

DDAS Accident Report

Accident details

Report date: 29/12/2013	Accident number: 801
Accident time: 10:00	Accident Date: 08/12/2010
Where it occurred: El Maria, Kassala	Country: Sudan
Primary cause: Unavoidable (?)	Secondary cause: Inadequate equipment (?)
Class: Excavation accident	Date of main report: 08/12/2010
ID original source: None	Name of source: [Removed]
Organisation: [Name removed]	
Mine/device: No.4 Iran AP Blast	Ground condition: dry/dusty hard metal fragments
Date record created:	Date last modified: 29/12/2013
No of victims: 1	No of documents: 1

Map details

Alt. coord. system:	Coordinates fixed by: GPS
Map east: 36 35' 41.9"	Map north: 15 25' 37.6"

Accident Notes

handtool may have increased injury (?)
Inadequate detector pinpointing
no independent investigation available (?)
request for machine to assist (?)
squatting/kneeling to excavate (?)

Accident report

Details of this accident were made available in 2013. It is not clear whether the UN conducted an independent accident investigation. The content of the internal accident report is reproduced below, edited for anonymity. Text in square brackets [] is editorial.

From IMSMA report:

"The Team Manager observed the deminer carrying out clearance drills. The deminer had a signal and it was during his initial prodding that the mine detonated. The deminer was blown backwards, spun around and ended up on his back in the clearance lane; however his right arm ended up in the uncleared area."

Internal Accident report

mine/uxo accident and incident detailed investigation report

IMCT 5 Task ID: NR-880 EI Maria, Kassala State

References:

1. Operations Manager email 08/12/2010 @ 14.36hrs
2. NTSGs, Edition 10, Version 1 dated 01/09/2010
3. IMAS
4. [Demining group] SOPs July 2009
5. Task Dossier NR-880
6. IP dated 10/08/2010.

Part one - Introduction

Team Manager IMCT4 was tasked to carry out an Internal Investigation into a mine accident at Task ID: NR-880, EI Maria (IMCT5 current task location) by [Demining group] Operations Manager, via phone and then formally by email on 08/12/2010.

1. Demining Organization: [Demining group].
2. Organization sub-unit: IMCT5, Task ID: NR-880. Team Name: IMCT5
3. Worksite Supervisor: [Name removed]
4. Location of Accident: Eastern Region, Kassala State, Kassala, EI Maria, Task ID: NR-880
GPS: E36 35' 41.9" N15 25' 37.6"
5. Date & Time of Accident: 08/12/2010 at approximately 10h00
6. Type of Accident: Mine related (No 4 A/P mine detonation)
7. Executive Summary:

The deminer was busy with clearance in M/F No3, Lane No1 and had an indication from his F3 mine detector. He then carried out the prodder drill investigating the signal and the mine detonated. It is unclear at present why the No4 A/P mine detonated. It appears that the mine was slightly outside the 10cm overlap of the basestick but this could not be confirmed due to the movement of the marking rocks and base stick when the blast occurred

Part two - Details of Accident

1. Questioning the witnesses it appears that the deminer was carrying out 'investigation' of a signal using his prodder when the detonation happened. [The Victim] the casualty was working in M/F No3, Lane No1 and mine-row No 2. The clearance lanes are 50m apart because of AT and No4 (Iranian) A/P blast mines in the minefield and deminers was present in Lanes No 2, 3, 4 & 5 the accident occurred. Team Manager informed me that he was observing the deminer approximately 20m away to his right. The DTL was observing demining activities from behind the deminer approximately 40m away.
2. Numerous sub-surface PM-1 Sub-munitions & 60mm HE Mortars have also been located during the clearance period.
3. The minefields were laid by GOS. Numerous battles occurred in the region. The Jebel directly in front of the minefield is a Military Post.
4. The deminer was using the MineLab F3 detector, prodder, excavating tool, basestick, 50mm paint brush, Rofi PPE & helmet with visor.
5. See photographs and map attached.

