

# DDAS Accident Report

## Accident details

<b>Report date:</b> 13/06/2008	<b>Accident number:</b> 578
<b>Accident time:</b> 10:50	<b>Accident Date:</b> 22/08/2005
<b>Where it occurred:</b> SS 19, Nimule to Juba Road, Lokichokkio	<b>Country:</b> Sudan
<b>Primary cause:</b> Management/control inadequacy (?)	<b>Secondary cause:</b> Inadequate training (?)
<b>Class:</b> Missed-mine accident	<b>Date of main report:</b> 26/08/2005
<b>ID original source:</b> None	<b>Name of source:</b> UNMAO Sudan
<b>Organisation:</b> [Name removed]	
<b>Mine/device:</b> PMN AP blast	<b>Ground condition:</b> grass/grazing area route (verge) sparse trees
<b>Date record created:</b>	<b>Date last modified:</b> 13/06/2008
<b>No of victims:</b> 1	<b>No of documents:</b> 2

## Map details

<b>Longitude:</b>	<b>Latitude:</b>
<b>Alt. coord. system:</b>	<b>Coordinates fixed by:</b> GPS
<b>Map east:</b> E 031 57 34.3	<b>Map north:</b> N 03 59 25.0
<b>Map scale:</b>	<b>Map series:</b>
<b>Map edition:</b>	<b>Map sheet:</b>
<b>Map name:</b>	

## Accident Notes

inadequate area marking (?)  
inadequate communications (?)  
inadequate medical provision (?)  
inadequate metal-detector (?)  
inadequate survey (?)  
inadequate training (?)  
mine/device found in "cleared" area (?)  
visor not worn or worn raised (?)

## Accident report

Details of this accident were made available as a collection of files in June 2008. The files show that two accidents occurred within minutes of each other, and two days after these accidents, a missed AT mine was found by road construction workers at the same task site. The two accident reports have been separated and this report deals with the second accident. See DDAS Accident 577 for the first accident. The missed-mine investigation is included in this report under Other documents, Related papers. The conversion of these files to DDAS format has led to some original formatting being lost. The original files are held on record. Text in square brackets [ ] is editorial.

### **Initial report**

Initial reports state that [the victim of the first accident] was working in his lane when he initiated an unknown item. The size of the blast would indicate a partial or fuse assembly. A few seconds later, a larger explosion was heard, where [the Victim of this accident] had moved from his lane to assist [the first Victim]. [The Victim of this accident] moved using the shortest possible route, through uncleared area.

The accident occurred in an un-cleared area

The team were conducting BAC clearance methods in an area identified as an UXO contaminated zone. Both deminers were working in echelon, 25m apart, following the road verge 3m from road centre.

Based on information received to date, it appears that [the Victim of the previous accident], conducting BAC sub-surface clearance was moving within his lane when he initiated an unknown device. [The Victim of this accident] reacted to this incident crossing uncleared ground to help his colleague. { Later claimed that walked the cleared lane and trod on the mine in a cleared area.}

The deminers were working parallel to the road, estimated as 3m from centre.

The area, Chainage 64 + 000 (GPS N 03 59 25.0 E 031 57 34.3) was classified as a UXO contaminated area based on survey information gathered previously. No indications of an AP threat could be obtained.

## **1.) Investigation of the mine accident [Demining group]**

Investigating officer [Name removed] QA officer Rumbek

Dated 23 – 26 August 05

### **Introduction**

On Monday 22 August 05 UNMAS were informed by [International demining NGO] that a mine accident had taken place in Nimule and a request was made to form an investigation into the incident. UNMAS QA officer from Rumbek was asked to accompany [International demining NGO] to the accident site and carry out a on site investigation

### **Sequence of events**

[International demining NGO] team 1 were given task SS 19 route verification and clearance from Nimule to Juba. Team 1 from [International demining NGO] deployed and had carried out a second survey of the road and designated several areas as high risk areas needing to be searched. Both surveys had been carried out using local SPLA engineers and professional witnesses to explain the local military situation. It was agreed by [International demining NGO] that team 1 would divide in to two smaller teams due to the task sizes and locations and one half would work at Moli and the second half would push forward to the mined area at Jebelain approx 2 hours up the road towards Juba. On Thursday 18 August the team deployed to their

new task and set up there admin area at Grid N 03 59 31.5 E 031 57 31.3. The area was classed as a BAC task as the local information gained said it was a accident site and contained UXO only and no mines

On Thursday 18 Aug the team found a TM 57 on the road side. On Friday 19 Aug a searcher walking down the middle of the road (not in a search lane just walking to his box) discovered a large reading in the middle of the road. This information was brought to the attention of the on site supervisor who investigated further and discovered 2 x TM72 mines laid on top of each other 29 m from the previous mine. Again once the search of the east side was complete the team were tasked with the clearance of the main carriageway before proceeding to the west side of the carriage way. Once the team started to search the west side they discovered another TM57 on the road edge 19 m from the previous 2 mines in the centre of the road. The search continued of the west side when the deminer in lane 3 stood on a AP mine which partially detonated causing deminer 1 to fall forward in to the uncleared area of his search lane. On hearing the detonation the searcher from lane 4 deminer 2 rushed to help (removing his visor as he left his lane) although this deminer did not raise the alarm but ran to the area cleared in the lane and proceeded to walk in the cleared area to assist deminer 1. As he got towards the end of the cleared lane he also stood on an AP mine which fully detonated.

