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## Now What? A Tool to Help Commercial Fishermen Encountering Sea-Disposed Chemical Munitions

**Editor's Note:** NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature this column on environmental health services from the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, authors from CDC's Water, Food, and Environmental Health Services Branch, as well as guest authors, will share insights and information about environmental health programs, trends, issues, and resources. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

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Before the 1970s, disposal of excess, obsolete, or unserviceable munitions at sea was common. (Photo 1). It was believed that the vastness of ocean waters would neutralize chemical agents that might have leaked from these weapons. Sea-disposal operations included the disposal of conventional munitions of every type and chemical munitions with various chemical agent fills. Commercial fishing, clamming, and dredging operations can stir up these munitions and they can be encountered anywhere at sea, not just charted hazardous areas.

There is now increasing concern about environmental and human health effects associated with the disposal of these agents both on land and in the ocean. Environ-

mental health practitioners, especially those along coastal areas, should be aware that these incidents are occurring. Since 2004, the Centers for Disease Control and Prevention (CDC) has been notified of several incidents in which personnel were exposed to chemical agents associated with recovered sea-disposed chemical munitions. Several of the reported incidents resulted in toxic chemical agent contamination/injuries to workers involved in commercial clam fishing operations. All incidents involved World War I-era blister agents recovered from previously unknown sea disposal locations off the U.S. East Coast. The first incident was the result of harvesting clamshells for the use as aggregate in concrete and for drive-

ways on the eastern shore of Delaware in 2004. A military explosive ordnance disposal (EOD) technician developed substantial blistering (Photo 2) after responding to an incident off base in which an unknown projectile was recovered and destroyed by detonation (Fendick et al., 2013).

In 2010, commercial fishermen recovered an unknown number of munitions while dredging for clams off the coast of Long Island, New York. During the effort to dump the munitions back in the ocean, a munition fell on the deck of the boat, releasing a black liquid substance. Drops of the substance also landed on the clothing covering the leg and arm of a crew member. After several hours, two crew members felt ill and were transported to a local hospital for evaluation. One was evaluated and released, while the other developed small blisters on his forearm and upper thigh. These injuries were recognized as sulfur mustard exposure by a nurse trained in chemical agent injuries. Exposure was confirmed by chemical analysis (Fendick et al., 2013).

In 2012, a 75-mm projectile was recovered at a clam processing plant in Delaware. It was reportedly brought to the plant accidentally during dredging operations for clams in Delaware Bay. An EOD team removed the munition for disposal. The munition contained mustard agent. None of the potentially exposed persons developed signs or symptoms of exposure to mustard. Clam fishermen told investigators that they routinely recover munitions that often "smell like garlic," a potential indication of a chemical agent (Massachusetts Department of Environmental Protection, 2010).



Photo 1. Conducting sea disposal operations. Photo courtesy of the U.S. Army.

In 2016, an ocean clammer was sorting through clams on an ocean clamming vessel and was exposed to a liquid-like substance while dislodging a rock or object that had clogged the hopper of the vessel. He developed blistering symptoms but did not present to a medical care center until 36 hr later. Due to his significant burns—reportedly 7–8% of the skin surface on his shoulder and arms—he was transferred to a burn unit in Philadelphia where the injury was recognized as a burn consistent with mustard exposure (The Maritime Executive, 2016). In 2017, a fisherman was exposed to a suspected chemical warfare agent in an event that closely mirrored the 2016 event.

CDC has concerns for the health of fishermen who might be exposed when munitions are dredged up with clams and other bottom dwelling sea life (Photo 3). CDC started an interest group for stakeholders, including the U.S. Coast Guard and federal and state departments of health and environment, to discuss responses to these incidents and help improve future responses. The goals were to protect fishermen, improve recognition in treatment facilities, and improve the public health network notification.

Working with interest group partners, CDC recently introduced a new tool for the fishing industry designed to be helpful when

chemical munitions are encountered. It lays out a sequence of personal protection, disposal, and after-event monitoring. The tool also provides guidance regarding what to do starting from the point that a munition is inadvertently brought aboard. The tool concisely covers four things important to protecting the health of fishermen who could encounter these munitions: 1) disposal overview, 2) protective equipment donning and doffing, 3) nine-step emergency disposal procedure, and 4) symptoms and healthcare provider card. It even includes a “take me with you to your healthcare provider” card with useful information about signs, symptoms, and chemical testing.

The tool can be found at [www.cdc.gov/nceh/demil](http://www.cdc.gov/nceh/demil). Next steps include preparing personal protective equipment (PPE) kits and training resources for fishermen, as well as for medical providers who could treat the resulting exposures. The expanding use of the world’s oceans, and particularly its coastal zones, requires not only an increased awareness of both chemical and conventional munitions in the sea but also increased response and medical treatment capabilities. 🐚

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Photo 2. Image of the burns to the hand of an explosive ordnance disposal airman exposed to mustard in 2004. Photo courtesy of the U.S. Army.



Photo 3. An unrecognizable munition brought up during ocean floor dredging. Photo courtesy of the U.S. Army.

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