

STANDARD REPLY TO ENQUIRES RE SEA DUMPING OF MUNITIONS

It is important first of all to set the issue of marine munitions disposal in its historical context. At the end of World War II, Britain was faced with the need to dispose of an enormous quantity of surplus munitions. This process had to be completed quickly and safely. However, given the technological limitations of the time, it soon became clear that sea dumping was likely to be the only practicable method of disposing of the bulk of the munitions. Other nations arrived at the same conclusion and sea dumping became the internationally accepted method of munitions disposal during the 1940s.

The main disposal site for the United Kingdom was Beaufort's Dyke, a long narrow trench in the Northern Channel between South West Scotland and Northern Ireland. Beaufort's Dyke may have been used for sea dumping of munitions as early as 1920. It is estimated that a million tons of conventional munitions ranging from small arms ammunition to heavy aircraft bombs were dumped there between 1945 and 1973. Surviving records also show that some 14,500 tons of 5 inch artillery rockets filled with phosgene gas were dumped in Beaufort's Dyke in July 1945. However, phosgene is destroyed by hydrolysis on contact with seawater. A further emergency dump of two cases of heavily corroded 40mm shells took place at Beaufort's Dyke in 1976.

Sea dumping at Beaufort's Dyke had effectively ceased in 1973, however, as, in 1972, the United Kingdom adopted the London Convention on the Disposal of Wastes at Sea and the Oslo Convention on the Prevention of Marine Pollution in the North East Atlantic. These Conventions ended munitions disposal on the United Kingdom continental shelf. By 1973, the sole approved MoD dump site was the Atlantic Deep which was a circular area of

15 miles' radius, centred on a position 48 degrees 20 minutes North, 13 degrees 40 minutes West, and located some 400 miles south west of Land's End. More information on the Atlantic Deep is given below in respect of sea dumping of radioactive waste.

I should add that, in late 1995 and mid 1996, the Scottish Office Marine Laboratory carried out two detailed surveys of Beaufort's Dyke to find out if the area had been polluted by the munitions, which had been dumped there. Samples of sediment and the edible flesh of fish and shellfish taken from the area were examined for a range of contaminants but laboratory tests confirmed that none were present. Laboratory tests of the samples also revealed no trace of explosives.

Turning to the disposal of chemical weapons (cw), these were partially disposed of by MOD between 1945 and 1957 through deep sea dumping at a number of locations in the Atlantic. The process involved loading surplus cw in sealed containers on to redundant merchant ships and then scuttling these vessels at pre-selected deepwater sites in the Atlantic. Munitions were dumped in water between 500 and 4,200 metres deep.

Wreck dumping of cw in the Atlantic took place in four distinct phases. Phases 1 (1945 – 48), 2 (1949 –51) and 4(1956) involved the disposal of some 120,000 tons of mustard and phosgene charged munitions. Records for Phase 4 are incomplete and there is no clear evidence that the usual practice of sealing cw into containers and dumping it in scuttled merchant ships was followed during this Phase.

Phase 3 (Operation SANDCASTLE (1955 – 56)) involved the disposal of 14,000 tons of Tabun-charged munitions confiscated from Germany after World War Two. Additionally, 300 tons of arsenical compounds and 3 tons of toxic seed dressings were dumped on behalf of other Government Departments during this operation.

The inert arsenical compounds were in powder form and sealed in drums from a Ministry of Supply depot. The 3 tons of toxic seed dressings were in 50 containers, and came from HM Norfolk Flax Establishment.

Tabun and phosgene become ineffective through dilution and hydrolysis. Mustard gas being heavier than water would stay on the seabed. Furthermore, at the depths where the ships were scuttled, seawater movement is very slow. Any chemicals released at these depths would not present a health hazard.

None of these three cw agents (tabun, phosgene, mustard gas) was the “Nazi Death-Camp gas”. The Nazis used carbon monoxide from internal combustion engines and “Zyklon-B” as their lethal agents in the gas chambers.

In addition, the allied nations undertook dumping of confiscated German chemical munitions into the Baltic and Skagerrak between 1945 and 1947. The total tonnage of cw dumped at sea in the Skagerrak by the UK was in the region of 120 – 130,000 tons. Although we have no contemporary material that confirms the exact scuttling locations of the majority of the vessels

believed to have been used in the UK cw dumping programme, all the available evidence indicates that the Skaggerak was used as the UK's sole scuttling site. A contemporary document records the location of the site as between 53 degrees 14 minutes North (53 14 N) 09 27 E; 53 19N 09 40E; 53 17N 09 40 E.

The cw covered a wide range of types, primarily the more common vesicants and blood agents. However, it should be noted that some shells from the French Zone dumped by the UK in the Skaggerak contained nerve agent.