At the same time the team leader nearest to the incident raised the alarm and the team moved to the accident site. When the Site Supervisor arrived at the lane he discovered deminer 1 had dragged himself from the lane and was at the roadside complaining and the deminer 2 was several meters inside the area with a foot injury. The team were apprehensive and did not really want to enter the lane so the site supervisor picked up a locator and cleared to the injured deminer 2. As he drew near he asked if he could turn around to make it easier to carry him out. This was done and the supervisor picked up the deminer and withdrew to the road.

At the roadside was the medic and the ambulance and so immediate first aid was given.

### **Geography and weather**

The verges of the roadside out to 13m either side of the centre line in accordance with the road contract. The verges are overgrown with tall grass and minor trees and vegetation. The road itself is a small track running from Nimule to Juba. The team had come from the Juba side and placed the control point at the northern end of the road. The weather was hot sun and clear skies.

### **Site layout and Marking**

Site layout was in accordance with the [International demining NGO] SOPs which included a rest area, ambulance point, control point and clearance lanes in accordance with the BAC SOPs. Marking inside the clearance lanes did not comply with the SOPs which state either a brightly coloured rope between two sticks are to be used as a guide for the searcher or brightly coloured traffic cones.

On site the team were using 2 or 3 red topped pickets as the guides.

### **Management, supervision and discipline on site**

Management of the site was under the command of the international site supervisor and added to which he had two nominated team leaders all of which patrolled the site looking for problems and correcting them. However once the accident occurred the International supervisor took a hands on role instead of a supervisory role and so command and control was lost during this time.

The team gathered around the accident site while the clearance and recovery was taking place.

The ambulance and medic were on site only a few meters from the accident site while the clearance and recovery of the second deminer was taking place.

The equipment was not properly recovered and marked for investigation.

No map of the site or written report had been assembled before the investigation so it could not be confirmed what equipment had been recovered or from where.

### **Communications and reporting**

Communications and reporting consisted of a radio check with lima base in the morning before work and no further check until the accident happened.

The radio log had recorded the following details for the day of the accident.

07:35am from Moli to lima base radio check

10:55am from Moli to lima base mine accident.

11:45 am from Moli to lima base leaving task mobile to Nimule airstrip

1:00pm From Moli to lima base arrival at Nimule airstrip

1:15pm arrival at Nimule hospital

2:05pm confirm plane arrival at Nimule.

It had been agreed between WFP [International demining NGO] and [Name removed] security that the teams on the ground would have thuraya satellite phones on all sites, the team itself did have a sat phone but it was with the other half of the team 2 hours away.

Radio checks had not taken place at regular intervals during the working day.

There was no comms established between the two half teams so the team at Jebelain was not aware of the accident until much later when informed by the [International demining NGO] HQ in Loki.

The team had no direct communications with their HQ in [International demining NGO] as the SOPs state and so it was 12:55pm before [International demining NGO] HQ were informed and they were given the information from [Name removed] security.

The original radio request only stated a mine accident and none of the information stated in SOPs during the emergency procedure was sent.

[International demining NGO] HQ in Loki was not aware of the accident until they were informed by [Name removed] security at 12:55pm some two hours after the accident.

### **Medical and injuries**

Deminer 1 sustained what was described as like a sprained ankle and internal pain in his right leg.

The team had not carried out casevac training since Jul 5 before leave on July 8. SOPs state Casevac training must take place either once a month or on arrival at a new task location.

Records of the last casevac training were recorded in a personal diary not on [International demining NGO] site paperwork that was present on site.

Contents of the Trauma pack could not be checked during the investigation as the team medic had taken his bag with him to Loki and so it was not on site during the investigation.

Several people both within and from external agencies who witnessed the ambulance drive by suggested it was travelling too fast for the local road conditions. Also the used of flashing lights and sirens would be better used only in built up areas or when needed not permanently as this causes people to come to the road to see what's happening and may cause further problems.

