

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1983 RESEARCH VESSEL PROGRAMME

REPORT

PROGRAMME: RV CIROLANA : CRUISE 9

STAFF:

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DURATION:

28 September-19 October

LOCALITY:

British Isles Coastal Waters, Skagerrak, Kattegat and Farøes.

AIMS:

- 1) To continue the examination of the distribution of Strontium-90, Caesium-134, Caesium-137, Plutonium-238, Plutonium-239/240 and Americium-241 in British Isles coastal waters.
- 2) To determine the suspended load in seawater of each locality.
- 3) To collect core samples of the seabed in mud areas of the Skagerrak and Kattegat for the determination of ^{137}Cs and ^{134}Cs .
- 4) To collect samples of seawater at selected stations for the determination of Technetium-99 for Mr B R Harvey.
- 5) To collect samples of neuston in the Celtic Sea and English Channel for Dr S Lockwood.

NARRATIVE:

CIROLANA left Grimsby on the morning tide of 28 September and proceeded to work a line of eight stations to the entrance of the Skagerrak. At all stations 50 litres of surface seawater were collected and the filtrate ($< 0.22\mu\text{m}$) was processed on board for later analysis of ^{137}Cs and ^{134}Cs . Samples were collected at depth at intermediate stations and up to two other positions in the water column were sampled in addition to the surface. Salinity/depth and temperature/depth profiles were obtained by use of the Guildline CTD, combined with a Hewlett Packard on board computer. Estimates of the suspended load at all depth stations were made by filtering 5 litre samples through previously weighed membrane-filters. At selected station 200 litre samples of surface seawater were obtained, filtered and the filtrate and particulate ($> 0.22\mu\text{m}$) were initially prepared on board for later analysis of the transuranic nuclides ^{238}Pu , $^{239/240}\text{Pu}$ and ^{241}Am . In addition a further 40 litres were collected and retained for ^{90}Sr analysis and 40 litres for ^{99}Tc . After six stations, on the 29 September, a fault developed in the CTD system and the rosette control for the Niskin water samples failed to

operate. Depth sampling continued by use of the normal hydrographic winch. A grid of 17 stations was then worked in the Skagerrak and Kattegat (chart attached) and at 7 of these stations up to 20cm length cores of the seabed in mud areas were obtained with the Tennant Box Corer. Samples were retained frozen for later examination of radioactivity depth profiles by gamma spectrometry. The fault on the Guildline CTD was diagnosed as a faulty moulded 'Y' plug and the use of the CTD was recommenced at 1300 on 30 September. Work in the Skagerrak was completed in the early hours of the 2 October and CIROLANA proceeded to a position off Aberdeen at 57° 00'N and 00° 00'E. A grid of 85 stations around Scotland, Orkney, Shetland, Faroes, Hebrides to the North Channel of the Irish Sea was then worked (chart attached). Gale force winds on the 5 and 6 October forced the abandonment of sampling at depth at 4 stations, 2 off the Shetlands and 2 off the Caithness/Sutherland coast. In addition problems of reeving on wire to the CTD winch reduced sampling depths to 500m. Streaming of the cable in deep water and rewinding on the winch improved the situation, although less than 2900m of wire were found to be on the drum. Work continued satisfactorily, with the exception of damage to the bodies of two 30 litre Niskin bottles on the rosette array, caused by recovery in a very heavy swell, until storm force winds on the night of 12/13 October caused abandonment of the proposed programme. During the night a crewman was injured and arrangements were made for him to be landed at Larne in the North Channel for hospital treatment. After making little headway against storm force winds CIROLANA finally went alongside to land the injured man at 1000h on 14 October. The ship then sailed back, at 1030, to a depth station in the North Channel where there was still a lee. The CTD again failed to operate and the hydrographic winch was used. Following further storm warnings for Malin and Hebrides, a severe gale forecast for the Irish Sea and a request to return a day early, it was decided to abandon sampling 13 stations to the North and West of Ireland and to steam south and work a line of stations in the Irish Sea to the St Georges Channel. Work continued on this line until storm force winds again caused the programme to be halted while a lee was sought on the Irish coast. Shelter was obtained until 1400h on 16 October when CIROLANA then proceeded at full speed to the English Channel. Both wind and sea swell conditions had improved by 0830h on 17 October to allow 3 stations to be sampled, by use of the 2m neuston net, for Dr S Lockwood between 4°W-2°W. Sampling of seawater continued on a line of stations to 52° 00'N 02° 00'E where another depth station was worked. With some time in hand for docking on the morning tide at Grimsby on 19 October a small grid of stations was worked, off the Suffolk and Essex coasts, where a sharp gradient in the ¹³⁷Cs distributions had been observed on previous cruises. CIROLANA docked on the morning tide of 19 October.

