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1SR87

FRV "Scotia"
Cruise 1/87

REPORT

7-27 January 1987

Personnel

Part I - 7-19 January

G Topping	PSO (in charge)
G G Urquhart	PSO
J M Pirie	SSO
P W Balls	SSO
R B Mitchell	SSO
R Payne	HSO
R D Adams	SO
M R Robertson	SO
J C McKie	SO
C W Glass	SO
G K Clark (Miss)	SO

Part II - 20-27 January

J H A Martin	PSO (in charge)
E W Henderson	SSO
R Payne	HSO
G Slessor	HSO
W R Turrell	HSO
R D Adams	SO
M R Robertson	SO
J C McKie	SO
R Ward (NCC)	

Objectives

Part I 7-19 January

- 1 To deploy and recover settlement traps at the Garrochhead sludge dumping ground.
- 2 To calibrate the ship's speed logs using Decca trisponder.
- 3 To survey the dumping ground area using a transmissometer.
- 4 To collect fish from selected locations in the Firth of Clyde for metal analyses.
- 5 To uplift and relay current meter moorings in the Firth of Clyde.
- 6 To collect water samples in the vicinity of the dumping ground for suspended solids, carbon and metals.
- 7 To collect water samples for radio caesium analysis.
- 8 To collect grab and core samples at selected stations near the dumping ground.
- 9 To survey the dump ground and adjacent areas using the multidepth plankton sampler.

Part II 20-27 January

- 1 To survey the dumping ground off Cloch Pt
- 2 To conduct a hydrochemical survey of the Firth of Clyde and North Channel.

Narrative

Part I

"Scotia" sailed at 1545 hrs on 7 January from Aberdeen and proceeded to the Firth of Clyde, samples of water being collected at three locations on passage in relation to MAFF's programme of radio caesium monitoring. On arrival in the Clyde on 9 January a survey of the sewage sludge ground was made using the towed transmissometer, to assess distribution and concentration of suspended solids. During the 9 and 10 January settlement pots were deployed in the vicinity of the dump ground to assess the deposition of sludge particles. Grab samples and speed log calibrations were also carried out over this period. Trawling began on 11 January in the vicinity of the dumping ground and on completion of this work the ship proceeded to the southern end of the Firth to complete trawling operations. On passage it became clear that one of the settlement pot moorings had become entangled with the hull so the ship had to be diverted to shallow water to disentangle this obstruction. The recovery and redeployment of the two current meter moorings began at 0800 on 12 January and was completed by late evening. Since one of the current meter buoys was found to be missing, the recovery of the mooring had to be conducted by a 'creeping' operation. The ship then proceeded to the dump ground where further transmissometer work and settlement pot collections were made. Following the successful replacement of the ship's log it was possible to continue the speed log calibration during the remaining part of the cruise. During the deployment of the transmissometer on 13 January the armoured cable snapped. Further work using this instrument was delayed until a replacement cable was provided on 14 January. Following the recovery of the settlement pots on 15 January a series of vertical profiles was commenced using the transmissometer at a grid of stations in the vicinity of the dump ground during and subsequent to the daily sewage sludge dumping operations. On 18 January water samples from selected depths were collected over a grid of stations (54) covering most of the Arran Basin. The ship proceeded to Greenock on 19 January arriving at 1300 hrs.

Part II

"Scotia" sailed at 1345 hrs on 20 January from Greenock and a grab sampling survey was commenced within the hour off Cloch Point. On completion in the early evening a hydrochemical survey was commenced and continued until 0800, 22 January when to take advantage of the windless conditions four parachute drogues were tracked for 25 hours to the north and west of Ailsa Craig and three further parachute drogues were tracked from east of Ailsa Craig. This work was terminated at 0930, 24 January after which the hydrochemical survey was completed at the intersect of the Clyde with the North Channel. At 1800 the same day "Scotia" sailed for the North Sea. A new hydrographic section was worked between 59°17'N 0°00.1'W and 57°46'N 1°54.4'W before "Scotia" docked in Aberdeen at 0900 27 January.

Results

Part I

Despite the bad weather, particularly the intense cold experienced by deck workers, and delays due to the need for repairs to scientific and ship's equipment, all objectives were successfully completed.

Four collections of settlement material were made at five locations on and in the vicinity of the dumping ground and these will be assessed for suspended solids, carbon and metals on return to the Laboratory. Provisional examination of these collections, made following dumping operations which occurred at highwater and under the influence of N to NE winds, and of the transmissometer profiles confirm that the initial dilution and dispersion of wastes in line with the calculations made before the cruise. Rates of settlement vary with size of particulates in the waste from 30 m/hr for large solids to a few cm/hr for the finer solids. Some of the intermediate size material remained long enough in suspension to be transported outside the 1 mile diameter dumping site under the weather and tidal conditions occurring at the time of the study. A more detailed assessment of these data will be made on return to the Laboratory.

Collections of a number of species of fish were made at three different locations in the Firth of Clyde and these will be analysed for mercury on return to the Laboratory to be compared with previous collections made in this area.

All currentmeter moorings were recovered and successfully redeployed. An analysis of the C/M records will be made on return to the Laboratory.

The series of grab samples taken at this dump site should provide sufficient numbers of Capitella for metal analyses in the Laboratory in relation to the section's studies of the movement of contaminants from the dump site to the food chain. Core samples will be sectioned and analysed for a range of metals to provide data for the assessment of the fate of contaminants following dumping.

Water samples and suspended solids will be examined on return to the Laboratory for carbon and metals to assess the extent of soluble and particulate contamination in the water column from this dumping operation.

Despite the delay caused by damage and repair to the speed log it was possible to conduct several speed log calibrations under a variety of different conditions using the shore based trisponders.

Both the Decca log and the Walker log gave a linear output with speed in the range three to 12 Kt, but both had a large zero offset and the Decca log dial in the Hydro Plankton lab was found to be very non-linear. The zero offsets were adjusted and the logs recalibrated. A separate calibration plot was produced for each of the dials in the Hydro Plankton lab and on the bridge together with calibrations for the MNS 2000 and Chameleon outputs (Decca log) and the Walker log output point in the instrument lab.

No leeway effects were detected at 10 Kt wind speed but with winds of 25 to 30 Kt the Decca log was found to read lower than the true water speed while the Walker log indicated speeds greater than expected. These effects increased with the angle of the wind relative to the ship's head.

Part II

A preliminary analysis of the hydrochemical survey indicated that the front between the Clyde water and the North Channel water was, unlike 1986, well to the south of the Clyde Sill. The drogue work, however, showed that the surface water was moving to the north, west of Ailsa Craig at about 20 cms/sec while at 20 metres it was following the same track at about 5 cms/sec. There appeared to be little movement at the bottom. East of Ailsa Craig there was little n-s movement but a westerly drift around the northern end of Ailsa Craig. Current meter records will help place these drift records in their correct perspective.

Acknowledgements

The excellent cooperation of Capt McInnes, his officers and crew and the prompt response of a number of colleagues at the Marine Laboratory to our plea for assistance with the transmissometer cable is gratefully acknowledged.

G Topping
J Martin
9 March 1987

Seen in draft: N E McInnes

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