The doctor who treated Deminer 2 at the Merlin Hospital said although sufficient pain killers had been administered to the patient (morphine) the patient was still in considerable pain and was screaming on arrival, the doctor stated that had Diazepam been administered the body could have relaxed and allowed the Morphine to take effect properly. Diazepam is on the [Demining NGO] trauma Pack kit list.

### **Personnel team and statements**

The team had been split into two teams and so only half the original team were on this particular work site. The team had been working and accredited for 7 months and had not reported any problems. UNMAS had not been on site to QA this team since the accreditation procedure. The statements were taken by UNMAS QA and [International demining NGO].

However they have not been included in my report due to the lack of command and control during the accident there were several inconsistencies which may have confused the investigation. All agreed on the general theme but all remembered different personalities doing different things at different times.

### **Equipment and tools**

[International demining NGO] were working with the standard BAC equipment and tools on site.

However due to the command and control breakdown the equipment was not dealt with. Resulting in the actual equipment from the accidents was not available for inspection.

The kit had been removed from site after the accident by one of the team leaders but it had not been kept separate or accounted for in any way.

The team leader stated he had cleared in to the lanes with demining equipment in order to recover the equipment, although no signs of clearance lanes or vegetation cutting and clearance could be seen.

### **Mines and UXO involved**

During the investigation a safe lane was cleared in to the two accident sites so an investigation was able to take place. Once the area around the first accident was cleared the remnants of a PMN were collected and removed. The evidence from the second mine suggested it would be the same or similar. The mine accident was 290m from the rest area.

### **Dress and PPE**

The team were wearing standard [International demining NGO] PPE consisting of body armour and visor. However it was not collected and marked and so was not available for the investigation team. [It is stated elsewhere that the Victim left his visor in his clearance lane, so he was not wearing it at the time of the accident.]

### **Clearance procedures**

Standard BAC clearance procedures and drills were to be used on this BAC site. Once the cleared lane had been breached to the accident site it was noted that the clearance lane was not in accordance with [International demining NGO] SOPs. The cleared lane was 2.5 meters wide and had extended past the short picket (clearance marker) by several meters. It also

appeared that the search was being conducted in a front to back method rather than a side to side method.

### **Conclusion**

It can be concluded that this accident could have been lessened and even avoided if the [International demining NGO] SOPs had been used correctly on the ground. Had the Threat assessment been upgraded in accordance with the SOPs when the first mine was found on a BAC site then demining drills and equipments would have been able to find all the AP mines. Even without this, had the on site casevac procedures been followed and command and control maintained then perhaps the second accident may not have occurred. Had deminer 2 raised the alarm and waited for the supervisor to take command in accordance with the SOP. However it must be concluded that the best medical care was given to the patients and all effort was given to them during their casevac procedure even when things were going slowly.

### **Recommendations**

Survey assessments need to be formalised and recorded and this information needs to be on site readily available

Surveys and threat assessments need to speak with more than one source however accurate in order to confirm the on site situation.

Threat assessments need to be formalised and recorded in accordance with SOPs and [International demining NGO] policy.

Threat assessments needs to be reviewed as and when necessary, not just written on day one of the task and ignored till the clearance is finished. If on site conditions change then the threat assessment needs to be reviewed again.

On site threat assessments needs to be communicated to [International demining NGO] HQ regularly any changes need to be communicated at the earliest opportunity

Agreements between [International demining NGO] and [Security company] due to the security situation that state a minimum equipment list on site need to be agreed and implemented and used on all sites. If this equipment Phones etc is not available then the site should be suspended till the equipment can be purchased.

Communications plans and SOPs need to be reviewed in accordance with what actually happens in country and practiced.

Radio checks form a important part of site safety and should be carried out on a regular basis and recorded on the radio log in accordance with SOPs

When using lima base as a communications centre then the casevac procedure needs to be practiced and agreed with them on a regular basis.

The casevac plan needs to be written to take in to account the fact that [Security company] planes may need to be diverted and may not be immediately available on site. This may mean alternative medical facilities need to be located or extra medical equipment issued to take this in to account.

Casevac training needs to be carried out in accordance with SOPs and recorded onsite in the site paperwork.

Medical teams should only move forward to a designated safe area and not adjacent to the continued clearance.

Casevac training needs to encompass all the accident procedure including what happens after the ambulance has left site.

During a casevac the vehicle speed should be acceptable but not excessive depending on the local situation and agreed in company policy

Due to the extended nature of a lot of sites and the extended times to the nearest airfield a review of the current medical training to ensure that the best care is given to any patient. Allowing for all the medical equipment and drugs to be used effectively.

Command and control needs to be maintained at all times to ensure safety.

SOPs need to be checked and written in accordance with what the teams should actually do on the ground.

Retraining needs to be undertaken every time a switch from BAC to Demining or demining to BAC takes place to ensure the procedures and skills are fresh.

