Results of the Radiological North Sea Programme RANOSP 1974 to 1976

(With Plates 1 to 8)

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Summary

In continuation of the work, begun by the Deutsches Hydrographisches Institut (DHI) in 1969, concerning the occurrence and the transport of artificial radio isotopes in the North Sea region (Kautsky [1973, 1976]) an intensive measurement programme was carried out, together with the Fisheries Radiobiological Laboratory (FRL) in Lowestoft, from 1974 to 1976.

From October 1973 to October 1976, 7 complete and 4 partial radiological surveys of the North Sea were undertaken, including the adjacent sea areas towards the North and the West.

During that time a clear increase in the $^{137}$Cs activity concentration was observed in the region around the Orkney Islands and along the East coast of Scotland. However, the values were only a fraction of the concentrations which would correspond to the dose limits recommended by the International Commission on Radiological Protection (International Atomic Energy Agency [1970], International Commission on Radiological Protection [1979]), and therefore present no danger to aquatic organisms or man.

The measurements of the distribution of the $^{137}$Cs supplied us with further information concerning the watermass transport processes in the North Sea region. The observation that – at least in the surface region – almost all of the water streaming out from the Irish Sea towards the North flows into the North Sea in the region of the Orkney Islands, was of particular interest.

Ergebnisse des Radiologischen Nordsee Programme RANOSP 1974 bis 1976 (Zusammenfassung)


Die Messungen der Ausbreitung des $^{137}$Cs konnten uns weitere Aufschlüsse über die Wassermassen-Transportvorgänge im Nordseebereich geben. Besonders inter-
Efficient monitoring of the North Sea region for pollutants requires, as a basis, good knowledge of the large scale distribution, spreading, and transport mechanisms of substances dissolved in water. The identification and tracking of watermasses – labelled by artificial radio nuclides, among them, especially the isotope $^{137}$Cs – on their way through the North Sea and the adjacent sea areas provides the opportunity of gaining suitable data.

In order to be able to carry out the work to a sufficient extent in the large sea area to be investigated, the radiological working groups of the FRL in Lowestoft and the DHI in Hamburg work in close co-operation. By means of a certain co-ordination and division of the work, as well as continual exchange of information concerning the respective results, a better utilization of the existing measurement capacities was achieved.

The results of RANOSP, a particularly intensive preliminary working phase during the years 1974 to 1976, is discussed in the following.

The collection of water samples in quantities of 20 l to 50 l (in deep water, up to 300 l) took place with suitable water samplers from different Federal German and English ships.

The activity concentration of $^{137}$Cs in the samples was determined. This determination took place either by chemical separation methods with subsequent $\beta$ measurement in a low-level-anticoincidence-$\beta$-counter or by separation of the $^{137}$Cs over an ion exchanger and $\gamma$ spectrometrical measurement (Baker [1975]). In order to ensure that the measurement values of the two laboratories – attained in different ways – are comparable within the framework of the normal deviations of measurement, repeated intercalibration measurements on North Sea water samples were carried out both before, and during, the execution of the Programme.

## Results

The measurement data – originating from the individual cruises – of the $^{137}$Cs concentration in the North Sea and the adjacent sea areas to the North are given in Figs. 4 to 16.

### 1. Vertical distribution

As a result of the work carried out during the past ten years we know that: