

UNEXPLODED ORDNANCE (UXO) AN INDUSTRY ADVISORY

INTRODUCTION

For well over a decade now there has been much publicity surrounding the scourge of landmines. As the Cold War ended, aid agencies flooded into post-conflict regions to assist long-suffering populations only to discover that their efforts were hampered by the threat of landmines and other unexploded ordnance (UXO). This has led to a campaign of Humanitarian Mine Clearance (HMC) regulated by the United Nations and formalized in the form of International Mine Action Standards (IMAS). IMAS aim to serve as a basic minimum standard by which humanitarian UXO clearance operations should be conducted. This has been a welcome development however the limitations of the “humanitarian” aims of HMC are not always compatible with those of the civil engineering and construction industries.

HMC is still being conducted by traditional – and some would say primitive – manual methods utilizing metal detectors, prodders, simple excavation tools as well as the human eye and human judgment. This is because HMC is largely an expedient means of achieving surface and shallow sub-surface clearance of contaminated land in order to remove the immediate danger to the local population. It also aims to return arable land as quickly as possible to the local population and ensure that land is available for returning refugees and so on.

However, the UXO threat is not limited to the surface and shallow sub-surface environment and, as such, there are a variety of technologies available to assist with deep sub-surface search, a process often ignored or seen as a low priority by aid-related HMC projects. It is this difference that needs to be discussed in relation to “Commercial” landmine and UXO clearance operations in support of the civil engineering and construction industries.

LIABILITY & CONSEQUENCES

Since HMC is largely aid-related, it is generally not subject to the threat of litigation that commercial operations might be exposed to. For this reason, aid-related HMC is often limited to surface and shallow sub-surface search techniques.

Commercial engineering operations on the other hand, will usually involve earth movement and excavation processes that, in terms of risk management, will render shallow search techniques inadequate. Health and Safety regulations dictate that a company’s duty of care to its employees, contractors and the general public demand the highest standards of safety and risk management. Employers must ensure that potential threats to life and limb are reduced or eliminated entirely. Quite apart from an employer’s moral obligation to provide a safe working environment, are the threats of vicarious liability, disruption to the works programme, budget overruns and reputational damage.

Recognition of the UXO threat is a relatively recent innovation within the civil engineering and construction industries but it is by no means a matter of universal good practice. Many organizations still enter into commercial ventures in post-conflict environments without ever having considered the threat that landmines and

UXO might pose to their project and personnel. The result is the same as for any contractor who fails to omit any other important aspect of the project risk management considerations. In other words, UXO are a fact of life in post conflict areas and their avoidance and/or removal should be treated as an integral part of the project engineering process.

BLACK ART

There has been a tendency in the past for some explosive ordnance disposal (EOD) practitioners to portray their profession as some form of “black art”. This is perhaps one of the reasons why the civil engineering industry has tended to overlook the problem of UXO and treat it as something of an alien concept; a problem that someone else should have dealt with.

Whilst it is true to say that the clearance of landmines and UXO needs to be dealt with by trained specialists, it is by no means rocket science. Once commercial organizations have conducted their project risk assessments (One simple question helps: Is the project located in a former war zone?) the problem of UXO should be factored into the risk management process and, like other project risks, action should be taken to deal with it. With adequate foresight and appropriate planning, UXO clearance need not become the insurmountable problem that it is often perceived to be.

PITFALLS

As mentioned before, HMC is largely a process of shallow search using tried and tested manual methodologies. When deep search becomes a necessity (as in engineering works) a variety of technology is available to assist the UXO clearance operators.

A word of warning: UXO clearance contracts are often awarded on the basis that the vendor possesses “state of the art” equipment. Prime contractors should beware of being lulled into a false sense of security by sophisticated technology alone. In many cases, the equipment works as advertised however, it may be at worst inappropriate or at best, expensive overkill.

For example, in the post-war United Kingdom, analogue magnetometers have been used by the Royal Engineers for decades in order to locate UXO buried at depth. This technology is still most satisfactory for many deep-search requirements yet contracts are won by companies expounding the virtues of electromagnetics, digital geophysical mapping (DGM) and ground penetrating radar (GPR). These technologies certainly have their merits but only when appropriate. Organizations with a UXO clearance requirement are still being convinced to pay top dollar for a sophisticated suite of equipment when a simpler and cheaper option would have sufficed and, in many cases, been more appropriate.

The overkill scenario is largely a matter of education or lack thereof. In their ignorance, organizations may be convinced by a UXO clearance contractor’s smooth talk into utilizing their “unique” services. Like many other aspects of engineering, it

sometimes pays to invest in the services of an independent consultant who can advise on the problem, the scope of works and the recommended solutions.

TECHNOLOGIES

So, the human eye, the metal detector and the prodder are suitable for HMC but they are also an important part of the toolbox for commercial landmine and UXO clearance. Where landmines are present, these tools are essential however, in general UXO search they help to remove metallic surface “clutter” that might interfere with deep search procedures.