Clearance should only proceed when the proper equipment is on site so the SOPs for marking and clearance can be followed and easily understood.

Internal and external QA assessments need to be carried out on a regular basis to confirm team drills and skills.

### **Victim Report**

<b>Victim number:</b> 754	<b>Name:</b> [Name removed]
<b>Age:</b> 22	<b>Gender:</b> Male
<b>Status:</b> deminer	<b>Fit for work:</b> not known
<b>Compensation:</b> Not made available	<b>Time to hospital:</b> 130 minutes
<b>Protection issued:</b> Frontal apron Long visor	<b>Protection used:</b> Frontal apron

#### **Summary of injuries:**

severe Arm

severe Leg

AMPUTATION/LOSS

Leg Below knee

COMMENT: See Medical report.

#### **Medical report**

Treatments given:

compression dressing

wound dressing

IV fluid replacement sodium chloride 1lt

Morphine Inj. 5mlg initial, 2mlg 15min intervals

Adrenaline 10ml (administered in Merlin Hospital)

An IMSMA report sketch recorded “severe” injuries to: right side lower arm (laceration); right side foot (traumatic amputation); right side upper leg (laceration); right side upper arm (abrasions).

### **Internal medical report**

**Incident:** Deminer trod on an anti-personal landmine with ball/toe of right foot

**Date:** Monday, 22nd August; **Time:** 1040hrs

**Casualty age:** 22

#### **Timings:**

Medic to casualty **1050hrs**

Time left scene **1130hrs**

Time from scene to Nimule airstrip **1300hrs**

Time at Nimule Merlin Hospital **approx 1 hour**

Arrival of OLS plane to Nimule **1510hrs**

Take off from Nimule **1545hrs**

Arrive Loki **1650hrs**

Depart Loki **1730hrs**

Arrive Nairobi airport **1915hrs**

Arrive Nairobi Hospital **1945hrs**

Time to theatre **2300hrs**

**Treatment by medic:** [The medic] was at the check point and had communicated to Lima Whisky Base that operations were normal. He heard both the first and second explosion. All at the check point heard over their radios that there was a mine accident. [The medic] states that he told the ambulance driver to get in the ambulance and be ready to go. [The medic] and the ambulance were called forward on the radio by the national team leader to find the casualty was not yet out on the cleared road. He set up his trauma kit and gave gloves to nearby deminers and waited to receive the casualty. I am told by the supervisor [that the medic] was calm at the scene, reassuring to the patient and organised once the casualty was brought to the safe area. The patient was conscious and talking, GCS 15. He first removed what remained of [the Victim’s] shoe and sock then applied x 2 pressure bandages to right below ankle stump. He cut [the Victim’s] clothes off and applied crepe bandages to right thigh, and right arm wounds. The left thigh/behind knee wound was packed with gauze swabs and bandaged. He instructed the deminers to elevate [the Victim’s] right leg. [The medic] took [the Victim’s] observations, BP 120/90, HR 80, inserted a 16 gauge cannula, gave morphine 5mg (diluted up to 10mls with normal saline) and commenced I.V. Hartmann’s slowly. He and the team leader [Name removed], transported the patient in the ambulance to Nimule airstrip.

[The medic] asked the ambulance driver to stop once on route, where he rechecked [the Victim’s] observations which were unchanged, so gave further 2mgs IV morphine. Once there, they found the ETA of the OLS plane was over an hour away. [The medic] wanted to remain at the airstrip stating that the casualty was stable, but [the Team Leader] made the decision to seek help at Nimule’s Merlin Hospital. The doctor assessed [the Victim] and gave 50mg I.V. pethidine and an IM tetanus injection. After speaking to the Matron at Nimule

Hospital, I understand that the bleeding on [the Victim's] left leg was not controlled and the doctor undid the bandage, repacked and bandaged the wound. [The Victim] was then transferred with [the medic] to the airstrip, and was accompanied to Loki on the OLS flight. The OLS pilot did not want to take [the medic], but as I had requested it, [the Team Leader] radioed OLS for confirmation of taking [the medic] with the casualty. When I met [the Victim] and [the medic] at Loki, in the OLS plane, [the medic] was composed, knew what drugs [the Victim] had been given, had [Victim's] legs elevated on the trauma kit, and gave a satisfactory hand over. The bleeding from [Victim's] wounds at this time appeared minimal. [The medic] had just administered a further 2mgs of IV morphine bringing his 2mg increments to a total of 16mgs. [The medic] remained at Loki, and when being questioned by [Operations manager] to write his preliminary report, [the medic] told [him] (and later myself) that [the Victim] was given Adrenaline at Nimule Hospital. This information was incorrect. [The Victim] never received adrenaline, only pethidine and tetanus.

