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

1996 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 11

STAFF:

K S Leonard (SIC)	2 -22 December
D McCubbin	2 -22 December
H S Emerson	2 -22 December
R Bonfield	2 -22 December
T A Bailey	2 -22 December
B Taylor	2 -22 December
I T McMeekan	2 -22 December
J M Rees	2 -7 December
N D Pearson	2 -7 December
M Mason (Cambridge University)	2 -7 December
P Murray (Cambridge University)	2 -7 December
N Feates (HR Wallingford)	2 -7 December
H Mitchener (HR Wallingford)	2 -7 December
C McMahon (University College Dublin)	14-18 December
L Leon Vintro (University College Dublin)	14-18 December
A E Eroglu (University Sheffield)	14-18 December
T Ryan (Radiological Protection Institute of Ireland)	14-18 December
F Wigley (Southampton Oceanographic Centre)	14-18 December

DURATION: 2 - 22 December 1996
(All times are Greenwich Mean Time)

LOCALITY: Harwich Tower, Tees Bay, North Sea, Western Isles, Irish Sea, English Channel.

AIMS:

1. To deploy minipods, obtain core samples and CTD profiles, and carry out sidescan surveys in two locations (Harwich Tower and Tees Bay) of the southern North Sea. (AE0227A0).

2. To collect and process surface/bottom seawater and sediments from UK coastal waters for the analysis of Tc and transuranic radionuclides as part of the post EARP survey (AE0114A).

3. To collect and process surface/bottom seawater from UK coastal waters for the analysis of Cs and tritium radionuclides for the biennial monitoring programme (AE0139AB).

4. To assess the feasibility of concentrating radionuclides on microcolumns for the rapid determination of ^{239}Pu and ^{240}Pu in environmental samples by ICP MS (AE0114A0).

NARRATIVE:

Prior to sailing, the programme of work commenced with the collection of sediment core samples adjacent to the MAFF quay. Upon completion, RV CIROLANA departed from Lowestoft at approximately 1430h on 2 December 1996, and then proceeded to Harwich Tower. For the remainder of the day a grid of sediment core stations, in the area of the spoil ground (Figure 1), was successfully worked for the purpose of *in-situ* sediment shear stress studies.

Overnight, a problem concerning the manifold of the Atlas crane was identified and the problem was assessed. It was not possible to correct the fault without the appropriate spare parts, and these could not be obtained without some considerable delay (> 3 days). As a consequence of the fault, the winch on the crane could not be used for work in the North Sea. Nevertheless, under conditions more operationally difficult than is usual, the scheduled work programme continued during the mid morning of 3 December. During the late morning a CTD profile was carried out for calibration purposes, close to the site of the intended moorings (Figure 1). In the afternoon RV CIROLANA dropped anchor (Site A - Figure 1) to enable the controlled deployment of guard buoys, a minipod and a quadrapod. The ship's anchor was raised and two further guard buoys were deployed around the site of the moorings. Further south of the spoil area, two more guard buoys and a minipod were successfully deployed (at Site B - Figure 1). Two CTD profiles were obtained for calibration purposes.

During the early morning of 4 December a Sidescan sonar survey commenced in the spoil ground study area. This continued for the remainder of the morning, with a total of 6 tows being completed (Figure 1). After inspection of the survey results, two further sites were chosen for the collection of sediment core samples. Upon completion RV CIROLANA departed from the Harwich Tower study area in the early afternoon and proceeded north. During the period, 4 -5 December, surface water samples was collected for artificial radionuclides (^{99}Tc, ^{3}H and Cs nuclides), along the track in the southern North Sea (Figure 2) and initial processing of the samples was carried out on board.

Following arrival (late afternoon of 5 December) at the spoil ground of the Tees Bay, a grid of sediment core stations (Figure 3.) was successfully collected and *in-situ* sediment shear stress studies were completed. An additional core was obtained from the intended minipod site. During the morning of 6 December, a minipod and two guard buoys were successfully deployed. RV CIROLANA then carried out a Sidescan survey of the study area (Figure 3.). Four of the five intended tows were completed. The last tow was aborted because it was not possible to locate a failure, resulting in the loss of signal from the instrument. Three CTD profiles were obtained for calibration purposes, and a further three sediment cores were collected after inspection of the Sidescan survey results.

Prior to recommencing the artificial radionuclide sampling programme on 7 December, a number of scientific staff disembarked during the early morning at North Shields by searider. RV CIROLANA then continued to proceed along the track of surface water sampling sites in the North Sea (Figure 2).Under favourable weather conditions, excellent progress as made and all the remaining stations in the North Sea were completed by the morning of 11 December. During 11-12 December, water sampling was carried out in a grid north of the Scottish coast. The ship then continued along the track through the Western Isles. En route there was a short

but necessary detour to Ullapool, during the early evening of 12 December, to collect spare parts to enable repairs to be made to the Atlas crane.

