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FRV "Scotia"

ID

Cruise 3/85

Report

22 March - 11 April 1985

Personnel

Part I 22 March - 2 April

G Topping	PSO (I/C)
J H A Martin	PSO
D Seward	SSO
J M Pirie	SSO
I M Davies	SSO
R Payne	HSO
R B Mitchell	HSO
J Dunn	HSO
P W Balls	SO
Miss B A McLeod	ASO
Miss G K Clarke	Research Student
A Tappin	Visiting Scientist

Part II 3 - 11 April

G Topping	PSO (I/C)
D Seward	SSO
I M Davies	SSO
D C Moore	HSO
C W Shand	SO
M R Robertson	SO
J C McKie	SO
Miss B A McLeod	ASO
Miss G K Clarke	Research Student
P Barnett	Visiting Scientist (pt)

Objectives

The following list differs from the original programme in the ordering and number of objectives. This reflects the fact that it became possible to undertake additional work.

1. To deploy 2 current meter moorings in the outer part of the Firth of Clyde.
2. To conduct hydrographic sections and water sampling for nutrients, chlorophyll and suspended carbon in the Firth of Clyde, North Channel and the Northern Irish Sea.
3. To collect surface water samples from the above areas for metal analysis.

4. To conduct profiles of metals in sea water at selected sites in the above areas.
5. To collect samples of zooplankton from the above areas for metal analysis.
6. To collect sediment samples for hydrocarbon analysis at a position one mile south of the Isle of Arran for hydrocarbon analysis.
7. To conduct trials of the DAFS multi-depth plankton sampler.
8. To conduct a preliminary survey of the Belfast Lough sewage sludge dump site by collecting grab samples of sediment at and in the vicinity of the centre of the dump site on behalf of Dr J Parker, Department of Agriculture for Northern Ireland.
9. To conduct a detailed survey of the Explosives dump site, Birch Pt, Arran Basin, using underwater TV, grab, Agassiz trawls and coring.
10. To conduct a survey of sediments and benthos on the Garrochhead sewage sludge dump ground and adjacent areas.
11. To collect samples of fish from the sewage dump grounds for metal analysis and in relation to study of fish diseases.
12. To conduct trials of a new multicorer.

#### Narrative

Owing to delays caused by the annual refit "Scotia" did not begin the cruise until 1755 hours on 24 March 1985 when she left Govan Shipyard and proceeded to Turnberry Pt to commence the deployment of current meter moorings. On completion of this work (Objective 1) at 1430 hours on 25 March the vessel proceeded to Kilbrennan Sound to begin the hydrographic section work and associated sampling (Objective 2 and 3). This work was completed by 1830 hours on 27 March. During the next 2 days the work associated with the objectives 4, 5, 7 and 8 in the Northern Irish Sea and the North Channel was completed. The vessel then proceeded into the Firth of Clyde where the remaining work associated with objectives 4, 5 and 7 and objective 6 were completed (0130 on 31 March). The remaining part of the cruise was devoted to additional hydrographic section work in the Firth of Clyde; The ship then proceeded to Greenock for half landing, arriving at 0930 hours on 2 April 1985, where some of the scientists disembarked and where scientific gear for part II was loaded.

Following the half landing the ship left Greenock at 1015 hours on 3 April and proceeded to the Tail of the Bank where the Captain conducted steering trials to assess a steering fault which had reoccurred during Part I and to affect repairs on the ship's logs. (During these trials engineers from Brown Brothers and Racal Decca were present). Although the repair to the logs was successful a serious fault to the steering mechanism was diagnosed and the vessel had to return to Greenock where repair was conducted on the pumps and hydraulic lines associated with the steering. On completion of this repair work the ship left Greenock at 0600 hours on 4 April and proceeded down the Clyde Estuary to begin Part II. Prior to picking up Dr Barnett at Millport at 1015 hours the ship spent ca 30 mins calibrating the ship's log along the measured mile in the estuary. Following the embarkation of Dr Barnett the ship proceeded to Kilchattan Bay where trials of the multicorer were carried out at anchor. On completion of this work Dr Barnett left the ship at Millport at 1540 hours and the ship proceeded to Birch Point where the grab work commenced at 1645 hours.

During the following 6 days the work associated with objectives 9-12 inclusive was progressively completed.

Scientific work was concluded at 2000 hours on 10 April and the ship proceeded to Greenock where she docked at 1530 hours on 11 April.