[The medic's] immediate care was appropriate, he stemmed the bleeding at the site, applied pressure, used the deminers to elevate his limb, checked his observations, introduced a 16G cannula and gave slow IV fluids and analgesia. He has reassessed his patient before re-administering morphine. However there are problems with [the medic's] care to [the Victim]. He should have reinforced all [the Victim's] wounds as I am told by Nimule hospital that when [the Victim] arrived there, all his wounds were bleeding heavily, especially his left leg. This is care that should have been carried out by [the medic]. [The medic] didn't give I.V. antibiotics. He has I.V. Benzyl penicillin in his trauma kit and has had teaching in his training course on its use and application. [The Victim] had no oxygen when I meet him at Loki. This should have been provided. When we transferred [the Victim] to the KFDS plane, his oxygen saturations were 90%, and oxygen via nasal prongs was commenced.

**Medical Adviser's role:** (Operations Manager) was informed by thuraya at 1258hrs by [Name removed] (OLS) that [International demining NGO] had a casevac in progress with an OLS plane on diversion to our casualty to Nimule, ETA to Nimule 1430hrs. I was with [the Operations Manager] when he received this call, and until this point, 2 ¼ hrs after the call had been logged at the Loki Radio room, we had no indication that anything was happening. We both then attempted to contact the teams, and worked out it must be Team 2, which had been split for work purposes. [Name removed] (Team 2 Leader) in the north had the thuraya, and [Name removed] (Team 2 Leader) in the south, did not. We were not able to contact [Team 2 leader], and had only sketchy details: 1 casualty, lower amputation, on their way to Nimule. I contacted Kenyan Flying Doctors Service(KFDS) and asked [Name removed] (Team leader) to contact [Name removed] with the information we had. At KFDS I spoke to [Name removed] who told me the king air plane was available, and they would start the proceeding to take off to Loki. Flight time to Loki was 1hr 40 mins. I was requested to relay more information as I had it. They were aware that the casualty was in the process of being extracted from Nimule. I then talked to [Name removed], Programme manager and gave him the information we had so far and requested that he inform [Head office and insurance]. At 1325 [Team 1 Leader] contacted [Operations manager] with the information that there were 2 casualties. At 1332hrs [Team 2 leader] contacted [the Operations manager] from Nimule with more information.

**Extract from internal medical report:**

Casualty [the Victim] below ankle traumatic amputation of right foot, wounds to left and right thigh, and right arm. GCS 15 throughout, was being attended to by a doctor at Merlin hospital Nimule, and would remain there until transfer to Nimule Airport for collection by OLS aeroplane. I requested that the medic, [name removed] accompany [the Victim] to Loki.

I meet the KFDS crew at Loki airport while waiting for the OLS plane to arrive from Nimule, and meet [the Victim] and [the Medic] on the tarmac, received handover from [the medic], assisted in transferring [the Victim] onto the KFDS stretcher, then attended to [the Victim's] immigration papers. I accompanied [the Victim] and the KFDS to Nairobi, twice on route I requested further analgesia be given to [the Victim], both times this requested was fulfilled. I transferred with [the Victim] to Nairobi Hospital, where we were met at the door by [Programme manager] who attended to the administration for me. I gave a full hand over to the casualty nurse, [Name removed], and the orthopaedic doctor, Dr [Name removed]. Again I requested further analgesia, which was given followed by 4 x I.V. antibiotics. We then spent some time in X-ray, [the Victim] having multiple x-rays, before accompanying him to theatre. I requested that during theatre photos be obtained of [the Victim's] injuries.

I visited [the Victim] twice on Tuesday 23<sup>rd</sup>, and consulted with Dr [Name removed] re [the Victim's] condition and need for further surgery. On the evening of 23<sup>rd</sup>, I was informed by the hospital that [the Victim's] haemoglobin was 6, that [the Victim] required surgery within the next 2 days, and that Nairobi Hospital had no blood. I spent Wednesday morning organising suitable donors to give blood at Nairobi Hospital for [the Victim], and then was required to depart to Loki to continue with work commitments. I have remained in phone contact with the hospital and visited with [Victim No.1's] wife in Yei.

**Injuries:** [The Victim] had a below ankle right traumatic amputation. He sustained no further fractures. He has 3 further, significant wounds on his front right thigh, inner left leg and outer right arm all of which been debrided twice in theatre on the 22<sup>nd</sup> August and the 25<sup>th</sup> August by Dr [Name removed], orthopaedic specialist. All wounds were naturally very dirty. There were large chunks of debris, wood and bones in all wounds. A vascular surgeon assisted on the second operation as foreign bodies lodged behind [Victim No.1's] left popliteal artery were a concern. On the 23<sup>rd</sup> of August, [The Victim] was very tachycardic, slightly hypotensive and had a temperature 38.8 C. All wounds bar his right stump were seeping blood fairly heavily. [The Victim] lost a lot of blood in the first operation, and on the evening of the 23<sup>rd</sup> August, his Haemoglobin was 6, and he was due for further surgery. [The Victim] received 4 units of blood, and has recovered well. He is currently afebrile, and all observations are within normal limits. It is expected that further surgery will be required in the form of skin grafts as a minimum.