As already alluded to, magnetometers are an effective means of locating deeper buried ordnance but, other technologies are also available:

- a. Electromagnetics
- b. Digital Geophysical Mapping (DGM)
- c. Ground Penetrating Radar (GPR)

It should be borne in mind that all of the technologies currently available will, under the right conditions, detect the presence of UXO. All of the above technologies have advantages and disadvantages but none of them are appropriate for all ground conditions and environments, so care is needed in equipment and methodology selection.

It is worth noting that one of the main advantages of the above technologies is their suitability for UXO search over large, open and reasonably accessible areas of ground that need to be covered quickly. However, whichever technology is chosen for the search, the targets acquired will still need to be excavated, identified and disposed of safely. In other words, the equipment may allow for quick search and acquisition of targets, but the process of excavation, identification and disposal can still be time consuming.

Obviously, such methods would not be appropriate where there is a threat from landmines due to the inherent “booby trap” design of these devices.

- d. Mechanical Plant – NOTE: MACHINES DO NOT CLEAR LANDMINES!!!
It is important to understand that neither HMC nor commercial UXO clearance are the same as the Normandy beach landings or the crossing of barrier minefields on the Kuwait/Iraq border. During such operations, the military will accept a level of casualties commensurate with the importance of their objective. In this industry, casualties are NOT acceptable and, since machines (flails, rotavators etc.) cannot guarantee 100% clearance effectiveness, they are generally used as an aid to clearance operations. They can be useful for clearing bush and “preparing” ground but that ground must still be searched and cleared by trained personnel by way of follow-up.
- e. Dogs – Like the machines described above, dogs do not clear landmines and UXO but they are a useful tool when conditions render them appropriate. See

your independent consultant before agreeing to accept the bill for transportation, kennel facilities and veterinary support!

WHAT TO DO?

As already mentioned, an independent consultant can provide advice that will allow an organization to avoid expensive over-reactions to what might actually be a relatively simple problem. Such a consultant can also assist with the preparation of tender documents, project design, bid evaluation, vendor selection and subsequent Quality Assurance and Quality Control (QA/QC). Importantly, the consultant can ensure that UXO clearance activities are coordinated with the overall engineering programme to ensure that timelines are met and objectives achieved.

In effect, the independent consultant acts as the client's representative on matters relating to UXO clearance. Once a contractor is appointed, the consultant ensures that the client's interests are being looked after.

As well as looking at the obvious vector for landmines and UXO (the ground you will be working on and excavating), your consultant should be able to advise you on other matters such as:

- Potential risks from UXO and landmines in areas adjacent to your working areas (shrapnel from exploding UXO can travel at high speed to distances of over one kilometer).
- The effects of explosion and shrapnel on people and structures
- Risk reduction by use of Protective Works.
- Secondary vectors for UXO (e.g. movement by flood; contaminated spoil).
- Management and staff awareness.
- Health and safety policy inputs.
- Training of health and safety staff in UXO risk management.

Focusing briefly on staff awareness – there have now been numerous incidents around the world where workers have come across small items which have been picked up and taken home as trophy's. A Japanese photo journalist was jailed in Jordan a couple of years ago when a small item he had picked up in Iraq exploded as it was being examined by a security officer at Amman airport. Sadly, the security officer was killed instantly.

CONCLUSIONS

This has been a very brief introduction to the impact of UXO on commercial operations. If there are any points worth emphasizing, they are:

- a. When conducting project risk assessment, always ask whether or not work will take place in a former war zone.
- b. Landmine and UXO clearance is not a black art but it does need to be conducted by trained professionals.

- c. Sophisticated and expensive technology is not necessarily the panacea to all landmine and UXO problems.
- d. It is often worth seeking the advice of an independent consultant.
- e. Landmine and UXO clearance requirements must be anticipated and treated as an integral part of the engineering process and project budget.

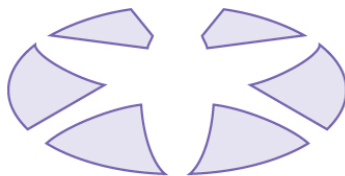
Very few places in the world have not been touched by conflict. Among those that have, the UXO threat varies immensely. UK is a former war zone as is Hong Kong even though their threat source dates back to the Second World War. Whilst the threat of UXO in these locations is a distinct possibility, the risk assessment process needs to be conducted wisely and with regard to what might have once been a target. On the other hand, Laos, Cambodia and Vietnam are obvious high risks areas as are many parts of Africa such as Mozambique, Angola and Sudan. The source of the landmine and UXO threat in such areas dates from far more recent times and risk management must be conducted accordingly.

Health and Safety in Industry has made great forward strides over the last thirty years and there is now greater than ever awareness of the responsibilities of all parties in respect of the avoidance of injury and death. Where landmines and UXO abound, the risks can also be contained, but the essential first step in addressing the problem is to recognize it.

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