6. Post Accident Activities. The following was carried out during the investigation:

- Visit worksite:
- Question witnesses:
 - [Name removed] - Team Manager
 - [Name removed] - Deputy Team Leader
 - [Name removed] - Deminer Lane No2
 - [Name removed] - Deminer Lane No3
- Check Site Board, mapping & Site Folder
- Deminers MineLab F3 detector check (M30 fuze in detector test pit)
- Checked the PPE. Helmet/Visor & deminers equipments

Part three - Accident Site Conditions

1. The accident site was laid out as per [Demining group] SOPs (pictures attached).

- Worksite layout and marking:

The worksite is large and the minefield is over 1km long. It consists of 11 clearance lanes 50m+ apart. The deminers were working in lanes 1 - 5 at the time of the accident. The worksite is marked as [Demining group] SOPs using various colored rocks. The deminer had cleared a 1m wide lane out to 4m.
- Directly opposite Lane No 2 is a Forward Medical Point.
- Ground & terrain: The ground is very dry and of medium density. The area is flat and contains highly metal contaminated.
- Vegetation: Grass about 5cm high covers the area and there are occasional small to medium sized bushes. The area of the accident had no bushes just grass.
- Weather: Dry and hot.
- See photographs attached.

Part four - Team & Task Details

Team Composition. The Team consisted of:

MMC worksite: Team Manager
Deputy Team Leader
Deputy Assistant Team Leader
Deminer x 8
Medic & ambulance driver
Driver (other) x 2

MDD worksite: MDD Coordinator
Senior Deminer x 1
MDD x 4
MDD Handler x 4
Deminer x 4

1. Qualifications & Experience:

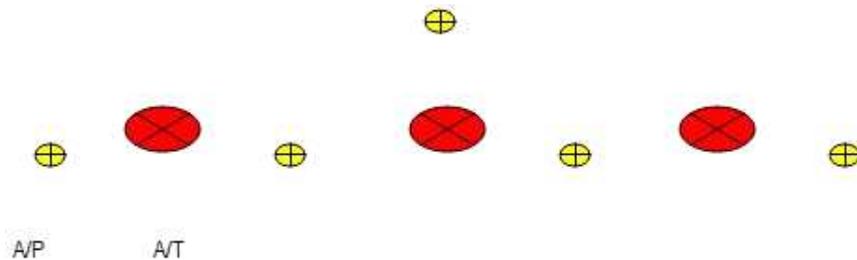
Team Manager: EOD Level IV (21 yrs)
DTL: EOD Level III (3 yrs)
Deminer: [Demining group] demining course (2 yrs)

Internal QA: Form L: 04/12/2010 - Medium (MMC worksite)
Form L: 05/12/2010 - Medium (MDD worksite)
Form N: 06/12/2010 - Medium (MMC worksite)
External QA: Form M: 01/12/2010 - High (MDD worksite)

4. Task Documentation:

- Task Dossier issued
- Recce Report
- IP submitted
- IP approved
- M/F Report submitted
- Technical Survey to located mined area
- Clearance activities
- Clearance depth 13cm
- Assets: MMC, MDD & Mechanical
- Clearance Plan (MMC followed by Mechanical - MDD area reduction & 10% QC on MMC & Mechanical

5. mines are laid as follows:



Task began on August 19, 2010 and 70 operational days to date.

Items found up to date:

- 300 x PRB-M3 A/T blast mines located & destroyed
- 290 x No 4 A/P blast mines located & destroyed
- 345 x UXO located and destroyed
- 400 x PM-1 Sub-munitions located and destroyed.

Part five - Equipment & Procedures Used

1. Equipment used: The following equipment is used on site:

- MineLab F3 detector.
- Prodder.
- Excavating tool.
- 50mm paint brush.
- Small & large vegetation cutters.
- ROFI PPE.
- Helmet/Visor.
- 1.2m Basestick.
- Motorola 340 H/H VHF radios.
- Motorola VHF & CODAN HF vehicle fit radios.
- Zain, Sudani & Thuraya phones.

2. MineLab F3 is tested prior to work in the detector test pit which has a M30 fuze at 13cm. The detector is tested periodically throughout the working day using the MineLab F3 test piece carried by each deminer.

3. Procedures used: Demining is carried out as per [Demining group] SOPs & NTSGs.

4. Work Routine:

- Daily briefing 06h35 – 06h45

- Medical briefing 06h45 – 06h55
- Detector testing 06h55 – 07h05
- Operations 07h05 – 08h10 (Shift 1)
- Break 08h10 – 08h30
- 2nd Shift 08h30 – 09h15
- Break 09h15 – 09h30
- 3rd Shift 09h30 – 10h30
- Break 10h30 – 10h45
- 4th Shift 10h45 – 11h30
- Breakfast 11h30 – 12h30
- Demolitions 12h30 – 13h30 (Tuesday and Thursday)

Part six - Explosive Hazards Involved

No4 (Iranian) A/P blast mine was involved in the accident.



Explosive content: 155g of TNT and 23g booster charge of PETN/TNT (88/12)

Operating pressure: 8kg

LengthxWidth: 135mm x 65mm

Fuze options: No 9 Igniter similar to MUV type fuzes

Description/Notes:

The No 4 is a rectangular shaped plastic bodied a pers mine which is designed to wound or kill by blast effect. The No 4 appears to be an updated version of the wooden bodied No 3 A pers mine which is no longer in service. The mine body consists of two over lapping plastic boxes hinged clamshell style at one end. The upper section has four reinforcing ribs arranged in a rectangular pattern on top. It contains 188 g of TNT and is actuated by 8 kg of pressure. The fuze assembly is similar to the Russian MUV series pull with some minor modifications. It has a medium metal content and can be located using metal detectors under most field conditions.

The No 4 is actuated by 8 kg of pressure on the upper lid. The force displaces a collar from the fuze. With the collar removed a spring loaded firing pin is free to snap onto the percussion detonator and begin the explosive chain.

The No 4 can be located using metal detectors under most field conditions. On detonation the mine will cause immediate blast injury to the victim as well as hearing damage to anyone within a 5 meter radius and it will also propel secondary fragmentation to a radius of 25 to 100 meters.

Average depth of mine from surface to top of mine is approximately 5mm. Information gathered indicate that some mines have been located on the surface and one mine was buried 25mm from surface to top of mine. No tripwires were attached or booby trapped so far.

Blast hole was 10cm deep and 40cm across.

Accident site:



Mine-row No 2 Mine-row No 1 Prodder Handle & Prodder

Part seven - Details of Injury

Deminer [The Victim] suffered damage to one finger on right hand and some bruising and major damage to his left hand resulting in the amputation of one & a half fingers. Bruising and slight burns to the upper & lower limbs.

According to witnesses the deminer was thrown backwards & upwards, spun around and landed in the clearance lane on his back with his right arm inside the uncleared area

I visited [the Victim] in hospital on 09/12/2010 and he was in a good condition and high spirit. I asked him what happened and he explained that he picked up a signal with his F3 mine detector and investigated the signal by prodding. He then identified the signal as a mine and while using the brush to clear the dirt when the mine detonation occurred. He also stated that he was dazzled for a few seconds and then saw his one hand was lying in the uncleared area about 20cm away from a No4 AP mine that was visible he then extracted his hand slowly he stood up and made sure he was in the safe lane and walked towards the baseline because he did not want his companions to step on a mine while extracting him in the mine line.

Part eight - Equipment/Property/Infrastructure Damage

The deminer's prodder was broken between the probe and handle and was blown into the uncleared area to the right of the deminers clearance lane. The deminers base stick was broken in half.

ROFI PPE & LDH Lightweight Demining Helmet/Visor were worn by the deminer slight damage sustained to the PPE jacket and major pock-marking to the Visor.

Photographs of PPE & Helmet/Visor damage:



Part nine - Medical and Emergency Support

Site Medic complete with two trauma packs and fully equipped ambulance on site. Motorola VHF CODAN, HF vehicle fit radios installed and a Zain cell phone.

Time-line:

- 10h00: Mine detonated by deminer in M/F No 3, Lane No 1 (mine-row No 2);
- 10h00: DTL blows whistle and send initial warning of mine strike casualty to Team Medic;
- 10h02: All deminers out of clearance lanes and into safe lane awaiting further instructions;
- 10h02: Assistance & directions given to injured deminer (DTL with casualty);
- 10h03: Casualty details relayed to Medic via radio (ID No & Blood Group);
- 10h04: Team Manager informs Operations Manager of mine related accident via telephone & provides brief outline of deminers injuries;
- 10h04: Team Manager informs Regional QA Officer - North of mine related accident via telephone;
- 10h05: Team Manager, DTL, 4 x deminers administer immediate first aid and Team Manager directs Ambulance & Medic to Forward Medical Point;
- 10h09: Casualty taken to Forward Medical Point receiving treatment from both Team Medics (Senior Deminer remain in Clearance Lane to secure site until Team Manager's arrival);
- 10h30: Casualty treatment completed and ambulance departs for Kassala Military Hospital;
- 10h35s: Team Manager speaks to International Medic regarding casualty injuries;
- 10h40: Provide updates to Operations Manager & Regional QA Officer - North;
- 10h45: Accident site secured and relevant pictures taken. Await arrival of UNMAO Investigation Team;
- 10h50: Team Manager informed IMCT4 Team Manager of accident;
- 11h10: Casualty arrives at Kassala Military Hospital;
- 12h00: Team stood down, Team Manager, DTL, two witnesses & medical cover remain at CP;
- 13h45: Regional QA Officer - North arrives on site for Initial Investigation.

Part ten - Reporting Procedures

1. The reporting procedures were followed as per [Demining group] SOPs & NTSGs; however, I was informed by the Team Manager that there was slight confusion regarding the casualties ZAP No & Blood Group details to {Demining group} Khartoum which was eventually rectified.
2. CASEVAC Reporting Form and other documentation were completed.

Part eleven - Sequence of Events

10h00: Mine detonated by deminer in M/F No 3, Lane No 1 (mine-row No 2);
10h00: DTL blows whistle and send initial warning of mine strike casualty to Team Medic;
10h02: All deminers out of clearance lanes and into safe lane awaiting further instructions;
10h02: Assistance & directions given to injured deminer (DTL with casualty);
10h03: Casualty details relayed to Medic via radio (ID No & Blood Group);
10h04: Team Manager informs OM of mine related accident via telephone & provides brief outline of deminers injuries;
10h04: Team Manager informs Regional QA Officer - North of mine related accident via telephone;
10h05: Team Manager, DTL, 4 x deminers administer immediate first aid (minimal) and TM directs Ambulance & Medic to Forward Medical Point;
10h09: Casualty taken & arrives at Forward Medical Point receiving treatment from both Team Medics (Senior Deminer remain in Clearance Lane to secure site until TM's arrival);
10h30: Casualty field treatment completed and ambulance departs for Kassala Military Hospital;
10h35: TM speaks to International Medic regarding casualty injuries;
10h40: Provide updates to OM & Regional QA Officer - North;
10h45: Accident site secured and relevant pictures taken. Await arrival of UNMAO Initial Investigation Team;
10h50: TM informed IMCT4 TM of accident;
11h10: Casualty arrives at Kassala Military Hospital;
12h00: Team stood down, TM, DTL, two witnesses & medical cover remain at CP;
13h45: Regional QA Officer - North arrives on site for Initial Investigation;
14h30: IMCT4 Team Manager arrives on site to carryout Internal Investigation;
17h00: IMCT4 Team Manager departs El Maria.

Part twelve - Conclusions and Recommendations

1. According to the casualty he already identified the mine and was cleaning the area around the mine with his paint brush. He might have pushed the brush to hard against the mine or fuze. No force to be used at any time
2. It is recommended that deminers approach any signal with care. Prodding should be at angle of 30degrees and not by force and begin 10cm back from the signal.
3. Once the items has been located, and found to be a mine, only sufficient excavation is to take place to allow positive identification. If, in the case of the signal being a No4 A/P mine, the deminer must approach the mine from the rear.
4. If the No4 mine is underground you will not know how it is lying when you get the signal from the mine detector and when you start your prodding procedures you might prod on top of the mine or the fuze and that make this mine very dangerous.
5. The Arjun concept might be an option when there is a presence of No4 AP mines in the task given
6. It is recommended that refresher training takes place to include locating the area of the No 4 fuze by detector.

Signed: Team Manager [Demining group]

[Good maps of the task site are held on record along with other photographs.]

Statement of [Name removed], Team Manager, IMCT5, [Demining Group] North Sudan Programme

I, [Name removed], was supervising the demining activities at Task ID: NR-880, El Maria on December 8, 2010. The DTL, DATL and one Senior Deminer were also acting as supervisors due to large M/F and number of clearance lanes involved.

At 1000hrs, whilst observing the deminer in Lane No 1 carrying out an investigation of a detector reading from approximately 20m away, and to the right side, a No 4 (Iranian) A/P blast mine functioned by what appeared to be the deminers 'prodding movement'.

The deminer was blown backwards (he was in the kneeling position at the time of the explosion), spun around and landed on his back in the clearance lane. He remained motionless for approximately 30secs and then stood up and was directed to the DTL who was in that particular clearance lane (approximately 25 - 30m behind), by the TM & DTL.

The deminer appeared to be fully aware of the situation, was calm, remarkably relaxed, though obviously in some pain.

The DTL blew his whistle as soon as the explosion occurred and all other deminers were directed out of their clearance lanes and into the safe lane to await further instructions.

Once a threat assessment was made the DTL & TM approached the deminer and began immediate first aid; the DTL then called for other deminers to come forward with the stretcher to assist with the CASEVAC.

TM instructed the medic and ambulance to prepare their area at the Forward Medical Point. (One ambulance and both medics).

The deminer's PPE & Helmet/Visor were removed in the clearance lane (approximately 5m wide at this point) and TM & one deminer applied pressure to the brachial area whilst the stretcher was positioned for CASEVAC. The casualty was placed and secured on the stretcher and taken to the Forward Medical Point.