### **Comments/Suggestions:**

Communications will always be in issue in the area we are working in. There were several communication issues brought to light from this casevac.

1. Each team had been issued with 1 Thuraya [satellite phone]. As team 2 had been split into 2, only one half of the team had access to a Thuraya, and it was not [Team Leader 2]. Ironically, on the 22<sup>nd</sup> August, [the Operations manager] had asked [the Programme manager] for every team leader to have a Thuraya, and [the Programme manager] had agreed before he left Loki. If [Team Leader 2] had had a Thuraya and been able to contact [the Operations manager] and myself directly at 1050hrs, other options could have been explored, such as KFDS flying direct to Nimule, or having the Juba helicopter pick up [The Victim], and KFDS rendezvousing in Juba or Loki, or having trackmark fly to Nimule, and back to Loki. All of these options are likely to have decreased the time from Moli to Nairobi Hospital significantly. This has already been resolved with all team leaders now having a thuraya.

2. Communication between OLS and [International Demining NGO]. I accept that it is not “policy” for OLS to contact an organisation, however they did contact us, 2 ¼ hours after the casevac call was logged at the OLS Loki radio room. Had this communication occurred earlier, as in point 1, many other options could have been explored, all likely to have brought about a shorter time between the site and Nairobi hospital for [The Victim].
3. I will be rewriting our casevac plan to reflect the above points. The first point of contact will be the Medical Adviser, if not contactable, then the Operations Manager. This person will contact all available options for extracting the casualty from the field and initiate whatever means is likely to be the most expedient and reliable. This information will be fed back to the Supervisor to arrange transfer of the patient to the appropriate place.
4. Refresher training is required to be carried out for the medics. Plans are (and were) already in process for this. The medics have received no refresher training since their original training for [International Demining NGO]. Topics to be covered should include, but not be limited to; haemorrhage control, drug indications and contraindications, the use of oxygen and drills in procedures for all traumas. [The Medic] was trained in November of last year, and has received no refresher training to date.
5. Re drilling is required for the deminers. [The medic] and the ambulance should not have been called further while the casualty was still being extracted from the lane.
6. Immigration papers for the casualty coming through Loki are able to be done in advance at Loki airport. I was not aware of this previously. It will be written into our casevac plan, and in [Victim No.1’s] case would have saved us 20 mins at Loki airport.
7. An HLS site needs to be recorded and registered. In Team 2’s case, maybe more than one, so as to not necessitate driving through an area where the LRA has been active.

## Related papers

### Missed mine investigation

Wednesday 24 August 05

Nimule Juba road

Conducted by UNMAS QA office Rumbek



The incident site

A Type 72 plastic Anti Tank (AT) mine was discovered by the WFP contracted road construction company (GRZ) by a grading machine at a [International Demining NGO] road clearance task. The Task Dossier had been issued by the UNSSRMAO Rumbek.

Approach to site: South approx. 15/16 km from Moli ([International Demining NGO] Base) to Nimale by armoured Casper along dirt road. Investigation lane cleared using manual mine clearance methods (detector) from graded area of road.

Evidence on the ground: Flat, compact earth road graded by construction company. Areas to sides highly vegetated. Top of AT mine exposed and flush with road surface. Vehicle tracks to side of mine. [International Demining NGO] Operations Manager confirmed that the area had been cleared by [International Demining NGO] using BAC procedures. The mine was located 500 metres from the area where AT mines had been cleared by [International Demining NGO].

Chinese Type 72 Plastic AT mine which had been exposed by the grader at a depth of 25 cm. The mine was pulled, neutralized by removing the fuze/detonator and recovered to Moli. The mine was in good condition and there was no evidence of damage.

After handing over the area to the construction company a Grader was used for ground preparation to level the road to a depth of 60 cm. During this process the Grader uncovered a Type 72 AT mine at the edge of and within the cleared which was later confirmed to be at a depth of 25 cm to the top of the pressure plate. The road construction operations were immediately stopped and [International Demining NGO] were informed of the find. [International Demining NGO] asked the construction company to close and mark the site to prevent anyone moving through the site. An investigation by the [International Demining NGO] Operations Manager and UNSSRMAO QA Officer was conducted on 25 Aug 2005.

Clearance had been conducted using a Half team (15 deminers/searchers), 2 x Team Leaders, 1 x Supervisor (International). There had been no external QA visits conducted and no record of internal QA visits. It is unknown whether there are any records of [International Demining NGO] training conducted in Sudan. There was no written task plan and no recorded survey.

