

DDAS Accident Report

Accident details

Report date: 19/05/2006	Accident number: 359
Accident time: 09:15	Accident Date: 04/12/1997
Where it occurred: 5km South of Dohuk	Country: Iraq
Primary cause: Inadequate training (?)	Secondary cause: Other (?)
Class: Demolition accident	Date of main report: 04/12/1997
ID original source: AF	Name of source: MAG
Organisation: Name removed	
Mine/device: Fuze	Ground condition: demolition site (explosives)
Date record created: 21/02/2004	Date last modified: 21/02/2004
No of victims: 1	No of documents: 2

Map details

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

Accident Notes

no independent investigation available (?)

inadequate investigation (?)

safety distances ignored (?)

inadequate training (?)

Accident report

The demining group carried out an internal investigation and made their limited report available. The following is edited for anonymity.

FIRST LOOK ACCIDENT REPORT EOD DEMOLITION GROUND, DOHUK.

Location of accident: 5km south of Dohuk, northern Iraq

Time and date of accident: 09:15 hrs, 4 December 1997

Injured: EOD operator

Ammunition involved: Fuze impact SQ/D ML7

Demolition explosives involved: Charge demolition 230g PE4 Cord detonating

Demolition equipment involved: Exploder Hand Held DC L3 (Shrike)

INTRODUCTION

On the 4th of December 1997 an accident occurred which injured an EOD operator. The accident resulted from a series of technical and procedural errors and recommendations to preclude such in future are given in this report.

SITUATION

A request was made by the Public Relations Office in Dohuk to remove and destroy approximately 7000 munitions, 2000 12.7mm rounds and 2500 mines which had been collected by the local Pesh Mergas (Force 1) from the area around Zawita, east of Dohuk. The mines were dealt with by [Demining group] 7 and a COR team from Diyana.

Force 1 decided that they required most the larger munitions (1500 x shell HE 152mm and mortar bombs 120mm) for their own purposes. All of these munitions were unsafe for firing but were taken nonetheless. This left the EOD team with few large HE filled munitions with which to destroy the remaining, smaller calibre, items. Despite requests to the PRO for the return of 400 large calibre munitions, Force 1 kept their haul.

On the day of the accident EOD team 1 was due to destroy 120 fuzes, 1000 12.7mm rounds and 3 illuminating mortar bombs, the last of the non-WP filled items remaining. WP filled items were to be destroyed the following week in another area following PRO assurances that the security situation in this area had improved.

GROUND

The only suitable demolition site available was 5km south of Dohuk city. This was not the most ideal of sites as a normally quiet agricultural road running through it is currently used for the illicit, and almost constant, traffic of petrol from Mosul. However, military operations to the north and east and the hazards of transporting ammunition through Dohuk city to the west precluded other sites.

The road through the demolition ground runs approximately north - south, the ground rising to the east and falling to the west. The firing point uses two walls of an extended culvert enhanced with a sandbag wall and a sheet metal roof. The pits were originally sited amongst boulders some 150m south of and below this point. Once the local villagers started to plough the land around the pits, it was agreed to move them to a point on the east side of the road, 120m south and 10m above the firing point.

The nearest pit (pit 1) was 120m from the firing point, the other 3 being spaced along the road at 10m intervals. Pits were fired in the sequence 4, 3, 2, 1 (back towards the firing point).

Sentries were positioned on high ground to the east and south-west. During firing, road cut-off groups were established at points 1 km north and south.

At the time of the accident the weather was sunny but cool with a light southerly wind and a medium inversion.

SEQUENCE OF EVENTS

The team arrived on site at 07:15hrs and prepared the site. 4 pits were laid. Pit 1 containing the following:

Fuze impact SQ+D ML7

Fuze impact SQ+D M12

Fuze proximity MDI 1
Total 120
Charge PE4A (230g) x 6
Cord detonating (m) x 3

The fuzes were laid in 3 layers.

The top layer comprised ML7 fuzes in their metal containers laid horizontally. The state of the containers was such that the fuzes could not be removed without difficulty. A 690g PE charge was spread over the approximate positions of the magazines with a central point of initiation.

The second layer comprised unpackaged fuzes. Again, a 690g PE charge was spread over the magazines with a central point of initiation.

Unpackaged fuzes placed with their magazines uppermost made up the bottom layer. The operator was relying on the explosive fill of the second layer to detonate that of the bottom layer.

1m to the side of the pit, the following items were linked to the demolition by detonating cord.

Bomb mortar 82mm illuminating (fuzed) x 1
Bomb mortar 82mm illuminating (unfuzed) x 2
Charge PE4A (230g) x 2
Cord detonating (m) x 3

After preparation, all items were covered with soil as protection against disruption by previous demolitions.