RESULTS:

Some 296 seawater samples were collected and prepared on board for radio-caesium, 24 for transuranic, 17 for ⁹⁰Sr and 26 for ⁹⁹Tc analyses. 51 stations were worked at depth by use of the rosette array in conjunction with the CTD. Plots of temperature and salinity showed significant changes with depth in the Skagerrak and Kattegat with lower salinity in the surface water than at the bottom. A minimum salinity of 22.4‰ was obtained at the surface near the entrance to the Sound with 32.38‰ in the bottom water. In the Skagerrak surface temperatures were between 12°C-13.6°C and bottom temperatures between 5.6°C-7.5°C. Relatively low salinity surface seawater at 35.06‰ was recorded between Shetland and Faroes at a position 61° 30'N, 03° 00'W with 34.96‰ at 500m. Associated with the latter salinity was very cold water with a temperature of -0.08°C. Suspended load samples were obtained at 162

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spatial positions and initial observation would suggest a reduction, between cruises, from similar areas sampled on CIROLANA 3/82. The maximum suspended load again appeared off the Suffolk coast.

All aims were achieved but with some modification to the original proposed programme.

D F Jefferies
19 October 1983

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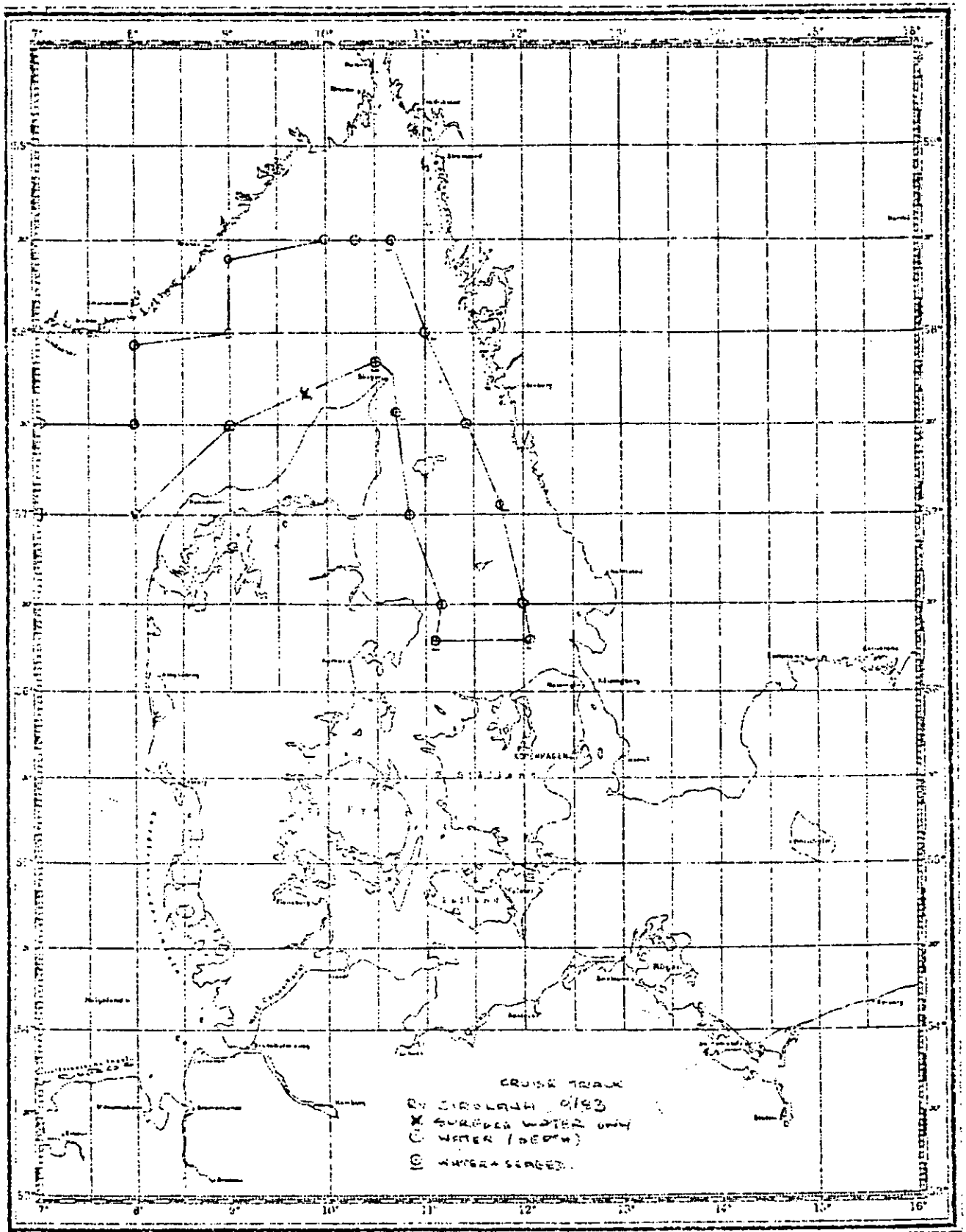