## **Conclusions**

A Chinese Type 72 Plastic AT mine was discovered by a WFP contracted road construction company at a depth of 25 cm in an area of the road clearance task in Moli (Loa) on 24 Aug 2005. The area where the mine was located had previously been cleared by [International demining NGO] using sub-surface BAC (battle area clearance) clearance procedures with Shonstedt locators. According to the [International Demining NGO] Operations Manager, a threat assessment had been made based on the fact that only metallic AT mines has been located during mine clearance and that no AP mines were reported as being laid. No formalized standard operating procedures (SOP) had been written and the [International Demining NGO] clearance team had not been trained in the procedure for searching for metallic AT mines using BAC procedures, therefore, this procedure was inappropriate for the task. There was inadequate marking in the area of the incident at the time of the investigation due to the fact that the task had not been officially completed (no handover and completion report) and the construction company had started work, the aim being to conduct a completion after the whole task (road) was cleared. The disadvantage in this is that it would not be possible to conduct adequate QA/QC, confirm the perimeter of the cleared area and the methods of clearance. Should any mines/UXO be discovered or an accident occur at a later date then it would be extremely difficult to prove if the area had been cleared by [the Demining NGO] and which method was used. There was no task map or records showing

coordinates of areas cleared according to the UNSSRMAO QA Officer. This information is necessary for all clearance activities.

Based on the information received during the preliminary investigation, it is concluded that these are the main factors which contributed to the demining incident:

1. A lack of recorded survey information by [International Demining NGO] with which to refer to prior and during clearance.
2. Reliance on one source (SPLA) for information regarding the threat in areas where there were GOS military activities and defensive positions.
3. Using BAC procedures to clear AT areas. Unless there is accurate information to the contrary, then it must be assumed that there may be non-metallic AT mines as they are known to have been used in Sudan.
4. No internal QA and external QA or QC conducted.
5. Correct procedures for completion and handover of the area to the construction company were not followed: (E.g., external QA / QC of cleared area, marking, IMSMA completion report).

### **Recommendations**

The road construction company have ceased work at the incident site and forward of this location. A detailed investigation or a BOI (board of inquiry) will be convened by the UNMAO regarding the [International demining NGO] demining incident on 22 Aug 2005. (*Reference: Preliminary Investigation Report [International Demining NGO] 001*). The following must happen prior to [International Demining NGO] resuming clearance operations at task SS19:

1. Conduct detailed investigation or BOI for [International demining NGO] incident 22 Aug 2005.
2. Clearance plan formulated by [International demining NGO] taking into account investigation or BOI findings and recommendations.
3. Detector trials to confirm whether [International demining NGO] mine clearance detectors area capable of locating Type 72 plastic AT mines at 25 cm.

**The following are recommendations** specific to the conclusions of this investigation:

1. [International Demining NGO] record survey information using IMSMA survey reports.
2. A documented clearance plan including clearance procedures, threat assessments and reasons for implemented by [International Demining NGO].
3. Improved liaison between [International Demining NGO] and UNSSRMAO regarding QA and reporting.

**The following should be Lessons Learned** by the demining incident:

1. All survey information is useful although it is not always reliable and should be cross-checked if possible.
2. SOP for all demining procedures must be documented and accredited prior to being conducted.

3. All necessary documentation must be completed prior, during and post clearance and submitted to the relevant agencies.
4. Dissemination of relevant survey and clearance information internally and between organizations is vital.

### **Background**

[International Demining NGO] had been contracted by WFP (World Food Program) and tasked to conduct route verification of the Juba – Nimale road ahead of a road construction project. The task dossier was issued by the UNSSRMAO Rumbek. The initial survey of the road was conducted by [International Demining NGO] and SPLA military engineers who stated that they had experience and knowledge of the mine types, their location and past military activities. A second survey was conducted immediately prior to the commencement of the task where several areas were allocated by [International Demining NGO] as mined, battle fields containing no mines and low risk. One particular area was identified during the survey as a high risk which required manual mine clearance as it had been a GOS military position and mines had been laid on the road as a defensive perimeter. Also the SPLA said that mines were only laid on the road and that the threat in the remainder of the area was from UXO only.

Prior to the start of the task, [International Demining NGO] made a threat assessment to commence manual mine clearance in the area reported as being mined with additional mine clearance in a 200 metre radius from any mines located 'buffer zone'. Other areas would be cleared using BAC procedures. During the mine clearance process, several metallic AT were located. Subsequently, [International Demining NGO] decided to conduct BAC in all other areas based on information from the SPLA that there were no AP mines in the area. [International Demining NGO] cleared a 25 metre x 1000 metre area prior to handing over the area to the road construction company as a 'low risk area'.

