MAT 2, Searcher

12. Accident Details (Circumstances / Sequence of Events)

MF-1115 is a minefield located in Meiss Al Jabal village, Marjeyoun District, south Lebanon, Blue line area, located just along the technical fence. MF-1115 and adjacent minefields were laid all along the southern border by Israeli Enemy between 1982 and 1985, containing mainly No 4, No 4A AP Mines with some minefields containing M15 AT Mines. [International demining organization] was tasked to start clearance on the Blue Line in Meiss Al Jabal village during May 2017. [Name removed]'s team MAT 2 had previously completed clearance on couple of adjacent minefields and started clearance at MF-1115 on the 20th of October 2017, cleared to date 2,363 m² out of 13,150 m² as original task size and destroyed 229 No 4A AP Mines up to the date of the accident. The majority of the destroyed items were found on the surface while the rest were found at different depths (not deeper than 7 cm).

[The Victim] is supervising 3 adjacent minefields at the same time: MF-1109 containing M15 AT mines, MF-1109A containing No 4A AP mines and the minefield where the accident occurred MF-1115 containing No 4A AP mines.

On the 6th of February SS [the Victim] had no demolitions at MF-1109A, he destroyed 1 x M15 AT mine at MF-1109 and then headed to MF-1115 to destroy 29 x No 4A AP mines that were located by MAT 2.

The demolition of the 29 AP mines at MF-1115 was split in 5 serials in the following order:

- 1) 7 mines
- 2) 7 mines
- 3) 7 mines
- 4) 2 mines
- 5) 6 mines

The injured site supervisor had already prepared all his demolition charges (for all the 29 mines) and attached each charge to a 1 meter det cord, but without connecting those charges with each other to the main det cord line, and stored them in a safe area about 5 meters behind the first set of 7 mines to be destroyed.

At the first set of 7 mines the SS had already placed sand bags next to each mine, 9 meters of det cord as main line, 7 x 100 grams charges of C4, each charge attached to 1 meter of det cord, next to each mine.

After site inspection, it was concluded that the SS had already placed his charges next to the 7 mines, laid his main line of det cord and started to link the charges with the main line of det cord starting from mine 7 towards mine 1; the explosion happened at mine 6 position; the whole system exploded except 3 x 100g charges, each attached each to a 1 meter of det cord, that were placed next to mines 1, 2, 3 but not in final position; showing that charges on mines 4,5,6 and 7 got all affected by the det cord which blew up (either they were properly connected to the main line or accidentally running over the main line of det cord). (see picture 8) [No pictures were made available.]

See below a diagram explaining the accident scene after the explosion:



M1 is the first mine, still in place, intact, next to it 100g charge of C4 attached to 1 meter branch of det cord. (see picture 9) [No pictures were made available.]

M2 is the second mine, still in place, intact, next to it 100g charge of C4 attached to 1 meter branch of det cord.(see picture 10) [No pictures were made available.]

M3 is the third mine, still in place, intact, next to it 100g charge of C4 attached to 1 meter branch of det cord.(see picture 11) [No pictures were made available.]

M4 is the fourth mine, still in place, intact, next to it a small hole with explosives smell indicating that the 100g C4 charge placed next to it, has exploded without affecting the mine (the charge was not placed in its final position: as close as possible to the mine). (see picture 12) [No pictures were made available.]

M5 is the fifth mine, still in place, partly burned, next to it a small hole with explosives smell indicating that the 100g C4 charge placed next to it, has exploded. (the charge was not placed in its final position: as close as possible to the mine). (see picture 13) [No pictures were made available.]

M6 is the sixth mine which exploded (where the accident occurred) along with the 100g C4 charge placed next to it, which initiated the whole system of det cord.

M7 is the seventh mine: exploded along with the 100g C4 charge placed next to it (the charges next to mines 6 and 7 were at their final position, placed as close as possible to the mines, since they blew up, and connected to the main line of det cord which also detonated).

When interviewing MAT 2 TL[Name removed], he stated the following:

The team members were at a safe point 100 meters away, medic and ambulance driver were at the ambulance point, SS [the Victim] was preparing for demolition and TL [Name removed] was 25 m away from SS; [the Victim] had already placed the sand bags, the main det cord line and charges next to the mines with his helmet on but the visor was up, he was kneeling facing the mine row, then he shouted to TL that he was one 100g charge short to conduct the demolition and that he was going to use a charge from another serial and replace it later and tasked him to go search for it near the explosives storage area; 30 seconds later the accident occurred. (TL had turn his back to [the Victim] and left the scene without seeing what happened and caused the explosion).

The direction of clearance is always done by approaching the mines from the rear, with the MUV fuse on the opposite side to the direction of excavation; this procedure was correctly applied looking at the excavation done on all the marked mines at the accident site: all excavations on located mines were done to the rear (opposing side to the MUV fuse), as the mines were still buried with only small part of the rear showing, which reduce the possibility of touching or disturbing the fuse by the injured site supervisor when placing the charge. (see picture 14) [No pictures were made available.]

