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DDAS Accident Report

Accident details

Report date: 29/12/2013	Accident number: 802
Accident time: 08:55	Accident Date: 13/04/2011
Where it occurred: IMCT4 NR-928 Rasai, Kassala State	Country: Sudan
Primary cause: Field control inadequacy (?)	Secondary cause: Management/control inadequacy (?)
Class: Missed-mine accident	Date of main report: 14/04/2011
ID original source: None	Name of source: [Removed]
Organisation: [Name removed]	
Mine/device: PRB-M3 AT 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: E36 34' 16.7"	Map north: N16 39' 54.6"

Accident Notes

inadequate area marking (?)
mechanical follow-up (?)
mine/device found in "cleared" area (?)
no independent investigation available (?)
protective equipment not worn (?)

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 demining group's internal accident report is reproduced below, edited for anonymity. Text in square brackets [] is editorial.

Mine/uxo accident and incident detailed investigation report

IMCT4 Task ID: NR-928 Rasai, Kassala State

From: [Name removed]

Date Report Submitted: 14/04/2011

References:

1. Telephone call from Ops Manager @ 1020hrs

2. NTSGs, Edition 10, Version 1 dated 01/09/2010
3. IMAS
4. [Demining group] SOPs July 2009
5. Task Dossier NR-928
6. IP dated 12/01/2011
7. AIP1 - 3 dated 03/02/2011, 10/02/2011 & 28/03/2011 (latter not signed to date)

Part one - Introduction

Team Manager IMCT5 was tasked to carry out an Internal Investigation into a mine accident at Task ID: NR-928, Rasai (IMCT4 current task location) by [Demining Group] Operations Manager, via phone and then formally by email on 13/04/2011.

1. Demining Organization: [Demining Group].
2. Organization sub-unit: IMCT4
Task ID: NR-928
Team Name: IMCT4
3. Worksite Supervisor: [Name removed]
4. Location of Accident: Eastern Region, Kassala State, Kassala, Rasai
Task ID: NR-928. GPS: E36 34' 16.7" N16 39' 54.6"
5. Date & Time of Accident: 13/04/2011 at approximately 0855hrs
6. Type of Accident: Mine related (A/T mine vehicle strike)
7. Executive Summary:

The GPM [Ground Preparation Machine – Armtrak 100] had been disabled due to an electrical (fuzer) issue. A driver was sent to Kassala to obtain a replacement fuze; part of the GPM Flailed area was MMC(V) cleared up to the machine to allow the GPM Support vehicle to safely approach the machine. There is no physical marking on the ground to highlight the uncleared & cleared areas. Furthermore, there are no marking stones to highlight the forward GPM Maintenance area and access routes to this area.

Part two - Details of Accident

1. Questioning the witnesses it appears that the GPM Support vehicle drove to the machine to handover the replacement fuze; the vehicle then reversed out back down the 'cleared lane' towards the 'safe area' and veered off this lane into an uncleared area (GPM skip area). The GPM Support vehicle had a mine-strike approximately 1m into the uncleared area. The vehicle was turned around 90° in a clockwise direction and resting approximately 2m away from the seat of the explosion..
2. There are two small Jebel's directly in front and to the left of the GPM working area. It had previously been reported that there were mines laid in between the two Jebels. Subsequent GMAA was carried out and the locals insisted that there were no mines in this area. IMCT4 carried out full clearance in between the two small Jebel's and no mines were located.
3. The minefields were laid by GOS. Numerous battles occurred in the region. There had been a previous mine-strike involving a cow on 8 March 2011 @ 1145hrs, East of the Jebels.
4. The mine that was detonated by the vehicle strike was also to the East of the Jebels approximately 50m to the South of the animal strike.
5. The driver was not wearing PPE & Helmet/visor.
6. As the GPM was being repaired there was no supervisor on this area of the worksite.
7. Two deminers extracted to the casualty from the rear of the LC (the casualty had been thrown into the rear compartment of the LC as a result of the A/T Blast Mine detonation. The

deminers approach the accident scene by vehicle which was driven and parked directly in front of the mine-strike vehicle.

