Simon Cooke, Managing Director of 6 Alpha Associates, a specialist risk company with particular expertise in the assessment and management of offshore UXO, who co-authored CIRIA’s report, speaks to PES about the extent of the UXO threat and the current risk mitigation options available to offshore developers.

Over 70 years have passed since the end of the Second World War, and the North Sea has witnessed limited warfare since. Yet the legacy left by the dropping of thousands of tonnes of bombs in two World Wars and the subsequent dumping of expired munitions is so great that the Construction Industry Research and Information Association (CIRIA) has recently announced official guidelines for marine UXO management.

In the two World Wars, naval mines were used extensively on both sides. Thousands of tonnes of mines were laid in the North Sea, at surface level or just below, ready to explode the minute an enemy vessel came into contact with them. Given the number of mines laid, inevitably a proportion of them did not detonate, eventually losing their buoyancy and sinking to the bottom of the ocean.

Unfortunately, records kept at the time didn’t manage to document the location of all the mines laid, so we can only make an educated approximation of the number and location of those left behind after VE Day. Furthermore, due to weather and seabed mobility, many of the mines whose locations may have been accurately documented, will have migrated during the seventy-year period since they were originally laid.

Indeed, during the four-year Second World War, the Dutch authorities reported that almost 6,500 mines drifted into neutral coastal areas of the Southern Netherlands. Given that it has now been over seventy years since many of the WWII mines them were first laid, it is difficult to predict how far some of them could now have moved. Today, these mines still pose a risk to offshore projects.

Unfortunately, however, lingering naval mines are not the only source of the North Sea’s current UXO threat. Many of the vessels successfully targeted by these mines, the remains of which now lie at the
bottom of the ocean, contained UXO, such as bombs and torpedoes. While these wreckages were generally accurately recorded, their contents will have been subject to migration, further polluting the seabed.

Thinking beyond the Second World War, our oceans have been consistently used as munition dumping grounds ever since. From 1945 onwards, millions of tonnes of unexploded munitions, including of the chemical kind, have been disposed of in the sea.

This major UXO legacy has proved a persistent problem for generations of fishermen and seafarers. However, more recently, it has also caused disruption to the construction of offshore projects. As European countries work towards tough 2020 targets, large offshore wind projects are cropping up across the North Sea. Over the last few years, a number of high-profile projects have experienced expensive delays and downtime as a result of UXO discovery.

For example, during the initial stages of development at Riffgat Offshore Windfarm, UXO was discovered along the export cable route. The German grid generator TenneT, who was working on the project, claimed that it spent €37m on clearing munitions and €43m on compensation caused by the delays as a result of the UXO threat detection. Delays were also experienced at RWE’s Gwynt-y-Môr offshore wind site when three WWII bombs were discovered.

More recently, in March this year, E.On discovered two 500lb bombs on its 400MW Rampion site. A 500 metre exclusion zone has been set up around the affected area, and warnings have been sent to mariners to stay away from the area until the devices are disposed of.

Given this context, the aim of CIRIA’s recent report, Assessment and management of unexploded ordnance (UXO) risk in the marine environment (C754), is to set out guidelines that will address possible UXO threats at the outset of a project, thus avoiding expensive delays when threats are discovered at a later stage.

The report outlines seven distinct phases of UXO management:

- Preliminary Threat Assessment
- Detailed Threat and Risk Assessment
- Risk Management Strategy
- Risk Mitigation Design and Specification
- Risk Mitigation Delivery

The initial stage of UXO risk management takes place at desktop level. UXO risk consultants, including 6 Alpha, carry out preliminary desktop threat assessments using an extensive database of all known and mapped UXO sites in European waters. Using this tool, they can quickly ascertain whether there is any chance of UXO being discovered on a site. If it is virtually impossible that UXO would be discovered on the site, then development can proceed without further UXO risk checks. However, if there is a fair chance that UXO could have been laid on the site, or migrated to the site from the surrounding area, then subsequent risk mitigation strategies will have to be implemented.

Indeed, if UXO is considered a possibility on a site, risk consultants would then proceed to a detailed risk assessment...
process, during which Bomb Search risk mapping would be employed to explore the site and determine what kind of UXO is most likely to be on the site.

At this stage it’s crucial to inform risk managers how they should proceed. Having established a fairly strong idea of what kind of UXO they may be dealing with, they will carry out a risk management strategy designed to reduce UXO risks to as Low As Reasonably Practicable (ALARP), a process which is legally required.

This strategy involves sharing, transferring, mitigating and tolerating UXO risks. To begin with, geophysical surveys are usually used to detect the level of the UXO threat. Once this has been ascertained, geophysical survey contractors, ROVs and divers are brought in to identify the precise UXO detected.

After this information has been found, the consultant team can make an informed decision on how to proceed. If the hazard discovered will directly interfere with the project or potentially cause harm to workers or infrastructure, it is possible for changes to be made to project plans so as to avoid the UXO threat.

However, this is not always possible and in cases when the project design cannot be adjusted, specialist bomb disposal contractors, including 6 Alpha, can be brought in to render the UXO threat safe. If the UXO threat is likely to explode, then it will be safely detonated on site. If it is likely to cause direct damage to on-site equipment it should be detonated, then carefully removed to a safe location for disposal.

When an UXO object is detonated in situ, an exclusion zone of no less than 1km is usually established around it. This ensures that neither infrastructure nor maritime wildlife is affected by the shockwaves from the detonation.

Once the UXO threat has been made safe or disposed of, the consultant team will give the developers a sign-off certificate which affirms that the site has had its UXO risk reduced to ALARP.

By following these steps, developers can ensure the proper safety of their project and staff, as well as avoiding future delays and unexpected costs. As the offshore sector grows and develops, the hope is that a comprehensive approach to UXO risk management will become routine procedure on all projects.

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