

Historic Dumping of Low-Level Radioactive Waste in the North-East Atlantic



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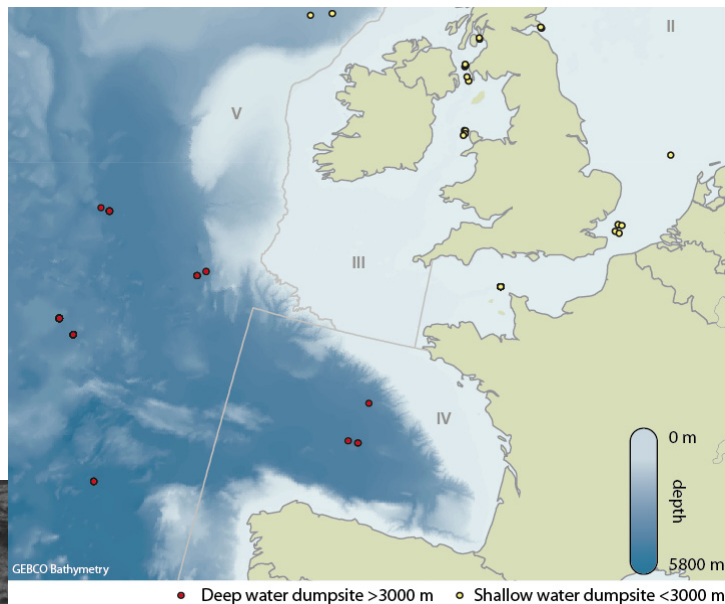
Background

Between 1949 and 1982 low-level radioactive waste was dumped in the North-East Atlantic from vessels by a number of European countries. The majority of the dumping took place in the deep waters of the North-East Atlantic from the 1970s up to 1982 at depths of between 3000 m and 5000 m, however some dumping was carried out at shallower depths prior to 1970 (fig.1). In total more than 150 000 tonnes of material with a total activity of 42,4 PBq was dumped in the North-East Atlantic. At this time, disposal at sea was considered to be suitable for the safe disposal of radioactive waste from both scientific and economic perspectives. This approach changed in 1983 with the adoption, under the 1972 London Convention (LC), of a voluntary moratorium on the dumping of radioactive waste at sea.

In 1992 OSPAR prohibited the dumping of low and intermediate level radioactive substances in the OSPAR maritime area (North-East Atlantic) followed by a global ban in 1993 under the LC. The prohibitions set out in these conventions do not apply to radioactive substances in authorised discharges from land-based facilities or in wastes arising from normal operations of offshore facilities. Compared to other man-made sources of radionuclides in the North-East Atlantic such as global fallout, the amount dumped was relatively minor and will, since 1982, have been reduced by radioactive decay.

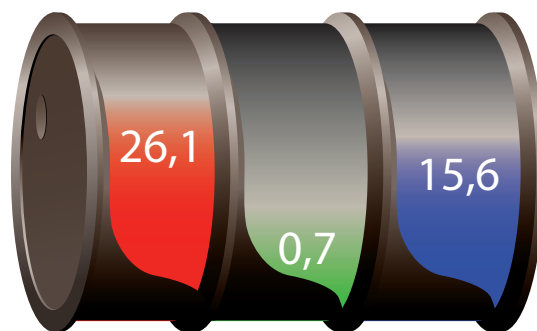
A 1995 report from the surveillance programme set up to assess the impacts of the dumped low-level radioactive waste found no evidence of harm to the environment and calculated doses for the public corresponding to only 0,002% of the recommended limit.

Figure 1. Locations where dumping of low level radioactive waste by European countries occurred in the OSPAR maritime area.



The low-level radioactive waste that was dumped originated from nuclear power plants, other nuclear fuel cycle operations, hospitals, and research and industrial facilities and from the decontamination and decommissioning of nuclear facilities and equipment. This material contained beta emitters such as caesium-137, alpha emitters including plutonium isotopes and tritium (fig.2).

Figure 2. A total of 42,4 petabecquerels (PBq) of radioactive waste was dumped in the North-East Atlantic between 1949 and 1982 comprising beta emitters including Caesium-137 (red), alpha emitters including plutonium isotopes (Green) and tritium (Blue). All figures are in PBq (1 PBq = 10^{15} Bq)



Guidelines on the type of the containers used to dump low-level radioactive waste ensured that dumped waste reached the seafloor intact and was then retained in the containers for a few years to allow for the decay of short-lived radionuclides. The eventual slow release to the marine environment and dispersal of the remaining waste was part of the disposal concept.