Despite 2 days delay caused by the refit and one days delay associated with repair to the damaged steering gear hydraulic system, all but one of the original objectives plus additional work was completed; Objective 11 was not completed due to a malfunction occurring in the starboard trawl winch which made trawling impossible.

The success of this cruise is largely due to the excellent cooperation of Captain Gillon, his officers and crew.

### Results

- Objective 1. Two current meter moorings were successfully laid at inshore positions just off Turnberry Point. These moorings will be recovered during the initial period of "Scotia" 4/85.
- Objective 2. Fifty seven hydrographic stations were completed during Part I; samples for salinity, nitrate, phosphate, silicate, chlorophyll and suspended carbon measurements were collected at standard depths. All nutrient measurements were completed on board the vessel during Part I of the cruise.
- Objective 3 and 4. Surface samples were collected throughout the study area for analysis of soluble Cu, Cd and Pb by anodic stripping voltametry. Cadmium values ranged from 22 to 38 ng/litre with a mean value of 28 ng/litre. The majority of Pb values for the Firth of Clyde samples were below the detection limit of 10 ng/litre whereas values of 15-24 ng/litre were observed in the Northern Irish Sea area. Regrettably the values for soluble copper were affected by contamination in the surface water sampling system, the cause of which has not been established although it could be linked to the antifouling treatment of the hull during the refit. Profiles of these metals in the water column will be based on samples collected in modified Go-Flo bottles.
- Objective 5. Zooplankton were collected at 43 locations throughout the study area using a double plankton net with mesh sizes and codends of 250  $\mu\text{m}$  and 68  $\mu\text{m}$  respectively. Fractionation of the zooplankton was done on board using plastic sieves with mesh size ranging from 68  $\mu\text{m}$  to 1000  $\mu\text{m}$ .
- Objective 6 and 8. Grab samples were taken at a grid of stations at both Belfast Lough dump site and at 1 mile south of Arran. The former samples, which consists of sediments for contaminant analysis and the material from the grabs that was retained on a 0.5 mm sieve for benthic analysis, will be sent to Dr Parker, N Ireland. The latter samples are to be analysed at the Marine Laboratory for petroleum hydrocarbon content.
- Objective 7. The multidepth plankton sampler was deployed on 12 occasions. During the course of the first 10 hauls adjustments, fault finding and rectification and calibration were conducted. The last 2 hauls produced plankton samples which clearly showed the depth variation of zooplankton composition. Subsequent minor modifications should ensure that this new piece of sampling equipment will become a useful and versatile addition to the Laboratory's range of samplers.

Objective 9. Grab and core samples were taken at a series of stations (250m apart) within 1 mile radius of the Explosives dump site at Birch Point. A series of 12 Agassiz trawls were made to determine the location and extent of debris on the sea bed. These tows were made along radial lines towards the centre of the site to ensure that material dragged along the seabed would be displaced towards the centre of the site rather than away from the centre. TV scans of the site were made at several locations prior to the trawl work to assess surface debris.

Samples of sediment (from cores taken by Gravity Corer) are to be sent to ICI Ardrossan for analysis of nitroglycerine content.

Objective 10. Macro benthos was sampled at 14 locations on and in the vicinity of the dumping ground and the area to the north of the ground (at positions sampled by DAFS scientists in their 1971 survey). Cores of sediment were collected at these locations and at an additional 12 sites using the Craib corer. Collections of epifauna were made by Agassiz trawl along 7 transects and TV scans were made at the dumping centre and to the north of the dump site.

Samples of the cores and epifauna will be examined for metal content and samples of bottom water (taken from the Craib corer) will be examined for dissolved oxygen and nutrient content. Eh and ETP measurements are to be made on all sediment samples.

Objective 11. Trials of the multicorer were conducted under the direction of Dr P Barnett, SMEA who joined the ship for the first day of Part II. Regrettably these preliminary trials were unsuccessful owing to a fault in the hydraulic piston compartment which prevented the piston and associated trigger mechanism from operating correctly. With the assistance of the ship's engineers this fault was rectified and successful trials were subsequently conducted on the last day of the cruise.

G Topping

30 April 1985

Seen in draft: J W Gillon

SCOTIA 3/85. (24/3 - 11/4/85). TRACK CHART AND LOCATION OF STUDY AREAS.