On 13 December a grid of surface water sampling, for artificial radionuclides, was carried out to the north of Ireland. RV CIROLANA then proceeded along the sampling track into the North Channel. During the late morning of 14 December scientists were brought on board, by the ship's searider, from Stranraer. The locations and cruise track of artificial radionuclide sampling in the Irish Sea are given in Figure 4. This part of the artificial radionuclide sampling also included the collection of sediment samples. At 2100h on 14 December, during the collection of a sediment core sample, the cable wire parted and recovery of the NIOZ corer was not possible. For the next 13 hours the ship trawled to retrieve the corer, but attempts were unsuccessful. A separate report (available on request from SIC) of this incident was sent immediately to the Lowestoft Laboratory. The intended core sampling programme (at 7 sites) was replaced by grab sampling.

As planned, the artificial radionuclide sampling in the northern Irish Sea was completed between 14 - 17 December. With favourable weather good progress was made during this part of the cruise, whilst the schedule was timed to allow the chemical processing to be satisfactorily completed between stations. During the early morning of 18 December scientific staff disembarked at Hollyhead by searider. Sampling for the remainder of the Irish Sea (Figure 4.), and the Celtic Sea (Figure 2.), was achieved between 18- 20 December. RV CIROLANA arrived off the Scilly Isles at 1830h 20 December. En route to Lowestoft, the remaining number of the scheduled water sampling stations in the English Channel (Figure 2.) were visited. RV CIROLANA finally docked at Lowestoft at 1900h on the 22 December.

We express our sincere thanks to the Master, the ship's officers and crew for their continued support and high standard of service. We also record our gratitude to the galley staff for providing excellent catering and a superb Christmas lunch.

RESULTS:

Aim 1 . At Harwich Tower two minipods, a quadrapod and associated guard buoys were successfully deployed. A total of 11 sediment core samples were collected and, using the ISIS equipment, *in situ* shear stress measurements were carried out. Three CTD profiles were obtained in order to provide calibration of the deployed equipment. A comprehensive sidescan sonar survey (6 tows) of the spoil area was completed. In the Tees Bay spoil study area, a minipod and guard buoys were successfully deployed. *In situ* shear stress measurements were carried out in association with the collection of 9 sediment core samples. Three CTD profiles were obtained for calibration purposes and sidescan sonar survey (5 tows) of the spoil area was completed. In addition, 3 sediment cores of fine mud, were collected next to the MAFF quay as an end member for stress measurements.

Aim 2. Samples of 50 - 100 litres of surface seawater were collected from 105 locations around the UK coast (including 45 stations in the Irish Sea) and passed through ion exchange columns to extract ^{99}Tc. A further 12 surface samples were collected in the northern Irish Sea and independently processed by Southampton

Oceanographic Centre for ^{99}Tc analysis. At 11 sites (northern Irish Sea), 25-50 litres of surface seawater samples were collected to isolate ^{60}Co and $^{239,240}Pu$ Samples for each radionuclide were filtered and subjected to preliminary chemical separation procedures (co-precipitation methods). Further radiochemical purification and radiometric assay will take place at the Lowestoft laboratory. A CTD profile and a large volume surface and bottom water samples (135 litres) was taken and processed for the lower and higher oxidation states of Pu. Surface sediment samples were collected at 21 selected sites in the northern Irish Sea for ^{99}Tc assay.

Aim 3. Surface seawater samples of 50 litres were collected from 120 locations around the UK coast (including 45 stations in the Irish Sea) and passed through ion exchange columns to extract Cs radionuclides. Surface seawater samples of 1 litre were collected from 48 stations for tritium assay. These determinations are required for the biennial monitoring programme

Aim 4. Duplicate samples of surface seawater (50 litres) were taken at 11 sites in the northern Irish Sea to compare the assay of $^{239,240}Pu$ by α spectrometry including conventional methods of chemical preparation, with the rapid determination of ^{239}Pu and ^{240}Pu by ICP MS using microcolumns.