[International Demining NGO] team 1 had been tasked with the route verification of the road from Nimule to Juba to allow road rehabilitation to follow on behind them. An initial survey of the road was completed using SPLA military engineers who had experience and knowledge of what mines had been laid and where military actions had taken place. A second survey was conducted immediately prior to the start of the verification. Several areas were given as mined areas several as BAC areas and several as low risk areas. One of the areas that was considered a high risk area and needed a full clearance as it had been a GOS military position and mines had been laid on the road as a defensive perimeter. It was stated during the survey that the mines were only in one place along the road and the rest of the area was UXO only from the fighting.

### **Situation**

The threat assessment was made on site before clearance started that established the clearance would consist of a BAC clearance and in a certain area a full mine clearance would take place. As a safety buffer it was agreed that a zone of 200 meters along the road from all mines found would be cleared. Then the areas left outside this area would be cleared in accordance with BAC drills. The whole site was 1000m meters in length.

The clearance of this area had been completed and the area had been handed over to the road construction company as a low risk area that had been worked on. As the road construction company sent the graders on to the road to carry out ground preparation they discovered a mine at the edge of the original road. They immediately stopped and informed

[International Demining NGO] of the situation. [International Demining NGO] asked for the site to be closed and immediately dispatched a small team to go and make a initial report and secure the area. This was completed and it was agreed the site would be marked and secured until the following day Friday 26 Aug when a full investigation could be conducted and the mine dealt with.

This mine was located about 500m from the locations where mines were expected to be from the information gained during the survey. This area was only expected to contain UXO and so was only searched with BAC methodology. The locators used during BAC would not have picked up this mine at this depth.

Mines found at grid reference: N 03 47 00.6; E 031 59 13.8

A Type 72 AT mine was uncovered by a grader. The grader had removed 250mm of soil before uncovering the mine.

### **Follow up actions**

The area around the mine was cleared and the mine was pulled and neutralised and removed to a safe storage location. The road construction company were then informed that the area would need to be reassessed in light of the find and so [International Demining NGO] asked for the area to be handed back to them and for the road construction company to stop all works in this location and any forward of this location..

### **Recommendations**

Survey and survey reporting needs to be formalised and written and included in the clearance plan. Surveys need to cover as many different points of contacts as possible before an assessment is made. Not just one expert but as many eyewitnesses as possible to gain the fullest picture available. Time should not be a factor in this.

If a site has a mine threat then the site should be cleared as a minefield or a full threat assessment needs to be written and recorded in accordance with [International demining NGO] company policy.

## Analysis

The primary cause of this accident is listed as “Management control inadequacy” because the investigator found that there were many on site errors and the site was controlled by an “international supervisor”. The investigator states that after the accident “the International supervisor took a hands on role instead of a supervisory role and so command and control was lost”. That the international supervisor did not know how to react to an accident or how to maintain command and control indicates an extreme failing in terms of his selection, training and management, so the secondary cause is listed as “Inadequate training”. That the Operations Manager had to ask the Programme manager to supply satellite telephones for each separate working party illustrates one of the failings of employing programme managers who do not know basic field requirements. The team should not have been split until after an adequate communication system was in place and proven, but instead the team was deployed with no means of rapid communication. For both security and in case of accident, this decision was irresponsible.

An inadequate survey had been conducted and even after the survey had been shown to be inadequate because mines had been found, the type of clearance was not revised. This is the direct cause of the accidents that occurred. It meant that BAC using ferrous stick detectors was used in an area with known AT mines when minimum metal AT and AP mines should have been anticipated. The stick detector is not suitable for minimum-metal mine search. Even with the PMN AP mine, which has a large metal signature, most of the signature derives from an aluminium alloy band around the top of the mine. Ferrous-metal stick detector cannot detect aluminium alloys. The international site supervisor should have withdrawn BAC and halted work until it was possible to conduct properly organised and marked lane-drills with minimum-metal detectors.

There was inadequate marking on site, and the site was entirely disturbed before the investigation, both of which are serious breaches of SOP. The senior staff “cleared” the suspect lane (on which at least two devices had been missed using a stick detector) using a “locator” (stick detector), so risked stepping on another mine himself.

The failure of a timely medevac was ameliorated by the actions of the demining NGO’s medical coordinator who corrected errors and remained with the victim long enough to ensure that he has enough blood for transfusions when required.

Two days after the accident the road building company following the deminers found a plastic cased Anti-Tank mine on the road [See Related papers]. Fortunately it did not detonate.

The experience and professionalism of the management of the international demining NGO involved appears to have been unacceptably poor and it surprising that the UNMAS authority in Sudan did not withdraw their accreditation. The group is no longer working in Sudan (2008).