FIG 1

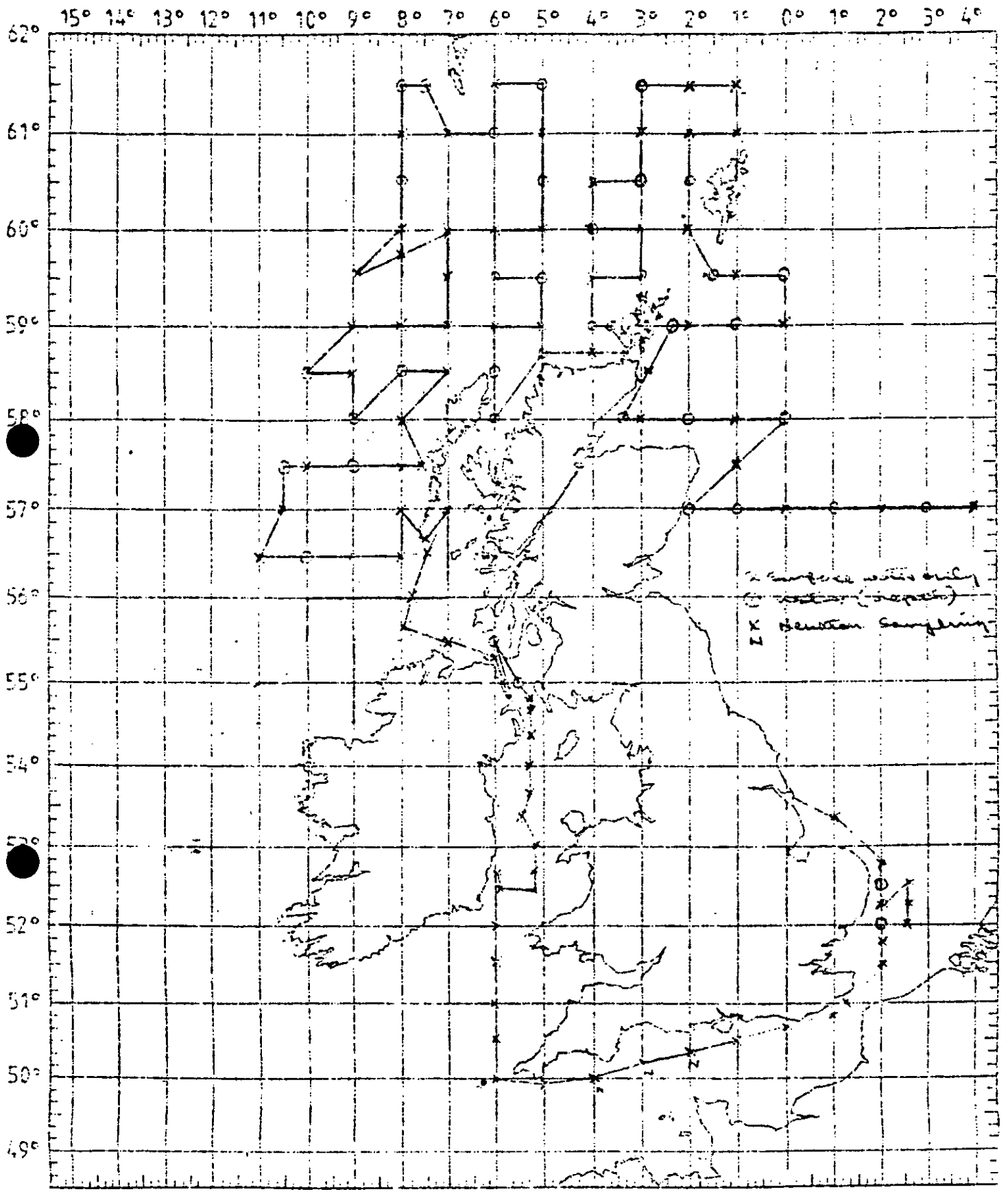


FIG 2