8. See photographs and map attached.

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

- a) Visit worksite:
- b) Question witnesses:
 - [Name removed] - Team Manager
 - [Name removed] - GPM International Supervisor
 - [Name removed] - GPM Operator
 - [Name removed] - International Medical Coordinator (not available - Khartoum)
 - [Name removed] - MDD Handler
- c) Check Site Board, mapping & Site Folder
- d) Deminer's MineLab F3 detector check (M30 fuze in detector test pit)

Part three - Accident Site Conditions

1. The accident site was not laid out as per [Demining group] SOPs (pictures attached).

- Worksite layout and marking: The current GPM worksite is approximately 131m (South) & 45m (West to East). The GPM had previously cleared one lane every 5m (Land Release); however, after the cow detonated the landmine an AIP (No 3) was submitted to enable 'full clearance' to be conducted in this area. The average clearance depth of GPM flail is 20cm.
- Directly behind (North) the GPM worksite is the GPM Maintenance area; the site has an alternative GPM Maintenance area approximately 100m to the East. It is noticed that both GPM Maintenance areas encroach on the minimum safety distance (300m) required for the GPM.
 - Ground & terrain: The ground is very dry and of medium density. The area is flat and has a high metal contamination. Numerous 'local' roads run directly through the GPM worksite.
 - Vegetation: There is very little vegetation within the current GPM Worksite. Random bushes & trees are occasionally encountered by the GPM.
 - Weather: Dry and warm.
 - See photographs attached.

Part four - Team & Task Details

Team Composition. The Team consisted of:

MMC worksite: Deputy Team Leader
Deminer x 6
Medic & ambulance driver

MDD worksite: Deputy Team Leader
MDD x 2
MDD Handler x 2
Deminer x 2
Medic & ambulance driver

GPM worksite: Team Manager
Spotter x 3

Note: Team Manager & Deputy Team Leaders rotate their worksites periodically. In addition, there was one International Medical Coordinator on site.

Qualifications & Experience:

- Team Manager: EOD Level III (10 yrs)
- DTL: EOD Level III (19 months)
- Deminer: [Demining group] demining course (19 months)

Internal QA: Form L: 07/04/2011 - Medium (MMC worksite)
Form T: 07/04/2011 - High (MMC worksite)
Form M: 11/04/2011 - Medium (MDD worksite)
External QA: Form J 02/03/2011 - Medium (Completion of Clearance Task)
Last recorded QA was on 20/01/2011; no External QA or visits

Task Documentation:

- Task Dossier issued
- Recce Report
- IP submitted
- IP approved
- AIP 1 - 3 submitted (AIP 1 & 2 approved; AIP3 not approved to date)
- Clearance activities
- Clearance depth 13cm
- Assets: MMC, MDD & Mechanical
- Clearance Plan (Technical Survey/Non-Technical Survey/Land Release)

Mines detonated by animal & vehicle: PRB-M3 A/T Blast Mine.

Task began on 17 January 2011 and projected end date as per AIP3 is 10 May 2011.

Items found up to date:

- 100 x UXO located and destroyed
- 243 x PM-1 Sub-munitions located and destroyed

Part five - Equipment & Procedures Used

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.
- Thuraya phone.

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.

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

Work Routine:

- Daily briefing 0630 - 0645
- Medical briefing 0645 - 0655
- Detector testing 0655 - 0710
- Operations 0710 - 0755 (Shift 1)
- Break 0755 – 0805
- 0805 – 0850 (Shift 2)
- Break 0850 - 0900
- 0900 - 0945 (Shift 3)
- Break 0945 - 0955
- 0955 - 0940 (Shift 4)
- Break 0940 - 0950
- 0950 - 1035 (Shift 5)
- Break 1035 - 1045
- 1045 - 1115 (Shift 6)
- Breakfast 1115 - 1215

Part six - Explosive Hazards Involved

PRB-M3 (Belgium) A/T blast mine was involved in the accident.



Explosive Content: 6kg of Triallene with a hexolite booster

Operating pressure: 250kg

Description/Notes:

The PRB-M3 is a square shaped, plastic bodied, AT mine which is designed to damage or destroy vehicles by blast effect. The mine consists of three parts: the mine body, M30 fuze, and the pressure plate. The mine body has rounded edges and is made of olive coloured plastic; a cloth carrying handle is moulded into the side of the mine body. The pressure plate is circular and is centered on top of the mine body. The mine functions when pressure is applied to the top of the pressure plate. The M30 fuze contains only one gram of metal which makes the PRB-M3 very difficult to locate using metal detectors under most field conditions. Trials have shown that the mine is resistant to sympathetic detonation from other mines. A variant of the mine called the PRB-M3 A1 is identical except that it has two anti-disturbance fuze cavities, one in the side and one in the bottom. Two spring loaded strikers are held apart by a cylindrical hollow bolt which has two perpendicular apertures. The bolt is connected to the pressure protecting cap of the fuze and moves freely along a slide in which there are two percussion caps pressed together. The bolt holds the two strikers apart and covers the percussion caps. When pressure over 250 kg is applied to the pressure plate, shear pins on the plate break and the bolt is displaced, the two apertures align with the percussion caps and release the spring loaded strikers. The strikers hit the percussion caps firing the detonator and the mine.

