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## I-129 in water of the Celtic Sea, the English Channel and beyond: sources and environmental impact

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The English Channel (the Channel) and the Celtic Sea represent a major transport pathway of Atlantic water to the North Sea, with anthropogenic I-129 added to the water parcels. The major source of this I-129 is the liquid discharges from the La Hague nuclear reprocessing facility of I-129 into the Channel that have been going on for the last 60 years, with an estimated total amount exceeding 7000 kg by the end of 2024. The fate of this discharged I-129 in the Channel is not entirely clear, but a large part of it is transported with the marine currents or deposited in the Channel bottom and a smaller part is transferred to the atmosphere. The understanding of I-129 distribution in the Channel is further complicated by the speciation forms of the isotope. Although the liquid discharge from the nuclear facility is dominated by the iodide species, occurrence of both iodide and iodate was observed in marine waters in addition to the organic iodine. To shed light on some of the I-129 occurrence forms and distribution pattern in the Channel and beyond, data on I-129-1 and I-127-1 and their species that were acquired from several investigations are presented. The data reveal large variation in the I-129 concentration and speciation forms as the isotope is transported from the Channel. The variations in the I-127 were less bracketed and strongly correlated with the marine water salinity. The transport pathways are predominantly northward, but leaks with high I-129 transport southward were also detected. The data also indicate that the major speciation form of the isotopes is iodate (IO<sub>3</sub>) with a varying ratio of iodide to iodate. Despite the relatively large amount of data on I-129 in the North Sea, accurate transport pathways are still disputable. However, the available data suggest extensive transport along the European continental margin, with some conversion of iodate into iodide by mostly the addition of water from the European rivers. The environmental impact of I-129 is presently not well understood, as calculations of radioactivity based on the concentration in marine water indicate acceptable levels. However, analysis of I-129 in seafood products from the Channel may add new perspective to this issue.

### Student Submission

No

**Primary author:** HE, Peng (Chengdu University of Technology)

**Presenter:** HE, Peng (Chengdu University of Technology)

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