As part of the investigation, the BOI searched the injured SS's personal kit and found a medication originally prescribed for neck pain, its side effects can cause dizziness, headache, agitation, insomnia, irritability, fatigue, visual disturbance, (blurred, double vision), cramps, and depression. This medication was not declared to the team's medic or senior medic as it is

required. We are unable to confirm whether the SS had taken the medication and if he had, how long for, as he did not declare it. (see picture 15) [No pictures were made available.]

All the mentioned above (the excavation procedure and the medication) strengthen the possibility of the injured site supervisor losing balance, tripping or fading and accidentally falling over with both hands hitting the mine.

The following information are based on an assessment of the evidence obtained by the RMAC-N BOI team at the accident site and from witnesses' statements.

Chronology of Events (According to witness statements and site documentation)

6th of February 2018:

06:06 Arrival at the site. Morning brief by SS and locators tests.

06:30 Start of operations.

10:30 Team stop operation and start preparing for demolitions for both MF-1109 and MF-1115

11:55 Accident occurs.

11:57 MAT 2 Medic [Name removed], [International demining organization] senior medic [Name removed] along with MAT 2 deminers evacuated the casualty from the mine row (the injured SS was found on his back having fallen backwards towards a safe area) and started preparing him for MEDEVAC.

12:00 RMAC-N was informed

12:10 Ambulance left the site, evacuating the casualty to Meiss Al Jabal Governmental Hospital; MAT 2 medic [Name removed] accompanied the casualty.

12:20 Ambulance arrived to Meiss Al Jabal Hospital

12:25 [International demining organisation] TOM [Name removed] and FOM [Name removed] arrived to the accident site.

12:50 RMAC-N BOI arrived to accident site and started investigation.

16:49 Lebanese Red Cross Ambulance moved the casualty from the hospital to UNIFIL barracks in Meiss Al Jabal for evacuation by helicopter to Beirut airport.

16:54 RMAC-N BOI left the site, heading to UNIFIL barracks in Meiss Al Jabal

17:35 UN helicopter left the barracks in Meiss Al Jabal heading to Beirut airport.

17:50 Lebanese Red Cross ambulance left Beirut airport moving the casualty to AUH for further treatment.

The investigation was followed up by a visit to the hospital to check on the casualty's medical situation and collect medical report on the 6th and 7th of February 2018 by the BOI team.

12.1 Medical Assistance and Evacuation (procedure, treatment, equipment.)

On the 6th of February 2018, there was one medic [Name removed] at task MF-1115 who was positioned with the ambulance and the driver at the control point during clearance operations, while senior medic [Name removed] was covering as medic for the adjacent site.

At 11:55 hrs an explosion occurred. The medic moved immediately, and reached the accident location, finding one casualty [the Victim], he conducted first aid and stabilization procedures assisted by senior medic, who was called immediately for support: tourniquets were placed on

each arm, and bandaging of the stumps. Bandaging of the face was also applied to stop bleeding.

According to the statements from [International demining organization] personnel at the site and from the radio log, the time taken for the casualty treatment at site was 15 minutes and the time to reach the hospital from the site was 10 minutes.

The last CASEVAC exercise for the team was done on the 5th of February 2018.

12.2 Geography and Climate: The area of the accident site is located in Meiss Al Jabal village. The task site is on a mainly flat area, dry soil, containing very light vegetation.

At the time of the accident the weather was clear, sunny and hot. Visibility was good.

12.3 Communications

[International demining organization] MAT 2 utilized handheld VHF Radios for internal team communications. Communications between the team and the RMAC-N were maintained by VHF radio. The team also had access to mobile phones (only through site supervisor and team medic).

12.4 Command and Control: The [International demining organization] MAT 2 team composition was in accordance to their SOP; previous internal and external QA reports had indicated good command & control at all levels.

12.5 Quality Assurance and Quality Control

External QA

Between the period stretching from the 20th of October 2017 to current date weekly basis RMAC-N QA inspections were conducted at MF-1115; all visits were acceptable.

Accreditation: [International demining organization] MAT 2 received a renewal for the full accreditation on January 2018.

Training: The last training received by [International demining organization] MAT 2 was on the 5th of January 2018 following Christmas and New Year stand down.

13. Details of Non Compliance to Agency SOP / NMAS / IMAS

The following points are clear and obvious evidence of breach of [International demining organization] SOP / NMAS:

1. SS was linking the charges to the main line of det cord simultaneously with placing the charges next to the mines (the whole system should be prepared and connected to the main line in a safe area; the only approach to the mines should be for charge placing only).
2. The injured SS was working with his visor up and then removed his helmet.
3. SS's mobile phone was at the accident location (when conducting electrical demolitions all radios and mobile phones should be dropped 25 meters away from electric detonators).