The PRB M3 is difficult to detect using metal detectors in field conditions where the ground has high metal content or fragmentation is present. In good conditions such as sand the PRB-

M3 can be located using a metal detector. The PRB M30 anti-disturbance device is a separate component which can be used with many mines which is laid underneath the mine. This will detonate if the mine is moved more than 30mm. The PRB-M3 A1 has two anti-disturbance cavities and looks identical to the more common PRB-M3.

The PRB-M3 comes packed in a wooden case. The case contains 6 mines complete and 6 fuzes and weighs 44.5 Kg when fully loaded.

Blast hole was 0.7m deep and 2.1m across.

Accident Blast hole:



Part seven - Details of Injury

Driver [Identifier removed]. Loss of left leg below the knee & Middle-finger right hand, broken right ankle & laceration to the chin.

Part eight - Equipment/Property/Infrastructure Damage

LC UN530 was destroyed as a result of the mine-strike

Photograph of LC 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.

Time-line:

- 0855hrs: Mine detonated by LC UN530 (GPM Support);
- 0857hrs: Call via Satellite phone from Team Manager IMCT4, Vehicle Mine Strike on site at 08:55
- 0859hrs: Operations room emergency response team assembled, including operations manager, medical coordinator, project manager and national support staff.
- 0900hrs Call from Operations Manager to Team Manager IMCT4, asking for full brief; points from Team manager IMCT4:
- the Armtrac 100 was broken down in the clearance lane due to an electrical fault,
- land cruiser driven by [Demining group] Driver [The Victim] delivered equipment to repair the Armtrac 100, driving down the cleared area behind the machine
- after successfully delivering the equipment the driver began exiting the area
- whilst leaving the area he strayed into an uncleared area and struck an AT mine with the front left side wheel
- Casevac immediately took place and the driver was seen to have an almost total amputation of the left foot and some damage to his left hand
- casualty was stabilized, IV fluids given, pain medication administered and oxygen provided
- casualty reported to be conscious and coherent
- UNMAO sub office at Kassala have been informed
- 0903hrs: Call from operations manager to Director UNMAO (couldn't raise other call-signs by phone) informed him of the above, he agreed to inform other UNMAO personnel as necessary
- 0905hrs: Call from operations manager to [Demining group] country manager, informed him of the above
- 0912hrs: Call from Team Manager IMCT4 Casualty now en route to hospital in [Demining group] ambulance, with escort vehicle and with international medic.
- 0930hrs: Operations Manager spoke with Team manager IMCT5, warned him off to move to Rasai to conduct internal investigation
- 1000hrs: IMCT5 Team Manager formally tasked with internal investigation at Rasai, he is to liaise with UNMAO Kassala staff to coordinate initial investigations as necessary, [Demining group]'s internal investigation will begin today.
- 1120hrs: Casualty arrives at hospital, and is taken directly in to the operating theatre for assessment and initial treatment.
- 1200hrs: (approximately) casualty confirmed as having amputation of left foot, and dislocation of right foot at the ankle joint, also amputation of ring finger on right hand. State of casualty reported as stable and in no danger, operations room emergency response team stood down, emergency declared over by operations manager, medical coordinator and operations manager to monitor situation and Direct/Coordinate/Assist further casualty evacuation as necessary
- 1245hrs: Team manager IMCT5 acknowledges receipt of formal direction to conduct internal investigation and prepares for deployment.
- 1330hrs: Informed by {Demining group} staff at the hospital that the surgeon requires the casualty to be further evacuated to Khartoum for further treatment at a level 3 facility. This is for quality of after care available at facilities in Khartoum not due to any medical emergency or immediate concerns.
- 1350hrs: Call to Country Manager confirms that evacuation to take place on scheduled civil air flight from Kassala to Khartoum, the flight will be met by [Demining

group]'s medical coordinator and the casualty transported to the Doctor's Clinic near the airport in Khartoum by an arranged ambulance

