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1976 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 1

(PROVISIONAL: Not to be quoted without prior reference to the author)

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DURATION

Left Grimsby 1730 h 2 January
Arrived Grimsby 0330 h 16 January

LOCALITY

British Isles Coastal Waters

AIMS

1. To continue the examination of the distribution of radiocaesium and plutonium in the Irish Sea and its approaches.

2. To continue the examination of the distribution of radiocaesium in coastal waters of the British Isles.

3. To collect seawater and suspended matter, over a tidal cycle period, at 6 stations in the vicinity of BNFL Windscale, at 3 depths in the water column.

4. To collect samples of seabed in the same vicinity for the examination of the concentration of radioactivity of sediment in both the solid and liquid phases, at various depths from the surface layer.

5. To record the gamma count rate, in a selected energy range, from seawater of the Irish Sea, with particular reference to a close spaced grid off the Cumbrian coast.

6. To measure the concentrations of inorganic and total mercury in British Isles Coastal Waters.

NARRATIVE

RV CIROLANA sailed from Grimsby on the evening tide of 2 January into storm force winds and proceeded south to the Irish Sea. At 23 stations between Grimsby and the entrance to the Irish Sea (see chart), 50 litre samples of seawater were collected and processed on board for later analysis of the 137 Cs and 134 Cs concentrations. At one station in the Celtic Sea a 100 litre sample was collected for the determination of ^{238}Pu and $^{239+240}Pu$. Seawater sampling commenced in the Irish Sea on

a line of stations from Fishguard to Rosslare at 1945 h 5 January and continued until 1830 h 7 January when gale force southwesterly winds forced RV CIROLANA to shelter in Ramsey Bay. The opportunity was taken at anchor to rig and test the Reineck box corer. Improvement in weather conditions on 8 January enabled sampling of seawater for radiocaesium and plutonium analysis to continue on a line of stations from Ramsey Bay to St Bees Head.

The first anchor station, for Aim 3, commenced at a position some 5 miles north of the BNFL Windscale discharge outlet at 1945 h. Sampling continued, at 2 hourly intervals, over a 12 hour period. Seawater was collected at surface, midwater and approximately 15 cm from the bottom using a 30 litre Niskin water bottle mounted and triggered in the horizontal position. All samples were filtered through 0.22 μm pore size membrane filters and both the filtrate and particulate portions returned for analysis by alpha and gamma spectrometry. Aliquot samples were filtered and the filter papers retained for the measurement of the weight of suspended load. Two core samples of the seabed were obtained by means of the Reineck box sampler and a penetration depth of approximately 35 cm was obtained. One core was divided into 5 cm sections and processed on board to remove the interstitial water for later radioactivity analyses of both the solid and liquid phases. The other core was retained frozen for later examination, in finer detail, of the surface layer radioactivity concentrations. Two similar type stations were worked, one 0.5 miles south of the discharge outlet and the other 5.0 miles south. However south westerly gale force winds caused the abandonment of the third station after a 10 hour period and RV CIROLANA had again to seek shelter in Ramsey Bay.

Improvement in weather conditions allowed work to begin again at 14.30 h 12 January at a position some 10 miles offshore of Windscale where cores were obtained and processed to remove the interstitial waters. Three similar type stations were worked until 1620 h when sampling on a close spaced grid (3km x 5km) commenced off the Cumbrian coast. A recording was made of the gamma count rate, in the energy range 0.6 Mev - 0.7 Mev, from surface seawater, from the clean salt water supply, blowing continuously over a 3" x 3" NaI crystal coupled to a gamma spectrometer, while RV CIROLANA sailed around a 30 station grid. A 45 station grid had been planned but was modified because of lack of time following the interruptions of the programme by bad weather. At selected stations seawater was sampled for the determination of radiocaesium to compare with the total gamma count rate.

Upon completion a further 11 stations of seawater sampling were worked between the Cumbrian coast and the North Channel and RV CIROLANA then sailed north-about to Grimsby and worked 31 stations for Aim 1. Measurements of the inorganic and total mercury concentrations in seawater collected at 83 stations in British Isles coastal waters were made on board using the FRL gold trap method.

RV CIROLANA docked at Grimsby at 0350 h 16 January.

RESULTS

All the aims of the cruise were completed although, because of time lost by bad weather, some modifications had to be made to the programme. All but one of the stations planned for Aim 1 of the programme were completed. The modified Niskin sampler worked well and was easy to use off the hydrographic platform. Preliminary results showed that the weight of suspended load was much higher than that obtained off Windscale in July 1975 (CORELLA 13/75). The Reineck box corer also worked well even in relatively rough sea states. The technique of bringing the 0.75 ton corer [illegible] in rough weather was improved considerably by passing a retaining strap around the lifting wire on hauling just prior to the corer emerging from the water. Squeezing the interstitial water from 10 cm diameter seabed cores, using apparatus made up at FRL proved to be simple and effective. The results from the gamma count of surface seawater, on the close spaced grid off the Cumbrian coast showed the maximum pulse rate obtained was

from a relatively narrow band of water at least 5 miles north of the discharge point. Time did not allow the testing of a towable probe suitable for examining the concentrations of radioactivity at various depths in the water column. Measurements of total mercury concentrations in seawater showed the maximum levels were found off the Humber, in Liverpool Bay, in the Straits of Dover and at a position in the English Channel, west of Portland.

D F Jefferies
6 February 1976

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