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DDAS: Using the Database of Demining Accidents

Humanitarian Demining Accident and Incident Database
AID

Using the database of demining accidents

Andy Smith, 2002 **(Published in the JMU Journal of Mine Action)**

Note: *the database has been further enhanced and maintained since this article was written.*

The author has maintained a database of demining accidents for four years. It contains records of many of the explosive accidents that deminers suffer while going about their work. This article explains the uses and limitations of the database and the software developed to contain it.

I first published a database of accidents in Humanitarian Demining in 1998. In my experience, it was unique because it attempted to contain the source material as well as the conventional "spreadsheet" style summaries that characterise most databases. There have been several releases on CD since 1998 and the latest was recently completed with backing from UNMAS/GICHD. It was originally called the "Database of Demining Incident Victims" (DDIV). At GICHD's request, the latest version has been renamed the "Database of Demining AccidentS" (DDAS).

Original accident reports (edited for anonymity) are included when possible. These may include photographs and usually include some medical details about the victim's injuries and treatment.

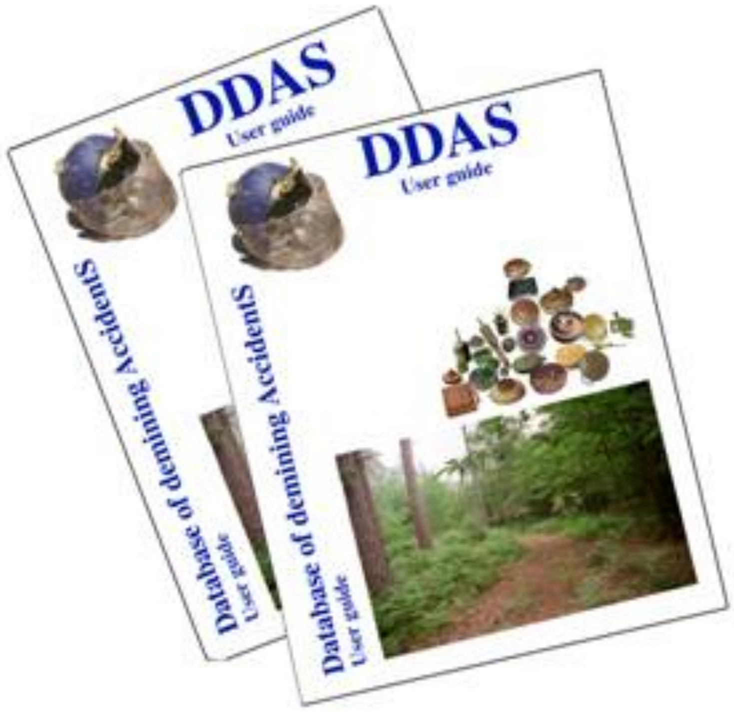
The 1999 edition of the DDIV contained details of 319 victims. The current release contains an additional 160 but also many extensions to old entries – such as medical reports and interviews concerning the ongoing situation of victims. Some of the additional data records accidents that happened some time ago. For example, there is now some data about accidents in the British sector of Kuwait after the Gulf war (none for other sectors).

Principal uses

It has been argued that the database provides a stick with which to beat the humanitarian demining industry. While it could not be used to target an individual or demining group, it could be used to criticise… But only if you subscribe to the belief that people only learn through pain. It is perfectly possible to use the lessons that can be derived in a positive way, as described below.

1) Research

By providing "snapshots" of activities surrounding accidents, the database can be used as an introduction to how demining is actually carried out. This is often at variance with published SOPs and recent, well detailed records show this clearly. Researchers developing new equipment have used it, and I recommend its use when preparing Technical Advisors for field deployment. This might be especially useful when a TA has experience in one area and is being sent to another.



Apart from my own papers, research papers based on the database have been presented by Colonel Alistair McAslan (ex-GICHD, now Director, Cranfield Mine Action) and Dr Vernon Joynt (ex-MECHEM, now CSIR in South Africa).

2) Training aid

As a training aid, real events can be used to show the importance of a whole range of demining rules. These include using adequate area marking, appropriate tools and detectors, cautious excavation, Quality Control checks, blast visors, etc. It also provides salutary lessons over the need for good training, appropriate field control, open management, appropriate medical and communications equipment, etc. With real examples, these issues cease to be entirely a “matter of opinion”.

Several demining NGOs have asked for the medical details in the database for use when training their field medics.

3) Reference

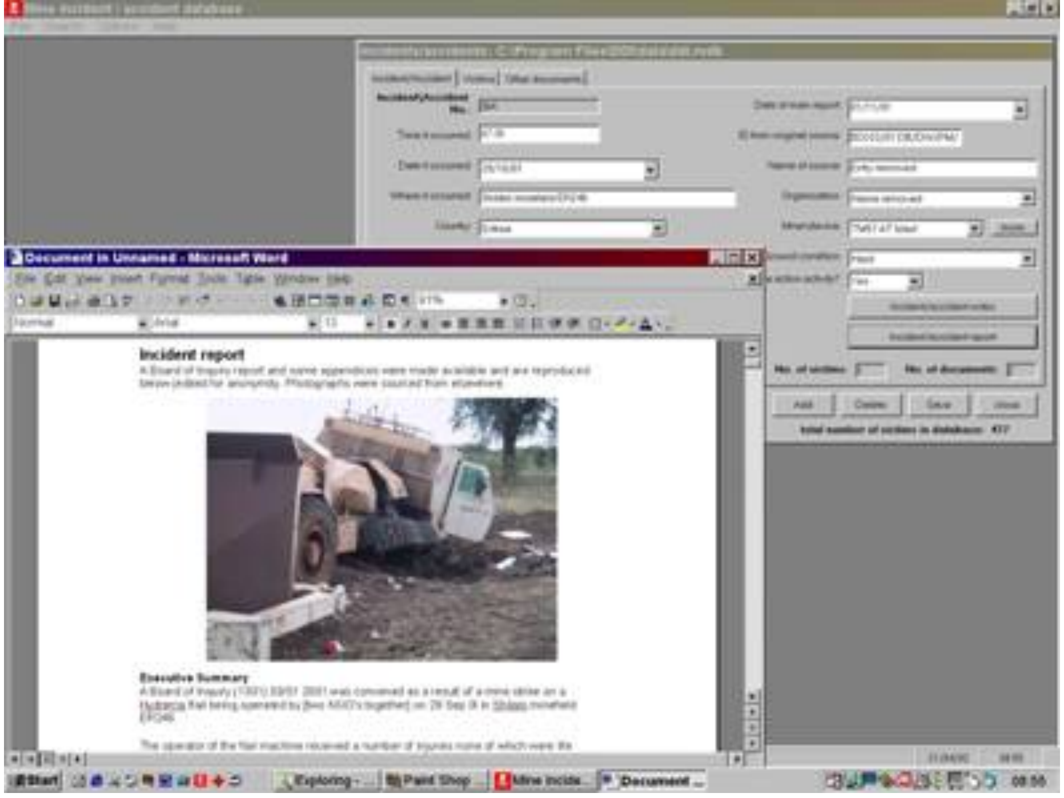
The database proved invaluable during the revision of some parts of the International Standards (IMAS) because the range of opinion was very broad and based on heartfelt individual experience. The ability to refer to a broad overview derived from global experience was useful, especially when the protagonists held positions of authority and had made previous decisions based on incomplete knowledge.

In this context, reference to the database established the prevalence of severe hand-injury and showed which mines and demining activities posed the greatest threat. It also showed that over-protection with ineffective PPE extras was neither desirable nor necessary.

4) Demythologising

Demining engenders myths of danger, heroism and the “black art”. The database explodes many of the myths – and shows how simple demining actually is. It also shows how multilayered management remote from the actual work can introduce new dangers by imposing their ignorance.

The most obvious myth that the database exposes in that deminers lie



prone when excavating mines. Even in the few places where the SOPs demand it, lying prone is so rare that it is certainly the exception rather than the rule.

5) Identifying causes

Perhaps most significant, the evidence clearly indicates that deminer error is an infrequent cause of an accident, and that failures in the control chain are far more common. When seeking to reduce the number of accidents and/or the severity of resulting injury, understanding why accidents occur is essential. When the person studying the database is a contributory cause, that can be a deeply uncomfortable lesson.

The picture on the right shows an accident report opened inside the database.

6) Archive

It is never possible to know what information will be needed in the future. The database provides an archive to ensure that data is preserved. For example, with the closure of the Kosovo MACC, their accident investigations would be very hard to access if they were not included in the DDAS. Also, a dataset of accidents in Mozambique was recently returned to the MAC in Mozambique , where the original records had been lost. And in Cambodia , most of the records that have survived are held in Khmer, so the DDAS provides an English language translation for those wanting to learn from past accidents.

The database is a useful source of information for managers and a very relevant training tool for field use. Examples can be found to support safety requirements that deminers may think unnecessary, and the reports themselves can be used to promote best practice in accident investigations. The standard of investigation varies as much as the experience of those carrying them out, and frequently an opportunity to learn from mistakes can be obscured or lost in the reporting procedure.

Acceptance and rejection

While some demining NGOs requested copies very early on and have issued the database to field groups as a resource, other famous groups have failed to cooperate with data acquisition and refused to accept the most compelling inferences that can be drawn from the data amassed about their own accidents.

Because some players in the industry have been less than honest in their reporting and less than open in sharing experience, the DDAS cannot be presented as “complete”. I think that there are about 65% of the accidents since 1996 in the database, but I cannot be sure. With records of close to 500 victims, it includes complete data for some countries in some years, Mozambique , Kosovo , Bosnia , Angola , Cambodia and Afghanistan are examples. The data made available for Kurdish Iraq is sporadic and was summarised by UNDP before being supplied. Data from the Kuwait clean-up after the Gulf War is only just becoming available so the data sometimes stretches back in time. Interestingly, the patterns that emerge in countries where all data is available do not differ significantly from patterns based on incomplete data, so it seems that the inferences can be generally applied. Certainly, until a more complete dataset is compiled, there is no reason not to use the best evidence we have while working to extend it.

In some cases, commercial and political interests have led to data being withheld. To cite a commercial example, it took me more than four years to get copies of the written reports surrounding accidents during the trials of a mechanical demining system in Mozambique . Those records include well detailed charts of the staggering percentage of mines that were not detonated and were left damaged by the machines, which may explain the protracted secrecy.

An example of “political” interests leading to secrecy is the fatal accident involving a roller system mounted on a tank outside Kabul in the early 1990s. I presume that it is a fear of their own mistakes being made public that has led the UK office of the famous NGO involved to be uncooperative. They began by insisting that they did not keep records of accidents. In 1997, they corrected this and said that all their accident records were hard to find. Two years later they promised that data on all their accidents would be provided if I gave them the details of which of their accidents I already knew about. I did that, but after a further 18 months they have failed to provide access to records of a single accident. Fortunately the field officers of that particular NGO are less fearful of the truth and (outside Afghanistan) have always provided all the records in their possession when I have gone to knock on their doors.

It is only fair to contrast the failures with the successes. Some MACs and NGOs have made their incident investigations readily available. The Kosovo MACC was especially helpful. It made the most thorough investigations on record, provided them quickly and then carried out follow-up inquiries over the health of the victims.

So, if the DDAS is less than perfect because it does not contain all of the records it could, that problem will only be addressed when some major players in the industry smarten up their act.

New data, new conclusions?

I have previously published papers on the conclusions I have drawn about accidents and their causes. The JMU Journal of Mine Action , Issue 4.2, Summer 2000, carries an article entitled *"The facts on protection needs in humanitarian demining"* which I recommend you read – http://maic.jmu.edu/journal/index/past.htm

The increased number of database entries have very little effect on my previous conclusions. But the incompleteness of the data means that any statistical analysis based on it must always be made with informed caution.

Additional records change the ratio between UXO and mine accidents in HD significantly. But that ratio was never representative because traditional EOD tasks are often carried out by serving military who do not carry out independent investigations and do not make their own accident records available.

The rich data stream from the Balkans has changed the balance of "threat" mines in HD, but not significantly.

Defining the "threat" mines as those most frequently involved in accidents, the current list (April 2002) reads:

Demining accidents in the DDAS

AP blast	74%
AP B/frag	8%
Fuze	5%
AP Frag	4%
AT	3%
Ordnance	2%
Submunition	1%
Other/unknown	3%

This is interesting, but not much help unless you put it alongside the results of those accidents. For example, the mines/devices involved in accidents where deaths occurred were:

Deaths in demining accidents

AP blast	22%
AP B/frag	33%

Fuze	0%
AP Frag	3%
AT	8%
Ordnance	18%
Submunition	3%
Other/unknown	12%

The AP blast and AP bounding-fragmentation situation is reversed with many more deaths from bounding-fragmentation mines than from AP blast mines. You should also notice that Ordnance, which only features in 2% of all accidents, causes a significant proportion of fatalities.