- 1440hrs: [Demining group]'s medical coordinator deploys to Doctor's Clinic to prepare the way for the arrival of the casualty, landing time of casualty in Khartoum is still to be confirmed.
- 1630hrs: Team Manager IMCT5 arrives at Rasai.
- 1645hrs: The flight between Khartoum –Kassala – Khartoum was cancelled, the onward movement of casualty will now be by [Demining group] ambulance tomorrow 14 April 2011. [Demining group] Sudan international medical coordinator to arrange and monitor progress.
- 1930hrs: Team Manager IMCT5 completes Internal Investigation at the accident site.

Part ten - Reporting Procedures

The reporting procedures were followed as per [Demining group] SOPs & NTSGs. CASEVAC Reporting Form and other documentation were completed.

Part eleven - Sequence of Events

- 0855hrs: Mine detonated by LC UN530 (GPM Support);
- 0857hrs: TCN TL blows whistle and send initial warning of mine strike casualty to Team Medic;
- 0900hrs: Casualty details relayed to Medic via radio (ID No & Blood Group);
- 0902hrs: Casualty extracted from accident site to the medics.
- 0912hrs: Casualty field treatment completed and ambulance departs for Kassala Military Hospital;
- 1000hrs: Accident site secured and relevant pictures taken. Await arrival of Internal Investigation Team;
- 1120hrs: Casualty arrives at Kassala Military Hospital;
- 1630hrs: IMCT5 Team Manager arrives at Rasai to carry out Internal Investigation.

Part twelve - Conclusions and Recommendations

- The casualty was extracted from the vehicle by two deminers via the rear door. It was noticed that there was no clearance marking leading up to the mine-strike vehicle.
- The complete site is devoid of any marking and consequently does not conform to [Demining group] SOPs and/or NTSGs.
- The 'clearance lane' leading to the GPM was not marked, therefore no delineation between uncleared and cleared areas could be made.
- Numerous 'skip areas' were noted and these had not been marked as such. The mine-strike was in between two GPM clearance lane in one of the skip areas.
- For some reason only the Northern half of the GPM clearance lane had been MMC(V) cleared; the mine-strike occurred in the area not MMC(V) cleared; however this could not be confirmed due to no minefield marking.
- It was noted from the External & Internal QA Records held in the Site Folder, that there had been no working External QA conducted on this site since 20 January 2011 (the last External visit was on 2 March 2011 where a Completion QA was conducted). No site visits have been afforded to IMCT4 since 2 March 2011, a period of six weeks.
- It is recommended that refresher training takes place to include minefield marking, CASEVAC & Recovery procedures as a minimum.

- It is further recommended that more frequent external visits are conducted by UNMAO/NMAC to ensure all procedures on site are being followed and conducted as per [Demining group] SOPs & NTSGs.
- This accident was avoidable if the basic principles and procedures had been followed on site.

[Name removed] Team Manager IMCT5 [Demining group]

Annexes:

A. GPS Mapping [Held on file]

B. LC & Site Pictures [Held on file, many showing no marking in area]



Victim Report

Victim number: 998

Name: [Name removed]

Age:

Gender: Male

Status: driver

Fit for work: not known

Compensation: Not made available

Time to hospital: 145 minutes

Protection issued: Frontal apron, Long visor

Protection used: None

Summary of injuries: severe Foot; severe Hand

AMPUTATION/LOSS: Finger; Leg Below knee

COMMENT: No Medical report was made available. The amputation was of a foot, so "leg below knee".

Analysis

The primary cause of this accident is listed as a "*Field Control Inadequacy*" because the field controllers allowed work to be conducted without using the marking required in their SOPs. The Secondary cause is listed as a "*Management Control Inadequacy*" because the UN QA staff who should have ensured that the SOPs were complied with had not done their job. A contributory factor was the fact that the ground preparation machine in use (Armtrak 100) had left "skip zones" (missed areas that had not been processed) which the Victim may not have noticed (they were unmarked).

The demining group's own management conducted the investigation, which appears to be both unusually thorough and transparent, so their management is not considered inadequate. This was a commercial demining group and it is to be commended for its professional ability to conduct investigations that include self-criticism in a manner that most (including UNMAS and UNOPS) could learn from. However, it is regrettable that they did not include a recommendation for disciplinary action to be taken against field managers who had not applied the appropriate marking SOPs.