Many records of past sea dumpings of conventional munitions and chemical weapons were destroyed as a matter of custom and practice after World War II. Those records, which remain in existence, are held at The National Archives at Kew. Should you wish to find out more, you can access details of the National Archives at <http://www.nationalarchives.gov.uk>

For your information, however, I am attaching as an Annex to this letter a list of the sites used for the disposal of conventional munitions and details of past dumping of chemical weapons in the Atlantic. This information has also been made available to the UK Parliament, and, in 1998, to the Oslo-Paris (OSPAR) Convention. The OSPAR website contains information on sea dumping by all other countries who have signed the Convention, with the exception of Portugal, which has still to supply such information. The OSPAR website is at: <http://www.ospar.org/>

Details of sea dumpings of cw in the Skaggerak were made available to the Helsinki Commission in 1993.

Turning to the disposal of radioactive waste, I can confirm that, in the past, some MoD radioactive waste has been dumped at sea. From 1946 to 1993, the United Kingdom disposed of amounts of both civilian and radioactive waste at sea, in accordance with national policy and legislation, and with later international agreements regulating such disposals. These disposals were seen at the time as routine and uncontroversial. The dumpings were carried out as part of the national programme of radioactive waste disposal at sea, run by the United Kingdom Atomic Energy Authority (UKAEA) as the UK's competent national authority..

Dumping at sea of radioactive waste was carried out after World War Two into two sites: the Atlantic Deep and the Hurd Deep. Arrangements for such dumping were subject to approval by the then Ministry of Agriculture Fisheries and Food (MAFF) Approval Committee, whose procedures included careful checks on the containment and transport of the waste. Dumping areas were chosen at least fifty miles seaward of the Continental Shelf, well away from fishing grounds or cable routes where there might be a risk of accidental retrieval or other contact.

The Atlantic Deep dumpsite is located 48 degrees 20 minutes North, 13 degrees 40 minutes West, approximately 400 miles south west of Land's End. It was used to dump up to 1,500 tons per year of highly active radioactive

waste at a depth of not less than 1,500 fathoms. Between 1949 and 1968, approximately 53,800 containers, with a gross weight of 29,000 tons, were dumped at this site. Records show that the estimated total activity in curies for these dumpings was:

Alpha activity:	4,000 curies;
Beta-Gamma activity:	117,200 curies.

Approved containers used for radioactive waste dumped in the Atlantic were designed to sink quickly to the seabed and remain intact for a number of years. The containers were steel drums with concrete linings, with provision for permitting pressures to equalise during descent so as to avoid implosion at depth. Such activity as may emerge when the drums break up would be harmless in the conditions of dilution and dispersion afforded by the ocean. Even if activity escaped immediately, it would present no hazard in these conditions.

The other approved dumpsite, Hurd Deep, is located in the English Channel north west of the Channel Islands at position 49 degrees 30 minutes North, 3 degrees 34 minutes West. It was used after World War One for dumping of chemical and some conventional weapons, and from 13 July 1945 to 31 July 1946 for the dumping of conventional munitions. Further routine dumpings took place there until 1973, with an emergency dump of munitions in 1973 – 74.

Dumping of radioactive waste into the Hurd Deep took place after World War Two until 1973. After this date, when the dumping of high level radioactive waste was banned under the London Convention, the sole approved UK dumpsite for radioactive waste was the Atlantic Deep.

Hurd Deep was used to dump up to 5,000 tons a year of low activity waste, which was not to exceed 200 curies of alpha, and 4,000 curies of beta-gamma, radiation. Between 1950 and 1963, approximately 61,550 containers, with a gross weight of 16,300 tons, were dumped in Hurd Deep. Records show that the total estimated activity in curies for these dumpings was:

Alpha activity:	400 curies;
Beta-Gamma activity:	1,200 curies.

The very low active waste (mainly sludges) dumped into the Hurd Deep was packed in approved light metal drums to permit rapid dispersion of the contents.

It may be helpful to explain the activity of types of radioactive waste. Alpha contaminated waste is characterised by less penetrating radiation, which is easily absorbed by matter. It is not dangerous to living organisms unless inhaled or ingested. It only requires secure containment in transportation. Reliance on natural decay for alpha wastes is not usually profitable since half lives may be very long. In this context, the most important alpha active isotopes are plutonium 239 and americium 241.

Beta and Gamma wastes are characterised by much more penetrating radiation and must be transported in containers designed to provide adequate shielding from such radiation, if necessary. This radiation penetrates matter more strongly and is dangerous to living organisms whether or not ingested. In a typical mix of beta and gamma radioactive waste only 10% of the original activity may remain after 25 years and only 1% after seventy years. The important beta isotopes are ruthenium 106, zirconium 95 and niobium 95.

Details of the disposal programme of radioactive wastes were contained in a Department of the Environment report entitled "Report of the Independent Review of Disposal of Radioactive Waste in the Northeast Atlantic". The report was published in 1984; it is available to members of the public.

Sea dumping of high level radioactive waste was banned globally under the London Convention of 1972, although this did not cover the disposal of intermediate and low level waste.

In 1993, the Ministry of Defence agreed to an indefinite ban on the disposal at sea of intermediate and low level radioactive waste, although in practice such dumpings had been discontinued by the UK in 1983.

I should add that the Ministry of Defence is not aware of any dumping of defence radioactive waste in Beaufort's Dyke. However, the Government is aware of the dumping of small quantities of low or intermediate level

radioactive waste in Beaufort's Dyke between 1953 and 1957. This was prior to the making of any legislation controlling such disposal operations. The material was mainly contaminated laboratory waste and radioactive luminous paint. MAFF was consulted about these dumpings and provided subsequently with details of the dates and positions of the dumping operations. Levels of contamination resulting from these dumpings are likely to have been low. Monitoring by MAFF (now Department for Environment Food and Rural Affairs – Defra) of radioactivity levels in Beaufort's Dyke has never detected any localised increase in radioactivity.

R.BOWLES

MOD - DSC-Env1

BRITISH ISLES EXPLOSIVE DUMPING GROUNDS

The following areas are charted as disused dumping grounds for explosive material.

<u>Area</u>		<u>Position</u>
Off the Continental Shelf	48 20 00 N	13 40 00 W
Beauforts Dyke	54 54 00 N	05 23 00 W
Beauforts Dyke	54 54 00 N	05 05 00 W
Inner Sound	57 19 00 N	05 51 00 W
Isle of May, Firth of Forth	56 10 45 N	02 30 15 W
Hurd Deep	49 30 00 N	03 34 00 W
St Catherines Deep	50 34 00 N	01 12 00 W
East of Orford Ness	52 07 00 N	01 55 00 E
East Swin (Kings Channel)	51 47 30 N	01 30 00 E
NW of Alderney	49 50 00 N	02 18 00 W
NW of Alderney	49 47 00N	02 17 00 W
SSW Guernsey	49 18 00 N	02 42 00 W
Whitesand Bay (Plymouth)	50 18 45 N	04 16 00 W
Milford Haven	51 34 30 N	05 01 00
W		
Milford Haven	51 38 00 N	05 20
00W		
Milford Haven	51 43 30 N	05 33 45
W		
Beauforts Dyke	54 45 00 N	05 15 00W
Sound of Mull	56 30 00 N	05 37 00
W		
Isle of May (Firth of Forth)	56 11 24 N	02 29 00 W
East of Aberdeen	57 09 00 N	01 58 30 W
Loch Linnhe	56 30 00 N	05 37 00 W

CHEMICAL MUNITIONS DISPOSAL BY UK POST 1945

Phase 1

<u>Date</u>	<u>Location</u>	<u>Ship</u>	
<u>Depth</u>			
02.07.45	Lat 58 00,9 N	Empire Fal	
2000M	Lon 11 00.0 W		
11.09.45	Lat 55 30.00 N	Empire Simba	
2500M	Lon 11 00.00 W		
01.10.45	Lat 55 30.00 N	Empire Cormorant	2500M
	Lon 11 00.00 W		
30.10.45	Lat 55 30.00 N	Wairuna	2500M
	Lon 11 00.00 W		
30.12.45	Lat 55 30.00 N	Botlea	2500M
	Lon 11 00.00 W		
25.08.46	Lat 47 57.00 N	Empire Peacock	700-800M
	Lon 08 33.24 W		
03.09.46	Lat 48 03.00 N	Empire Nutfield	500M
	Lon 08 09.00 W		
01.10.46	Lat 47 54.00 N	Kindersley	1000M
	Lon 08 21.00 W		
02.11.46	Lat 59 00.00 N	Empire Woodlark	800M
	Lon 07 40.00 W		
11.11.46	Lat 48 00.00 N	Lanark	
800-900M	Lon 08 21.00 W		
05.02.47	Lat 47 40.00 N	Dora Oldendorf	3500-
4000M	Lon 09 22.00 W		
27.07.47	Lat 47 55.00 N	Empire Lark	750-800M
	Lon 08 17.00 W		
09.08.47	Lat 56 22.00 N	Leighton	1300M
	Lon 09 27.00 W		

08.09.47	Lat 47 47.30 N Lon 08 21.00 W	Thorpe Bay	1500M
03.11.47	Lat 47 36.00 N Lon 09 31.00 W	Margo	4100M
01.03.48	Lat 47 55.00 N 2500M Lon 08 58.00 W	Harm Freitzen	

<u>Date</u>	<u>Location</u>	<u>Ship</u>	<u>Depth</u>
22.08.48	Lat 47 16.30 N Lon 09 24.00 W	Empire Success	4200M
22.09.48	Lat 47 23.00 N Lon 09 24.00 W	Miervaldis	4000M

Phase 2

20.06.49	Lat 47 52.00 N 2000M Lon 08 51.00 W	Empire Connyngham	
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Phase 3 – Operation SANDCASTLE

27.07.55	Lat 56 30.00 N 2500M Lon 12 00.00 W	Empire Claire	
30.05.56	Lat 56 30.00 N Lon 12 00.00 W	Vogtland	2500M
23.07.56	Lat 56 31.00 N Lon 12 05.00 W	Krotka	2500M

Phase 4

??.06.56	Lat 56 00 N Lon 10 00 W	UNKNOWN	2000M
??.06-09.56	Lat 56 00 N	UNKNOWN	2000M