All of the points mentioned above are clear SOP breaches; however none of those have been identified as direct contributing factors to the uncontrolled detonation.

14. Task Status: Current. Start Date; 20th October 2017.

15. Background Information

[International demining organization] was tasked to start Blue Line minefields clearance in Meiss Al Jabal village during May 2017. [International demining organization] has completed

clearance on couple of minefields and still ongoing for other minefields among which is MF-1115. All Blue Line minefields are military pattern laid by IE and contain hundreds of mines, mainly No 4 and No 4A AP mines.

16. Conclusions

From the evidence gathered the board concluded the following:

- a. An uncontrolled detonation of 2 No 4A AP mines plus 4 x 100g C4 charges , each charge attached to 1 meter det cord branch and 9 meter main line of det cord, occurred with the SS [the Victim] while he was preparing and placing his charges prior to conducting demolition.
- b. The injured site supervisor was taking a medication that has side effects such as dizziness.
- c. The injured SS had his helmet on but visor up, however the helmet was removed at a certain point for unknown reasons, but most likely this has a certain relation to the medication found in the SS's personal kit.
- d. It is clear that the SS hit the mine with both his hands (most likely he did not disturb the mine when placing the charge, but lost balance or tripped and fell over).
- e. Nobody saw exactly what happened and caused the detonation of the mine, since the SS is the only person who conducts demolitions and the team leader who was supposed to assist and observe left the scene at that point.
- f. The missing 100g C4 charge was used by mistake during the M 15 AT mine demolition at MF-1109.
- g. PPE (body armour) was worn in compliance with [International demining organization] SOP/NMAS, while the helmet was not.
- h. CASEVAC and MEDEVAC were conducted by [International demining organization] staff in a timely and professional manner.
- i. During investigation RMAC-N BOI team received full cooperation from [International demining organization].

17. Further Actions and Recommendations

- a- Refresher training for all [International demining organization] teams, and emphasize the correct sequence of actions for demolitions drills for site supervisors. (completed)
- b- Discussions to be made with [International demining organization] on how to ease pressure off site supervisors, especially those who run Blue Line minefields, concerning numerous demolitions per day and how can team leaders help or contribute in this process.
- c- When conducting demolition by site supervisor, the team leader should always be in a safe area which allows him to observe and provide the assistance needed; should he leave this area for any reason the person conducting demolitions (site supervisor) should stop all actions immediately until the observer comes back to his designated area.
- d- MF-1115 to be temporarily suspended until further notice.
- e- [International demining organization] MAT 2 to be moved to a different clearance site.
- f- Re-enforcement of declaring what medication any team member is taking shall take place.

- g- To ensure that all body parts, bones, etc, are cleared from the site before anyone starts working there again.

Report Written and Agreed By: [Name removed], RMAC-N Chief of QA, acting Chief of Ops.

Comments by [Name removed], Chief of RMAC-N.

Victim Report

Victim number: 1047	Name: [Name removed]
Age:	Gender: Male
Status: supervisory	Fit for work: no
Compensation: Not made available	Time to hospital: 25 minutes
Protection issued: Helmet; Short visor; Vest	Protection used: Vest

Summary of injuries: severe Chest; severe Eye; severe Face; severe Head

AMPUTATION/LOSS: Hand Both; Eye

COMMENT: No Medical report was made available. The Victim survived, retained some sight in one eye and was fitted with computerized prosthetics that allow him to grip some items. This has been seen in press reports.

Analysis

The primary cause of this accident is listed as ‘Victim inattention’ because it seems that the Victim fell over while setting the charges. The mines were apparently over a metre apart, so he is unlikely to have landed with his hands on separate mines. Equally, he is unlikely to have landed with two hands on the same mine. Without access to the photographs it is impossible to be confident but it seems likely that one hand was holding a demolition charge when he fell and put his other hand onto a mine which already had a demolition charge beside it. The mine detonated and its shock wave set off the demolition charge beside it, a detonation which was transferred in a microsecond to the charge in the Victim’s other hand via the detonating cord.

If the Victim fell over because of the side-effects of medication that he had not declared, that would be hard for anyone else to know and so control. However, the investigators’ concern for the Site Supervisors’ workload in this area may imply that the Victim was simply tired and fell over.

The Victim was the Site Supervisor and was breaching SOPs including failing to wear PPE properly, so he was setting the deminers under his control a bad example. His behaviour was a ‘Field control inadequacy’ that may not have caused the accident, but definitely made the consequences worse because wearing a visor could have saved his eyes.

Victims with injuries as extensive as this rarely survive, leading me to infer that the immediate medical care must have been very good. The evacuation was commendably fast and, presumably, staff at the receiving hospital staff were also very good at their jobs.