

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

1971 RESEARCH VESSEL PROGRAMME

REPORT: RV CORELLA: CRUISE 12

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

STAFF

J W Talbot  
G C Baxter  
J Woollorton  
I A Huggins  
S R Jones  
D B Smith  
D G Humphrys } AERE, Harwell } Part-time

DURATION

Left Lowestoft 1200 hours 12 July

Arrived Lowestoft 0915 hours 22 July

All times are British Standard Time

LOCALITY

Yorkshire Coastal Waters

AIMS

1. To measure the rates of dispersal of soluble and particulate matter by means of releases of Rhodamine B and radioactive Lanthanum respectively.
2. To lay an array of moored current meters.
3. To measure hydrographic parameters relevant to the dispersion studies.
4. To compare the performance of the Zone Research Model 701 fluorometer with the Turner instrument.

NARRATIVE

RV CORELLA arrived off Hartlepool 0640 hours 13 July, and proceeded to lay the current meter stations as arranged. The last meters were laid by 2135 hours that day and the ship then anchored in Scarborough Bay. Weather and sea conditions had been ideal all the day. The next two days were mainly occupied in checking and testing the Rhodamine and radioactivity monitoring equipment, some faults being found and rectified. On 14 July, contact was made with RV NUCELLA, who was then carrying out a bed radioactivity survey. The following day a message was received from Mr D B Smith that in view of a bad weather forecast, he had postponed the release of radioactivity originally planned for 16 July. The weather developed as forecast and CORELLA dodged from 0700 hours, 16 July in a fresh northerly wind and a heavy swell. That evening, sea conditions improved and arrangements were made for a release of radioactivity to take place the following morning. At 0645 hours, 17 July a message was received from Mr Smith that it was again necessary to postpone the radioactivity release because of the

adverse sea conditions. He said that his boat could only release in good weather and he suggested that the release should instead be made from CORELLA. After taking the advice of Messrs Jefferies and Mitchell of PRL it was agreed to make the release from CORELLA as suggested. The ship then proceeded to Middlesborough where she docked at 1100 hours. The radioactive tracers and release gear were then taken on board and Messrs D B Smith and D G Humphrys of AERE joined, at the same time Mr S R Jones disembarked.

The ship left Middlesborough at 1500 hours and proceeded to the tracer release area. On 18 July, CORELLA took up station 1 mile off the coast about 3 miles northwest of Whitby. At 0530 hours a vertical water bottle series was taken and the vertical temperature distribution measured. Five minutes later, 30 gallons of 20% Rhodamine-B solution were released at a depth of 1 metre and at 0615 hours approximately, 30 Curies of radioactive Lanthanum was released. Survey work of the tracer distributions was then carried out until 1457 hours, at which time it was necessary to allow some attention to be given to the ship's engine. The next day, 19 July, a very similar procedure was followed except that the water bottle and temperature measurement, the release of Rhodamine-B and the release of La<sup>140</sup> took place at 0654, 0714 and 0744 hours respectively and, that on this occasion, 60 gallons of 20% Rhodamine-B solution were released. Immediately after release of the tracers, the ship returned to Whitby Bay where Messrs D B Smith and D G Humphrys were transferred to RV NUCELLA and Mr S R Jones rejoined CORELLA. The tracer distributions were then surveyed until 1821 hours, significant levels of both tracers being found from time to time throughout the survey period. On completion of the survey, two radiation probes that had been damaged during the bottom surveys made by NUCELLA, were collected and both made serviceable.

On 20 July, NUCELLA came alongside at 0730 hours and collected the repaired probes. CORELLA then proceeded to the position where tracer releases had been made on the two previous mornings. At this position the vertical distribution of salinity, temperature and water velocity were measured.

The ship then made a survey of the distributions of Rhodamine-B and La<sup>140</sup>, RV NUCELLA assisting in measuring the former.

On 21 July, two releases of 50 scabed drifters were made at the tracer release position, these were at high and low water slack, 0100 and 0630 hours respectively. At 0430 hours a vertical series of DRCM reading was worked on the same station. The ship then worked two lines of stations normal to the coast for salinity and temperature before leaving the survey area at 1450 hours.

## RESULTS

Most of the results of this cruise were recorded on the data logger aboard ship or by the moored current meters and need processing:- at this stage only very preliminary comments are possible.

At the time of the tracer releases a thermocline was present at a depth of about 16 metres. From the time of the first release good weather was experienced and it is probable that the thermocline increased in intensity. It is thought that rates of dispersal of the tracers were comparatively low, particularly in the vertical direction following the second release, but there was appreciable dispersal normal to the coast, as has previously been observed in this area. It was observed that the second tracer release moved markedly off-shore on the ebb tide and then swung close inshore on the flood. This effect was so marked that by the high water after release the Rhodamine-B distribution occupied a large part of Whitby Bay where it was surveyed by NUCELLA. At that

time the tracers were located in a thin, perhaps 2 metres thick, surface layer. Such a slow rate of vertical mixing is considered remarkable. Surveys some 30 hours after the second tracer release detected distribution of both Lanthanum and Rhodamine-B, but by this time the water borne Lanthanum distribution was located beneath the Rhodamine-B.

Settlement of particles to the seabed after the first release, which was of larger particles, seems to have been appreciable, since NUCELLA found a significant distribution of activity on the bed at about the position reached by this patch at the first slack water after release.

It was impossible to fulfil the fourth aim of this cruise since no test fluorometer was available from the British Agents.

J W Talbot  
28 July 1971

SEEN IN DRAFT    JEB  
                  CNS

INITIALLED        AJL

DISTRIBUTION

Basic list  
J W Talbot  
G C Baxter  
J Woollorton  
I A Huggins  
S R Jones  
D B Smith        }  
D G Humphrys    } AERE, Harwell