The remaining 3 pits each contained:

Round 12.7mm tracer x 300
Charge PE4A (230g) x 3
Cord detonating (m) x 3

The shots were fired between 09:00 and 09:02 hrs. The remains of the illuminating bombs continued to burn for a minute or so after the demolition. At 09:05 hrs the operator went forward to check the pits in the order 1, 2, 3, 4 and, at 09:10 hrs, declared them clear. Traffic was allowed back into the area.

Pits 2 - 4 were fully clear.

A visual check of Pit 1 would have shown the remains of several fuzes, 6 fuzes still unfunctioned and an empty mortar bomb body.

The operator had returned to Pit 1 and was in the process of checking the pit fully when the EOD specialist arrived. As he left the pit to meet him, one of the fuzes functioned. 2 fragments had entered through the side and rear of his boot. Injuries to the operator were:

Small cut - left outer ankle
Partial tear - fibular collateral ligament, left foot. (Sprained ankle)
Bruising - rear lower tendon, left leg.

The EOD specialist was uninjured.

CAUSE OF ACCIDENT

The explosion was caused by a fuze "cooking off" in the pit. The internal temperature of the explosive filling had reached the point at which it burned to detonation (deflagration to detonation transition - DDT). Heat most likely came from illuminating composition still smouldering beneath the surface.

In sum, the accident can be attributed to a number of factors:

Insufficient large calibre HE munitions. The removal of many of the larger HE filled items by Force 1 meant that uneconomical and slower methods of disposal had to be used.

Too many fuzes in pit. 120 fuzes are difficult to place in a pit with a sufficient covering of PE to sustain a detonating wave over the entire charge. As this was the 4th pit to be fired it will have been subjected to groundshock 3 times before initiation. Without heavy cased munitions to hold light items such as fuzes in place it is doubtful that, when fired, the pit was in the same configuration as originally laid.

Two layers of fuzes to one of PE. The operator made a false assumption that the HE fill of one layer of fuzes would be sufficient to induce detonation in an underlying layer. This would not happen as:

The magazines did not contain enough HE.

They were not in close intimate contact (not enough surface to surface contact as the top layer would present round surfaces to the flat ends of the underlying layer.

Central points of initiation. Where a row of 5 or more fuzes is to be destroyed by a PE charge, this charge should be initiated, by detonating cord, at both ends. This was not the case here.

Burning illuminating bombs in close proximity to unfunctioned fuzes. The burning fill of the mortar bombs heated the ground above and around unfunctioned fuzes. This material remained hot in the ground for at least 10 minutes.

Insufficient soak time allowed for burning pit. A mandatory 30 minute soak time is imposed for WP filled munitions. A soak time is not normally allowed for illuminating bombs as most of the fire is burning parachutes or vegetation. However in this case a combination of hot ground and sensitive explosives caused an explosion 13 minutes after firing. At this site however, long soak times would be impracticable due to the large volume of traffic travelling through the area.

Pit not checked fully before personnel allowed into area. The operator made only a cursory check of the pit to ensure that the fire was out before declaring the area clear. Checking a pit after demolition is inherently hazardous. Allowing other personnel into the area before the check is complete increases the risk of multiple casualties.

RECOMMENDATIONS

Limits. A limit should be set upon the maximum number of fuzes to be destroyed in one pit. The current limit as per EOD SOPs is one layer. This should be further limited to a maximum of 40 fuzes (4 rows of 10 with 3 points of initiation).

Packaged munitions. Wherever possible, munitions are to be removed from their packaging before demolition.

Carrier munitions. Smoke and illuminating filled munitions are not to be destroyed in conjunction with fuzes or other low charge/weight ratio items (other than those fitted to the munition itself).

Checking of pits. The importance of checking pits fully, for the complete detonation and/or safety of munitions involved in the demolition before other personnel are allowed to enter the area, is to be emphasised to all EOD and demining technical personnel.

Signed: dated day of accident.

Victim Report

Victim number: 456

Name: Name removed

Age:

Gender: Male

Status: deminer

Fit for work: presumed

Compensation: not made available

Time to hospital: not recorded

Protection issued: Not recorded

Protection used: not recorded

Summary of injuries:

INJURIES

minor Foot

COMMENT

See medical report.

Medical report

The following brief reports are reproduced as found in the file – they have been edited for anonymity only.

Medic

Office, Dohuk – 13:30hrs 04 December 1997.

When I heard the explosion I went towards the pit. I conducted a primary survey of the casualty. His airway was clear and he was breathing. I looked to see if he was bleeding. He was not.

I then made further checks and measured his blood pressure. His breathing and circulation were both normal. He did not have any injury that required the use of an IV drip. He was in some pain so I administered 1 ampoule of Pentasusin by injection.

After that it was very necessary to transport him to the hospital. The doctor at the hospital sent him to the X-ray department. He was given 1 ampoule of aspegic (an anti-convulsant). The medical staff said that he would need to be seen later by a specialist.

