TNO | Knowledge for business

Environmentally acceptable disposal of ammunition that respects the occupational health and safety of the operators

Disposal of munitions and explosive substances

The destruction of munitions and explosives by open burning and detonation releases substances that may cause harm to human health as well as to the environment. Therefore, TNO has developed environmentally-friendly disposal and recycling methods.

Munitions and explosives are often cleared by open detonation, releasing chemical substances that may harm the environment. For instance, the local contamination may be so high that the vegetation is unable to survive and dies out. Furthermore, personnel charged with the clearing run health risks if their skin is exposed to the substance or they inhale it.

TNO has extensive knowledge and expertise in the area of munitions and the impact of related substances and forms a platform for the development of various alternative methods for the disposal of ammunitions and explosives.

Washing

Large-calibre ammunition (larger than 40 mm) is cut open and washed out by high pressure water, which ensures that the explosive substances and metal are separated. The metal can be recycled; so can the explosive substances. If recycling is not feasible, the explosive substances are converted into a non-explosive slurry, that can be classified as a transport hazard class 4.1, enabling transport and storage as non-explosive materials. This enable incineration in a commercial waste processor.

Shredder

Medium-calibre ammunition (20 - 40 mm) is destroyed using a shredder that leaves only scrap, which is contaminated by the explosive substances that are released. These explosives can be incinerated in an oven and the scrap that remains can then be recycled.

Rotary Kiln

Small calibre ammunition (smaller than 20 mm) is destroyed in a rotary kiln, the type used by commercial waste processors. All that is needed for this process is for the ammunition to be packaged in a suitable way so that it is ready for transport and incineration.

Mobile deployment

The rotary kiln is a fixed facility; the cutting and washing equipment as well as the shredder are mobile, so they can be taken to the actual munitions site, where and when needed. These two systems can be deployed for the clearing of explosives found from the Second World War as well as in UN peace missions abroad.

Phlegmatisation

TNO has developed a process where explosive substances of transport hazard class 1 are mixed with water and a stabiliser. In this way the explosive properties disappear, which enables transport and storage in class 4. This process - known as phlegmatisation - can be used for all

substances that have explosive properties, like munitions, explosives, gunpowder, pyrotechnics, fireworks, flares, airbags as well as other industrial products with explosive properties.

TNO. Committed to innovation for a safer world.

A projectile is cut open and washed out with high pressure water

Munitions that enter the shredder will leave as scrap.

TNO Defence, Security and Safety

'TNO Defence, Security and Safety' is the title under which TNO operates as a strategic partner for the Dutch Ministry of Defence and makes innovative contributions to enhancing the security of the Netherlands both at home and abroad. We also use our accumulated knowledge for foreign governments and for defence-related industries.

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