These figures are also misleading – because most of AP bounding fragmentation mine incidents occur in the Balkans with a mine that is not a problem in most of the rest of the world (the PROM-1). Also, most of the AP blast mine incidents involve the PMN, which does not occur at all in recorded accidents in the Balkans. It should also be noted that the majority of the ordnance deaths occurred in Kuwait during the post Gulf-war clean up and before any International safety standards for Humanitarian Demining existed.

To make an analysis of injury significant I have had to draw a distinction between "severe" injuries and "minor" injuries. I define the difference as:

> **Minor:** a minor injury is one that does not require surgical intervention and does not result in long-term disability.
>
> **Severe:** a severe injury is one that results in long-term disability or requires surgical intervention.

This is a fairly crude distinction but I have found it useful.

Not every accident involved severe injury. Of those that did, the devices involved were:

Severe injuries in demining accidents

AP blast	70%
AP B/frag	14%
Fuze	1%
AP Frag	4%
AT	6%
Ordnance	3%
Submunition	1%
Other/unknown	1%

These include deaths – which I have assumed always involved severe injuries.

So you can see that AP blast mines cause by far the most severe injuries.

What was the victim doing at the time?

Activity during AP blast accidents

Excavation	46.5%
Demolition	1%
Detection	2%
Handling	5.5%
Stepping on Missed mine	29%
Survey	6%
Vegetation removal	3%
Victim inattention	7%

The most common activity at the time of a blast mine accident is excavating a suspicious area. This may have been found using a metal detector or a dog, exposed by a machine or may have been a part of wide area excavation – during which the whole surface of the soil is removed in suspicious areas where other methods cannot be used.

In an excavation accident, the two most common severe injuries are to the eyes and the hands/arms. The injuries may be the loss of an eye, fingers, hand or arm – or may be the loss of function in it – so leading to permanent disability.

Common injuries when excavating AP blast mines

(as a % of all excavation accidents)

Loss of eye or eyes	6.7%
Severe eye	22.7%
Amp fingers	11.5%
Amp Hand	2.2%
Amp Arm	4.1%
Severe arm	6.3%
Severe shoulder	1.9%
Severe hand	16.4%

In about 30% of all excavation accidents with AP blast mines – a severe eye injury occurs.

In about 42% of all excavation accidents with AP blast mines – a severe injury to a hand or arm occurs.

Severe chest injury occurred in only 3.5% of recorded excavation accidents – and in more than half of those the injury was caused by parts of the handtool. Severe chest injury is rare – surprisingly, this is true whether or not the victim was wearing body armour. Many deminers without body armour get away with detonating an AP blast mine with no body injuries at all. While I personally like to wear frontal body armour, the database does not provide compelling evidence of its value in an AP mine blast. Blast visors in good condition, and purpose designed demining handtools, do make a noticeable difference.

Causes of the injuries

Severe eye injury results from:

> 1) The issue of inappropriate eye protection – such as the industrial safety spectacles that are still widely used;
>
> 2) The issue of visors that cannot be seen through.
>
> 3) The use of visors that are not down at the time of detonation.
>
> 4) The use of old, hard visors that shatter on blast impact.

Severe hand and arm injury results from:

> 1) The use of a short tool meaning that the hand is within 30cm of the mine when it detonates.
>
> 2) The use of an inappropriate digging method so that the hand is above the mine when it detonates.
>
> 3) The use of a tool that shatters on detonation and the parts inflict other injuries.

Hand injury also results from digging incautiously or by devices that are particularly sensitive, but if the device is an AP blast mine, the detonation does not generally cause severe injury unless one or more of the above are also true.

So perhaps you will understand why my own particular technology interests in demining have been visors, handtools, appropriate PPE and training. The database has helped me to identify the problems, and sometimes to begin to answer them.

The future of the accident database

Until recently the CD database was unsupported by any organisation or donor. My last update of the database was funded through GICHD with UNMAS approval. It is available on request [no longer available] from GICHD as a self-installing CD for use on computers with Windows 95 (or later) and Office 97 professional (or later). Please contact GICHD if you would like a copy.

I believe that it should be extended with another dataset listing missed-mine incidents where the device was "found" after clearance was finished. These events are sometimes investigated, but the reports are often jealously guarded. Such a dataset would allow some objective comparison of the effectiveness of methods (and groups). The database could also be extended to include datasets of civilian injury in uncleared areas – and you will find an example of this on the distribution CD.

But, at the time of writing, the future of the database is uncertain. But if you have details of any demining accidents, please send them to me by email.

The picture below shows a deminer gambling with his fingers in Angola.

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