Doctor's report

To whom it may concern:

The above patient had injury to lat. collateral ligament. (Fibular collateral ligament) partial tear. He needs to be in P.O.P. (gypsona) for 3 weeks rest. To be followed up.

Analysis

The primary cause of this accident is listed as "*Inadequate training*" because it seems that the Victim loaded the pit incorrectly and then went back to it too soon (although the investigator on site may have made the same mistake given that he found a mortar still too hot to touch).

The secondary cause is listed as "*other*" because the group's ability to conduct demolitions as they would have preferred was compromised by the actions of local fighting forces.

Statements

The following statements have been edited for anonymity.

The Victim

Azadi Hospital, Dohuk – 12:30 hrs 04 December 1997

After firing there was a fire in the pit. I told the 2 checkpoints to stay in position. I waited a few minutes after the fire had finished. I went to the pits and saw that a piece of cloth was still

burning in pit 1. I put some soil on it to extinguish it. I then checked the other 3 pits which were clear. I then told the Supervisor to come back and to allow vehicles through. After this I put the detonators for the next series of blows in their safe place amongst the rocks.

I went back to pit 1 to check that it was all clear. I saw that the ground was hot around the fuzes was hot. As I was leaving the pit, the explosion occurred.

Q. Just before the explosion occurred you were in the pit. How many fuzes did you see in there?

A. I could see between 6 and 10 fuzes still in the pit but the ground was soft so it was difficult to see if there were any more.

Q. Did you notice the burnt out mortar bomb in the pit?

A. No.

Q. How was the pit laid?

A. There were three layers of fuzes. Those on the bottom layer were lying with their magazines uppermost. Above these was a layer of fuzes with their magazines back to back above which was a layer of PE4. Those in the top layer were in containers with a layer of PE4 on top.

There were two strands of detonating cord running into the pit, one to each layer of PE.

Another strand of detonating cord led to 3 illuminating mortar bombs outside the pit. Each of these had its own charge, in the fuzewell of the two unfuzed bombs and over the fuze/body joint of the fuzed bomb.

Q. How much PE did you use on the fuzes?

A. Six (230g) charges.

Signed.

Supervisor

Office, Dohuk – 13:15hrs 04 December 1997.

We prepared 4 pits. After this we told all Checkpoints to stop vehicles and personnel from entering the area. After this was done we started demolitions.

After all shots had been fired, [the Victim] called me on the radio and said that there was a fire in the pit. I told him not to go near the pit until the fire was out and that we would not allow any vehicles in.

Later [the Victim] contacted me to say that he was at the pit and the fire was out. When he said this, we allowed vehicles through and returned to the pits.

Whilst I was beside the road I heard the fuze explode.

Q. What was in the other pits?

A. There were 3 other pits each containing 300 rds of 12.7mm (Dyoshka) ammunition, 3 x 230g cartridges of PE4A and detonating cord.

EOD Specialist

The following is given by way of a witness statement as, unusually (but conveniently) for an investigating specialist, I was on site when the explosion occurred.

I was visiting the team on their last day of demolitions on this site. Most of the large items had been destroyed and only fuzes and 12.7mm (Dyoshka) rounds remained. 900 fuzes and 2000 Dyoshka had been amongst the items destroyed the previous day.

Following a meeting with UNGCI at 0:800hrs, I arrived on site at 08:43hrs to find the team leaving the danger area as they were about to "det up" for the first blow. I went back to the

sentry point on the Dohuk side of the danger area. The EOD supervisor went to the sentry point on the opposite side. Because no large items were being destroyed, a reduced danger area of 600m had been imposed. At the checkpoint at which I was stood, a total of 3 tractors and one car had been stopped by the time the shots were fired

Between 09:00 and 09:02hrs, the 4 shots were fired. At 09:10 hrs, the operator declared the pits clear and traffic was allowed through.

I reached the pits at 09:15 and walked up the incline. The operator was stood in the first pit which was 0.5m deep. As I approached him, I asked if the shots had been successful. He said "Not good" and stepped out of the pit towards me. He was about a metre out of the pit, and about half a metre from me when the explosion occurred.

The explosion, consistent with the functioning of an impact fuze, had torn away the lower part of his left trouser leg and put a few small tears in his boot. I looked into the pit and saw several fuzes and a mortar bomb inside. He said "gaerma" (Kurdish for hot) by which I assumed that he meant the fragments inside his boots were burning him and, after moving him 10m away from the pit I helped him to remove it. The injury to his foot did not seem overly serious and so I helped him to his feet and walked him back down the hill.

Within a minute of the explosion the medic and most of the team arrived to render assistance. He was taken to the roadside, treated and casevaced.

After some preliminary questioning of the supervisor and other operator, I allowed 10 minutes for the pit to cool down before starting the investigation.

The mortar bomb body was still hot to touch. The ground on the side at which the explosion had occurred was cool. After searching the pit and surrounding area I found 19 unfunctioned fuzes.