

Low Order deflagration for UXO disposal for the commercial sphere

Unexploded Ordnance

- Unexploded Ordnance (UXO) are explosive weapons that did not detonate when they were employed and still pose a risk of detonation.
- There are around 500,000 items (100,000 tonnes) of UXO in the water surrounding Great Britain, the vast majority a result of WWI and WWII activity, including exercise drills, deployment of mines/bombs during combat and offloading munitions to conserve fuel.
- Much of this UXO lies in areas designated for planned windfarm projects (and their cable routes), and needs to be cleared for safe construction.
- There has been an increase in the number of off-shore wind farms under construction or planned in UK coastal waters following the publication of the government's Off-Shore Wind Sector Deal in 2019. Further expansion of offshore wind is a key plank of the government's efforts to achieve net zero by 2050.

High Order – detonation

- The traditional method for disposing of UXO is to place a counter charge next to the explosive and detonate it – known as 'high order' disposal – as most underwater UXO may be unstable, making them unsuitable to be safely moved.
- This is a heavy handed technique that, despite legally mandated mitigation measures, cannot ensure that marine mammals and other sea life are being protected from harm.
- While mitigation measures – such as 1km mitigation zone that must be cleared of marine mammals – can prevent direct physical harm, they often can still lead to severe effects on marine mammals for two reasons:
 - The sound propagation of water is 5 times that of air, meaning damaging levels of noise can have effects up to 25km away from the source for large UXOs.
 - Marine mammals are very vulnerable to noise trauma, which can affect their navigation systems, feeding patterns, and communication with other mammals. ○ The [best available study](#) assessed the impact of UXO clearance on harbour porpoises and found that 88 explosions in one year very likely caused 1,280, and possibly up to 5,450, permanent hearing loss events.

Kyle of Durness incident

- An example of the effects of high order outside the mitigation zone is the mass stranding event that took place at the Kyle of Durness in 2011, when 39 long-finned pilot whales entered the bay at high tide and became stranded, with 19 eventually dying.
- A Defra report that looked into the event found munitions disposal operations conducted by the Royal Navy's Northern Diving group in the vicinity of Kyle of Durness was "the only external event with the potential to cause the Mass Stranding Event."
- The report also found that the mitigation practices employed by the Northern Diving Group – including establishing a mitigation zone - were "insufficient".

Low Order – deflagration

- There is now a less damaging, less disruptive alternative available for use in the commercial sphere – a technique known as ‘low order’ deflagration.
- Low order causes UXOs to burn out without detonating. A small charge is fired at the explosive, causing the explosive contents to ignite and burn out. The casing of the explosive cracks open, but, crucially, it does not detonate.
- This capability was pioneered by Alford Technologies in the early 2000’s, a world leading British explosives company, this capability is now regularly used by the Royal Navy, the US Navy and 15 other militaries globally.
- A recent [BEIS-funded study](#) by the National Physical Laboratory (NPL) and Loughborough University found low order deflagration has significantly lower noise emissions, with noise levels dependent only on the size of the low order counter-charge, not on the size of the explosive tested, as was the case for high order detonations.
- The study tested explosives up to 18.7Kg and found an 11x reduction in sound emissions. As UXOs can be up to 820kg, low order deflagration used to dispose ordnance at sea would be up to several hundred times quieter.
- Low order also offers other benefits over high order, including lower unit costs and the ability to carry out multiple disposals simultaneously. These developments will help further drive down the unit cost energy generated by offshore wind.

The current licensing regime

- The use of explosives within the UK’s marine licensing area requires a license under the Marine and Coastal Access Act 2009, Part 4. The body responsible for licensing in England and Wales is the Marine Management Organisation (MMO), a non-departmental entity that sits underneath the authority of Defra.
- License holders must comply with:
 - The Habitat Regulations (where conservation areas are involved), ○ The UK Marine Policy Statement;
 - Guidelines issued by the Joint Nature Conservation Committee (JNCC), which issue best practice for minimising risk to marine mammals from the use of explosives, including the mitigation measures required as part of the licensing.
- The MMO also claims to consult with other statutory nature conservation bodies (SNCBs) such as Cefas and Natural England and “refer to best available and most recent evidence”.
- But the JNCC guidelines haven’t been updated since 2010, before deflagration was an option for commercial UXO disposal.

What needs to change?

- The JNCC Guidelines ought to be updated to take account of the improved technology; however, low order deflagration will not receive wider take up until Defra and the MMO issue guidance, as the ultimate responsibility for licensing sits with them.

- Defra – via the Secretary of State for the Environment, Food and Rural Affairs – ought to issue guidance stating that licenses should require low order deflagration as the default method of UXO disposal, unless this technique is not possible. (This happens in the small number of cases where the UXO is damaged or unidentifiable, and contractors also ought to be able to perform high order disposals in these circumstances)
- It is our position that the evidence base for the reduced noise impact low order deflagration as means of reducing is sufficient for Defra to issue guidance, based on results from the BEIS trial and its global military use for over 15 years. This action should be taken immediately to prevent further damage and disruption to vulnerable marine species.

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