Detonation Chambers, UXO, and Explosives Safety

VIEQUES ENVIRONMENTAL RESTORATION PROGRAM FACT SHEET



Background

The Vieques cleanup involves enormous amounts of Unexploded Ordnance (UXO) located in remote areas of the island. In order to use detonation chambers on Vieques, site workers would need to carry UXO across difficult terrain, transport UXO on unimproved roads, move UXO into and out of storage, and set up each UXO item in the chamber. Such repeated handling of UXO would expose site workers to the very real danger of being injured or killed in an accidental explosion. The Viegues public would also experience greater hazards because detonation chambers would delay the cleanup by many years, thereby increasing the amount of time that residents or tourists may encounter UXO. The use of detonation chambers would not affect public health on Viegues because the current process of open detonation is already protective of human health and the environment. Overall, the use of detonation chambers on Viegues would put site workers in danger and delay the cleanup by many years, without providing any public health benefits. For these reasons, detonations chambers are not used on Viegues.

What is UXO?

Unexploded Ordnance (UXO) consists of munitions that have been fuzed and fired, but somehow failed to explode as expected.

Why is UXO so dangerous?

UXO items are especially dangerous because they are set to explode and may do so without warning. In order to avoid an accidental explosion, cleanup workers must be extremely careful with UXO. Some types of UXO are so dangerous that they should not be moved or touched, even by UXO experts. Other types of UXO can be picked up and moved short distances during cleanup operations; however, handling UXO is never completely safe. The United States Department of Defense (DOD) explosives safety standards say, "There are no safe procedures for moving, rendering safe, or destroying UXO, but merely procedures considered less dangerous (DOD 2010, Section E3.3.3)." Fortunately, accidents at munitions cleanup sites are rare, but they do occur, and historical records show that most munitions accidents occur while someone is handling UXO (EPA 2001 and ACOE 2011). Thus, the safest approach to UXO cleanup always involves the least amount of handling by site workers.

THE CARDINAL RULE OF EXPLOSIVES SAFETY

The single most important rule of explosive safety is:

LIMIT EXPOSURE **TO A MINIMUM**:



TO THE MINIMUM NUMBER OF PEOPLE



FOR THE MINIMUM AMOUNT OF TIME



TO THE MINIMUM AMOUNT OF EXPLOSIVES

(DOD 2010, Section 4.2)

This cardinal rule applies to the manufacture, use, and cleanup of all types of explosives, including the munitions on Vieques.

What types of munitions are found on Vieques?

The Vieques cleanup involves a wide variety of high explosive UXO, including bombs, mortars, projectiles, rockets, grenades, and submunitions. Cleanup workers also encounter white phosphorous, flares, and spotting charges, which are designed to produce heat, light, or puffs of smoke. To date, site workers have safely destroyed approximately 100,000 munitions items on Vieques and tens of thousands remain. The Vieques cleanup does not involve chemical weapons.



UXOs are scattered across miles of rugged, hilly terrain; which is challenging for site workers.

What are detonation chambers?

Detonation chambers (also called blast chambers) are large, heavy structures that are made to contain the metal fragments, noise, heat, shockwave, and gases produced by an explosion. In order to avoid major damage to the chamber, only a limited amount of high explosives can be processed at a time. As a result, the use of detonation chambers for high explosives is a very slow process.

How are detonation chambers used?

In order to use a detonation chamber, site workers must handle munitions repeatedly. Each munitions item must be picked up, carried to a truck, loaded onto the truck, transported



Transporting UXO to a detonation chamber would expose site workers to the risk of being injured or killed in an accidental explosion.

to storage, unloaded, moved into storage, later taken out of storage, prepared for detonation, and finally placed in the detonation chamber. Every time a UXO item is handled, the risk of an accidental explosion increases.

How are chemical weapons different from highexplosive munitions?

Chemical weapons are designed to spread toxic chemicals that are poisonous to people, animals, or vegetation. In contrast, high explosive munitions are designed to be destructive, rather than poisonous. When high explosives detonate, the explosive chemicals are consumed, releasing a destructive shockwave, metal fragments, and large amounts of non-toxic gases (mostly nitrogen, hydrogen, carbon dioxide and water vapor) that are normally present in the atmosphere. Throughout the world, detonation chambers are often used to destroy chemical weapons, but they are rarely used for high explosive munitions.



