Continuing Exposure to Mustard in the Adriatic

Ocean Dumping of Chemical Weapons

From World War I until the 1970s, dumping of chemical weapons at sea was the accepted practice for disposal. Little documentation of this practice can be found before the mid-1940s. In 1943, mustard (H) was released into the waters of Bari harbor in Italy. Since the end of World War II, ocean dumping has occurred in many areas, including the Baltic Sea, around Japan, in the Adriatic Sea near Bari, and in the coastal waters of the United States. During the period 1945-1948, The US scuttled at sea approximately 32,000 tons of captured German chemical weapons. The British dumped approximately 175,000 tons of chemical weapons at sea, with 100,000 tons coming from Scotland and the balance from the captured German stockpile. During 1955-56, the British dumped a further 17,000 tons of captured German munitions. During 1956-1957, the British disposed of the remainder of their stockpile of chemical weapons, 8,000 tons of World War II vintage mustard and phosgene munitions.[1] News reports indicate that the ocean dumping in the 1950s occurred in the Irish Sea; some of the British dumps in the late 1940s may have occurred in the North Sea. The Adriatic, Baltic, and Japanese ocean dumps have provided evidence of the persistence of mustard under water.

Bari Harbor and the Adriatic

An American freighter, the S.S. John Harvey, carried 2,000 M47A1 bombs, each containing 60 to 70 pounds of sulfur mustard (H) bombs and an unknown quantity of high explosives when it was attacked during a German raid on Bari, Italy, at 7:30 PM on 2 December 1943. Shortly after 8 PM, a nearby oil tanker blew up, and a few minutes later the John Harvey exploded and sank in Bari Harbor, killing all aboard in the blast.[1] One source indicates that subsequent exposure to mustard caused 630 serious military cases and killed over one thousand Italian civilians within a few days.[2] A recent U.S. government briefing counts 83 killed and 534 wounded as the toll from mustard during the Bari raid.[3] Shortly after the end of World War II, the United States dumped unspecified quantities of phosgene, hydrogen cyanide, and cyanogen chloride bombs in the Adriatic Sea "off the Island of Ischia, near Bari,"* from 12 October to 5 November 1945 and from 1-15 December 1945. Unspecified quantities of mustard and/or Lewisite bombs were dumped at the same site from 1-23 April 1946.[3] From 1946 to 1997, medical researchers at the University of Bari detected over 230 cases of exposure to mustard in the Adriatic Sea, most recently in June 1997; most of the cases have been among Apulian trawler fishermen.[4] Dr. Sivo and Dr. Lobuono of the University of Bari have kindly provided data from their studies on the continuing exposure of fisherman to mustard.

*This notation comes from unpublished US government records. There is a relatively well known Island of Ischia in the Bay of Naples, and at this point it is unclear whether (a) there is another Island of Ischia off Bari, (b) the reference to the Island of Ischia is mistaken, or (c) the dumping described in these records took place in the Bay of Naples rather than in the Adriatic and documentation for the Adriatic dumping has not yet been located.

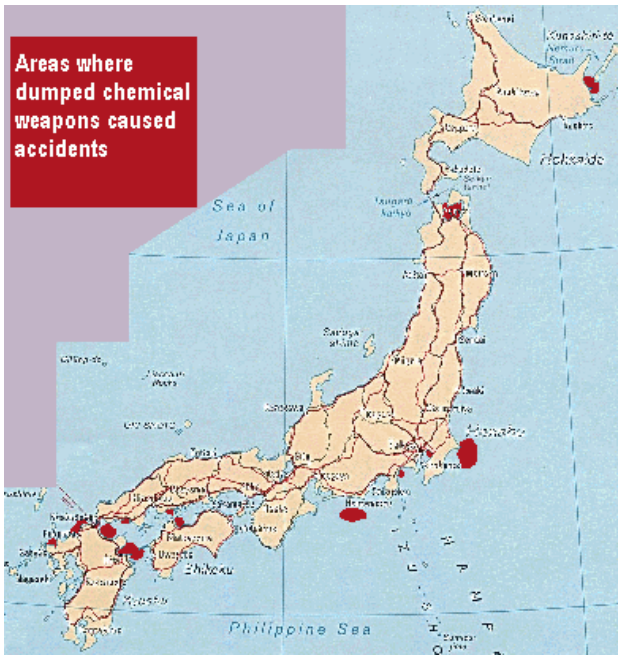
The Baltic

At the end of World War II, large chemical munitions stores were discovered in Germany and Japan. From 1946-1947, an estimated 50,000-150,000 tons of chemical munitions were dumped in the Baltic Sea. The area of the largest dumping activities was the Bornholm basins, 15 miles northeast of the Danish island of Bornholm.[5]

Chemical Weapon Dumping in the Baltic Sea			
Location	**Munitions Quantity**	**Chemical Agent Quantity**	**Chemical Agent Type**
Bornholm basins	35,300 to 43,399 tons	5,300 to 6,500 tons	mustard, Clark I, Clark II, Adamsite, chloroacetophenone, phosgene, nitrogen mustards, Tabun
Southwest of Bornholm	Up to 15,000 tons	2,250 tons	unknown
Gotland basin	2,000 tons	300 tons	unknown
Little Belt	5,000 tons	750 tons	Tabun, phosgene

Japan

Chemical weapons were dumped in the Pacific Ocean and the Sea of Japan after World War II.[6] This map shows the areas where multiple casualties were caused by chemical weapons dumped in the waters around Japan.



The United States

A review of documentation of movements of U.S. chemical munitions indicates that the U.S. military dumped chemical warfare agents in U.S. coastal waters prior to 1970.[7]

Agent	Loaded at	Destination	Date	Munition	Estimated Quantity
Phosgene	New Orleans Port of Entry, Braithwaite, LA San Jacinto Ordnance Depot, Houston, TX	Gulf of Mexico	May 1946	Bombs	Less than 1 ton
	Charleston, SC	Site "Baker"	Aug 1946	Bombs, Mines, Bulk	Portions of 3 barge loads
Cyanogen Chloride	Edgewood Arsenal, MD	38É30'N 71É06'W	2-7 Aug 1964	Bulk, Projectiles	Less than 1 ton
GA	Charleston, SC	Site "Baker"	8-22 Aug 1946	Bombs, Mines	Portions of 2 barge loads
GB	Colts Neck Naval Pier, Earle, NJ	39É39'N 70É57'W	15 Jun 1967	Bulk, Rockets	39 tons
	Colts Neck Naval Pier, Earle, NJ	39É33'N 71É02'W	19 Jun 1968	Bulk, Rockets	266 tons (total GB and VX)
	Sunny Point, NC	29É21'N 76É0'W	18 Aug 1970	Rockets (vaults)	67 tons
H	Attu and Adak, Alaska	12 miles off Chichagoff	1947	Bulk	Unspecified
	Charleston, SC	Site "Baker"	Aug-Oct 1946	Bombs, Projectiles, Mines, Bulk	Over 7 tons
	Colts Neck Naval Pier, Earle, NJ	39É39'N 70É57'W	15 Jun 1967	Rockets, Bulk	3,890 tons
	Colts Neck Naval Pier, Earle, NJ	39É33'N 71É02'W	7 Aug 1968	Contaminated water	2,975 tons
	Edgewood Arsenal, MD	38É30'N 72É10'W	18 Jun 1962	Projectiles, Bulk	3 tons
	Edgewood Arsenal, MD	38É30'N 71É06'W	6-7 Aug 1964	Bulk, Projectiles	65 tons
	Naval Mine Depot, Yorktown, VA	Site "Baker"	21-25 Mar 1946	Projectiles	13 tons
	New Orleans Port of Entry, Braithwaite, LA	Gulf of Mexico	1-7 Mar 1946	Projectiles	207 tons
	NWS Concord, CA	37É40'N 125É0'W	8-19 Apr 1958	Bulk	9,030 tons

	Theodore Naval Magazine, Mobile, AL	Gulf of Mexico	13 Jul 1946	Bombs (German)	7 tons
Nitrogen mustard	Sunny Point, NC	"off South Carolina"	20-27 Mar 1958	Bulk	54 tons
	NWS Concord, CA	37É40'N 125É0'W	25 May 1958	Bulk	9 tons
L	Attu and Adak, Alaska	12 miles off Chichagoff	1947	Bulk	Unspecified
	Charleston, SC	Site "Baker"	Aug-Oct 1946	Bombs, Bulk, Projectiles, Mines	1,222 tons
	Charleston, SC	"300 miles of Florida"	15-20 Dec 1948	Bulk	3,154 tons
	Colts Neck Naval Pier, Earle, NJ	37É50'N 70É37'W	13-14 Nov 1957	Bulk	41 tons
	Edgewood Arsenal, MD	38É30'N 72É06'W	6-17 Jun 1960	Projectiles, Bulk	2 tons
	Edgewood Arsenal, MD	38É30'N 71É10'W	11-18 Jun 1962	Projectiles, Bulk	1 ton
	NWS Concord, CA	37É40'N 125É0'W	8-19 Apr 1958 25 May 1958	Bulk, Bombs Bulk	1,257 tons 285 tons
	Sunny Point, NC	"off South Carolina"	20-27 Mar 1958	Bulk	1,281 tons
Unspecified	Theodore Naval Magazine, Mobile, AL	Gulf of Mexico	Jan-Feb 1955	Unspecified	Barges (1 or 2)
VX	Colts Neck Naval Pier, Earle, NJ	39É33'N 71É02'W	19 Jun 1968	Bulk, Rockets	266 tons (total GB and VX)

Persistence of Mustard Under Water

Accidents due to ocean dumping of chemical weapons have been reported in the Baltic Sea,[5,8] the Adriatic,[4] and in the Pacific Ocean and Japanese coastal waters.[6] Most reports came from fishermen who had inadvertently snared plastic lumps of mustard gas in their nets. When exposed to sea water, mustard forms a thick outer "crust" over a core of mustard which allows the mustard to be brought to the surface where it can injure unsuspecting fishermen. These accidents began occurring shortly after the material was dumped and have continued throughout the intervening years (see figure below).[4,6,8] Note that in each location exposure continued through the date of the report (1980 in Japan, 1985 in Denmark) with the most recent reports coming from Italy in 1997.[4]

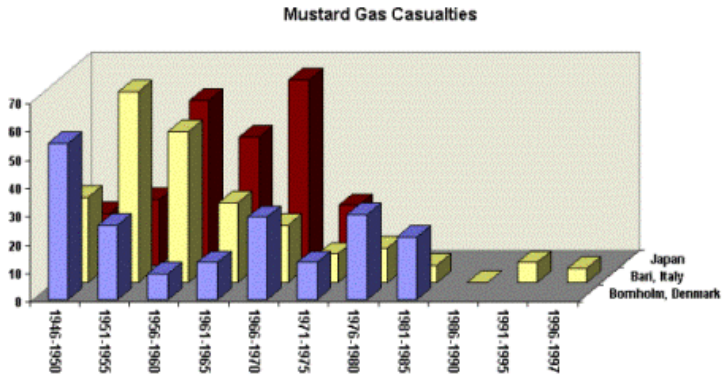


Figure prepared using data from references 4, 6, and 8.
Mitretek Systems thanks Dr. Sivo and Dr. Lobuono for providing the Bari data.

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