The casualty was handed over to the two medics at 1009hrs.

The medics stabilised the casualty who had suffered fairly heavy injuries to his left hand, minor injury to one finger on his right hand, and some superficial burns to the upper & lower limbs.

The on-site treatment was completed by 1025hrs and the ambulance complete with support vehicle and two deminers of the same blood group (A+) left site at 1030hrs.

Once the ambulance had left site for Kassala Military Hospital the TM secured the accident site and returned to the CP to debrief the remaining team members.

At the time of the accident the DATL was in the CP having just returned from an EOD Spot task recce.

Due to the size of M/F No 3, clearance was only being carried out in Lane 1 - 5 which ensured adequate supervision could be maintained throughout clearance activities.

Whilst securing the site the TM noticed the damaged prodder, which had separated at the handle/probe point, had come to rest approximately 10m behind & to the right-side of the deminer in an uncleared area. The end of the prodder was bent at an angle of 30degrees.

It was also noticed that the deminer had been very fortunate as his right arm had landed in an uncleared area to the left of the clearance lane, and about two feet away from an intact No 4 (Iranian) A/P mine.

During the time of the accident and subsequent CASEVAC procedure the TM informed the OM of the accident and also the Regional QA Officer - North who was in UNMAO Kassala covering for the Ops Officer who is presently on leave.

The DTL transmitted the necessary information to the medic, as and when required, throughout the CASEVAC procedure.

The Team performed very well; they were professional, calm, well controlled and safe. The medics provided good treatment and the casualty was constantly reassured, and all bleeding was stemmed and wounds bandaged quickly. As the deminer was conscious and fully aware of the situation, it made the medics task a little easier as they could all communicate regarding possible additional injuries.

The ambulance arrived at Kassala Hospital and the casualty was transferred to the Hospital staff at 1110hrs.

The deminer's basestick was broken in two by the blast and three marking stones had also been moved (one by the deminers right arm). The blast hole was 10cm deep and 40cm across (GPS: E36° 35' 41.9" N15° 25' 37.6").

It is clear from the damage sustained to the deminer PPE & Helmet/Visor that further, more serious injuries, would have occurred without it.

This is a true and correct statement by [Name removed], Team Manager, IMCT5, [Demining group], North Sudan.

Signed: Team Manager

El Maria, Kassala State

Victim Report

Victim number: 997

Name: [Name removed]

Age:

Gender: Male

Status: deminer

Fit for work: not known

Compensation: Not made available

Time to hospital: 70 minutes

Protection issued: Long visor; Frontal apron

Protection used: Long visor; Frontal apron

Summary of injuries: minor Arms; minor Hand; minor Legs

AMPUTATION/LOSS: Fingers

COMMENT: No Medical Report was made available.

Analysis

The primary cause of this accident is listed as *“Unavoidable”* because it seems that the Victim was working as directed when the accident occurred. It seems unlikely that the Victim was using his paintbrush at the time of the detonation for three reasons. First, a photograph showed a paintbrush with its bristles apparently intact. Second, it is unlikely that he would have had both hands on the short paintbrush, - it is far more common to have two hands on a prodder. Third, the Team Manager was observing and stated that he was prodding. Victims are frequently confused about the events leading up to an accident so no criticism of the victim is implied.

The secondary cause is listed as *“Inadequate equipment”* because the short-handled paintbrush would have placed the Victim’s hand too close to an initiation and because the prodder (not photographed) was not blast-resistant, so broke up in the blast. It is possible that the Victim would have suffered lesser injuries if using blast-resistant tools that were designed for purpose.

The demining group’s internal investigation is exceptionally thorough and commendably transparent, allowing a possible procedural error to be identified. The report’s conclusions include comments that:

“Prodding should ... begin 10cm back from the signal” and *“if the No4 mine is underground you will not know how it is lying ... when you start your prodding procedures you might prod on top of the mine”*.

The dimensions of the No.4 are 135mm x 65mm, so starting 10cm (100mm) from the signal of a concealed mine could mean starting to prod/excavate too close to the mine. While experienced deminers may be able to tell the orientation of a concealed No.4, it is desirable to expose a side of the mine by approaching from a distance so it would be safer to start excavations at least 200mm back from the signal (and 200mm is generally recommended).

The ground was hard, so all excavations would be dangerous. This means that the investigator’s suggestion of using a mechanical rake (Arjun) in advance of the deminers was sensible (although not apparently done).