Rugged, hilly terrain is challenging for site workers.

What about the safety of site workers on Vieques?

It would not be safe for site workers to use detonation chambers on Viegues. The Vieques cleanup involves enormous amounts of UXO, scattered across miles of rugged, hilly terrain. In order to use a detonation chamber, UXO would be transported from the distant regions of the site to a central location. Site workers would need to carry UXO for hundreds of yards across difficult terrain, load the UXO onto trucks, transport UXO over miles of unimproved roads, move UXO into and out of storage, and set up each UXO item for treatment. Such long-distance transport and repeated handling of tens of thousands of UXO would expose site workers to the very real danger of being injured or killed in an accidental explosion. In contrast, the current process of open detonation is much safer for the site workers because it can be done with little or no handling of UXO.

What about the health and safety of Vieques residents?

The munitions cleanup on Viegues is done in a way that is protective of public health and safety, without the use of detonation chambers. Since 2005, UXO has been destroyed on Vieques by open detonation, and the health effects of the open detonations have been evaluated by air dispersion modeling and many years of on-site air sampling. The results show no health risk to the residents of Viegues. Detonation chambers would actually increase risk to the public because their use would add many years to the cleanup, thus increasing the amount of time that UXO may be encountered by local residents, tourists, and wildlife managers. In contrast, open detonation is safer for the public because the cleanup can be finished sooner, thereby reducing the risk of UXO encounters.

FOR MORE INFORMATION CONTACT:



NAVFAC Atlantic Public Affairs and Communications Office Phone: (757) 322-8005 Email: NAVFAC_LANT_PAO@us.navy.mil ADDITIONAL RESOURCES:



FOLLOW US ON FACEBOOK: **FB/VIEQUESRESTORATION**

VISIT OUR WEBSITE: WWW.NAVFAC.NAVY.MIL/VIEQUES

What about the 2019 NAS Report?

In 2019, the National Academy of Sciences (NAS) issued a report on the management of excess stockpiled munitions at seven US Army depots. Most stockpiled munitions are much safer to handle than the UXO items found on Viegues. For stockpiled munitions, the NAS report describes the use of detonation chambers and other alternatives to open burn/open detonation (OB/OD), but the NAS also states that some munitions "...may not be safe to handle or transport for treatment by alternative technologies; thus, the capability for OB/OD will always be needed."

Why are detonation chambers not used on Viegues?

Compared to the current process of open detonation, the use of detonation chambers on Viegues would expose more people to more munitions for a greater amount of time, thus violating all aspects of the cardinal rule of explosives safety. Computer modeling and extensive environmental sampling have shown that the open detonations pose no risk to the health and safety of Viegues residents. Overall, the use of detonation chambers on Vieques would delay the cleanup and create significant danger for site workers, without providing any public health benefits. For these reasons, detonations chambers are not used on Vieques.

References

- 1. A Study of MEC-Related Civilian Incidents Associated with FUD Sites, QuantiTech Inc. for the Army Corps of Engineers (ACOE, 2011).
- 2. Department of Defense (DOD) Ammunition and Explosives Safety Standards, DOD 6055.09-M, Volume 7, (DOD, 2010).
- 3. Alternatives for the Demilitarization of Conventional Munitions, National Academies of Sciences, Engineering, and Medicine (NAS), 2019. Washington, DC: The National Academies Press. https://doi.org/10.17226/25140.
- 4. UXO Incident Report. United States Environmental Protection Agency (EPA, 2001).

PRACTICE THE **3RS** OF MUNITIONS SAFET

For your safety, pay attention to all warning signs and locked gates, stay out of restricted areas, and practice the 3Rs.



RECOGNIZE when you may have come across a munition, and that munitions are dangerous.



REPORT REPORTE DO NOT approach, touch, move, or disturb a suspected munition, and carefully leave the area. At sea, **DO NOT** bring a suspected munition alongside or on board a vessel.

On land, CALL 911 OR (787) 741-2020 and tell the authorities what you saw and where you saw it.

At sea, notify the US Coast Guard (USCG), CHANNEL 16 - 156.800 MHZ. Use World Geodetic System 1984 (WGS-84) for reporting.