Figure 3. Total activity of low-level radioactive waste dumped in the OSPAR maritime area between 1949 and 1982 by country (PBq)

Country	Radioactivity Dumped (PBq)
Belgium	2,12
France	0,35
Germany	0,0002
Italy	0,0002
Netherlands	0,34
Sweden	0,03
Switzerland	4,42
UK	35,1

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OSPAR
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1949 Dumping begins in OSPAR maritime area under control of national authorities. Some waste is dumped in shallow waters (between 20 m and 200 m) at a few sites in the English Channel, Irish Sea and the North Sea

1957 First International Atomic Energy Agency (IAEA) meeting on Radioactive Waste Disposal at Sea

1965 IAEA publishes Methods of Surveying and Monitoring Radioactivity (IAEA Safety Series No. 11) stating that dumping locations should have average water depths greater than 4000 m and be situated away from spawning areas, fishing grounds, shipping lanes and paths of submarine cables

1972 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LC) is adopted with recommendations on environmental evaluation, site selection, packaging and disposal options

1970 Main period of dumping begins

1975 LC comes into force prohibiting the dumping of high-level radioactive waste. Dumping of other radioactive waste continues

1977 OECD Multilateral Consultation and Surveillance Mechanism for Sea Dumping of Radioactive Waste formally commits nations to apply the guidelines and procedures adopted within the Nuclear Energy Agency (NEA) and to subject their operations to consultation and surveillance

1980 IAEA issues technical document on Packaging of Radioactive Wastes for Sea Disposal

1981 Co-ordinated Research and Environmental Surveillance Programme relevant to sea disposal of radioactive waste (CRESP) is established to assess the impacts of dumped low-level radioactive waste on the environment and human health via regular monitoring of the dump sites as well as geological, hydrological, chemical, biological and modelling aspects

1983 Dumping at sea ends following a voluntary moratorium

1986 LC establishes an inter-governmental panel on the political, legal, economic and social aspects of dumping low-level radioactive waste at sea (IGPRAD)

1992 OSPAR bans dumping of low and intermediate level radioactive substances in the OSPAR maritime area

1993 Total ban on dumping of all radioactive waste is adopted at LC

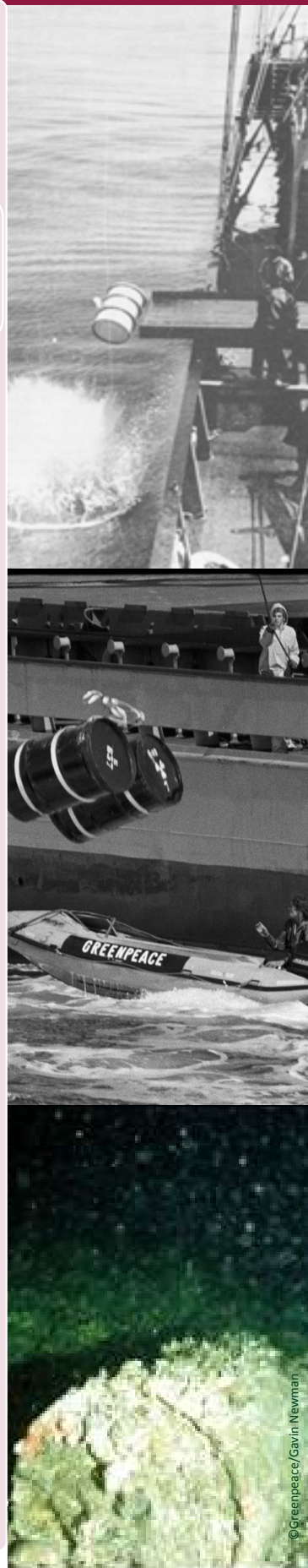
1994 The legally binding LC prohibition on dumping of all radioactive waste enters into force on the 20th February

1995 Final CRESP report finds no evidence of harmful environmental impacts resulting from the dumped low-level radioactive waste and calculated doses for the public corresponding to 0,002% of the recommended exposure limit

Since 1995 A limited number of international research expeditions carry out monitoring of the North East Atlantic dump sites. Releases of some radionuclides have been detected in areas where dumping occurred, but the levels detected are not radiologically significant

1999 OSPAR reconfirms the total ban on dumping of low and intermediate-level radioactive waste in the North-East Atlantic (OSPAR Decision 98/2)

2019 A scientific study of radioactive waste dumping and a review of the prohibition on dumping of radioactive wastes and other radioactive matter under the LC is due



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Sources of data and information:

Co-ordinated research and environmental surveillance programme related to sea disposal of radioactive waste – Final report 1981 – 1995

<https://www.oecd-neia.org/rwm/reports/1996/CRESP-1981-1995.pdf>

Inventory of radioactive material resulting from historical dumping, accidents and losses at sea, IAEA TECHDOC 1776 http://www-pub.iaea.org/MTCD/Publications/PDF/TE-1776_web.pdf

Bewers, J. M. "Sea dumping of radioactive wastes." Nuclear J. Canada 1 (1987): 290-301. <https://canteach.candu.org/Content%20Library/NJC-1-4-03.pdf>