K S Leonard 8 January 1997

SEEN IN DRAFT:

R W (Captain)
L S (Fishing Skipper)

INITIALLED: DSW

DISTRIBUTION:

Basic List +
K S Leonard (SIC)
D McCubbin
H S Emerson
R Bonfield
T A Bailey
B Taylor
I T McMeekan
J M Rees
N D Pearson
M Mason (Cambridge University)
P Murray (Cambridge University)
N Feates (HR Wallingford)
H Mitchener (HR Wallingford)
C McMahon (University College Dublin)
L Leon Vintro (University College Dublin)
A E Eroglu (University Sheffield)
T Ryan (Radiological Protection Institute of Ireland)
F Wigley (Southampton Oceanographic Centre)

Figure 1. Harwich Tower Work Area (Station Locations)

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SHOWING :
STATION POSITION

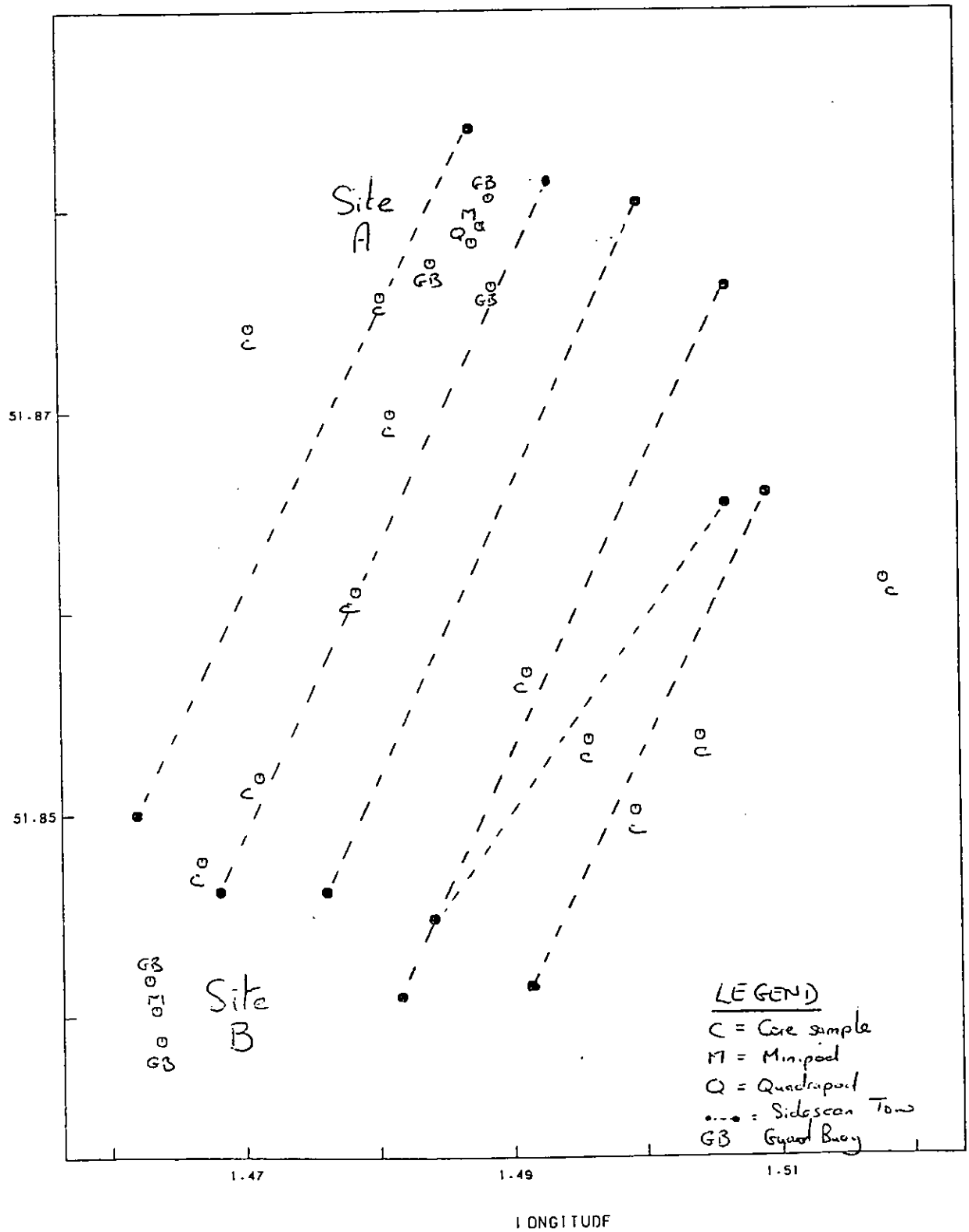

Figure 2. Artificial Radionuclide Sampling Stations (excluding Irish Sea)

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SHOWING :
CRUISE TRACK
STATION POSITION
STATION NUMBER
COASTLINE

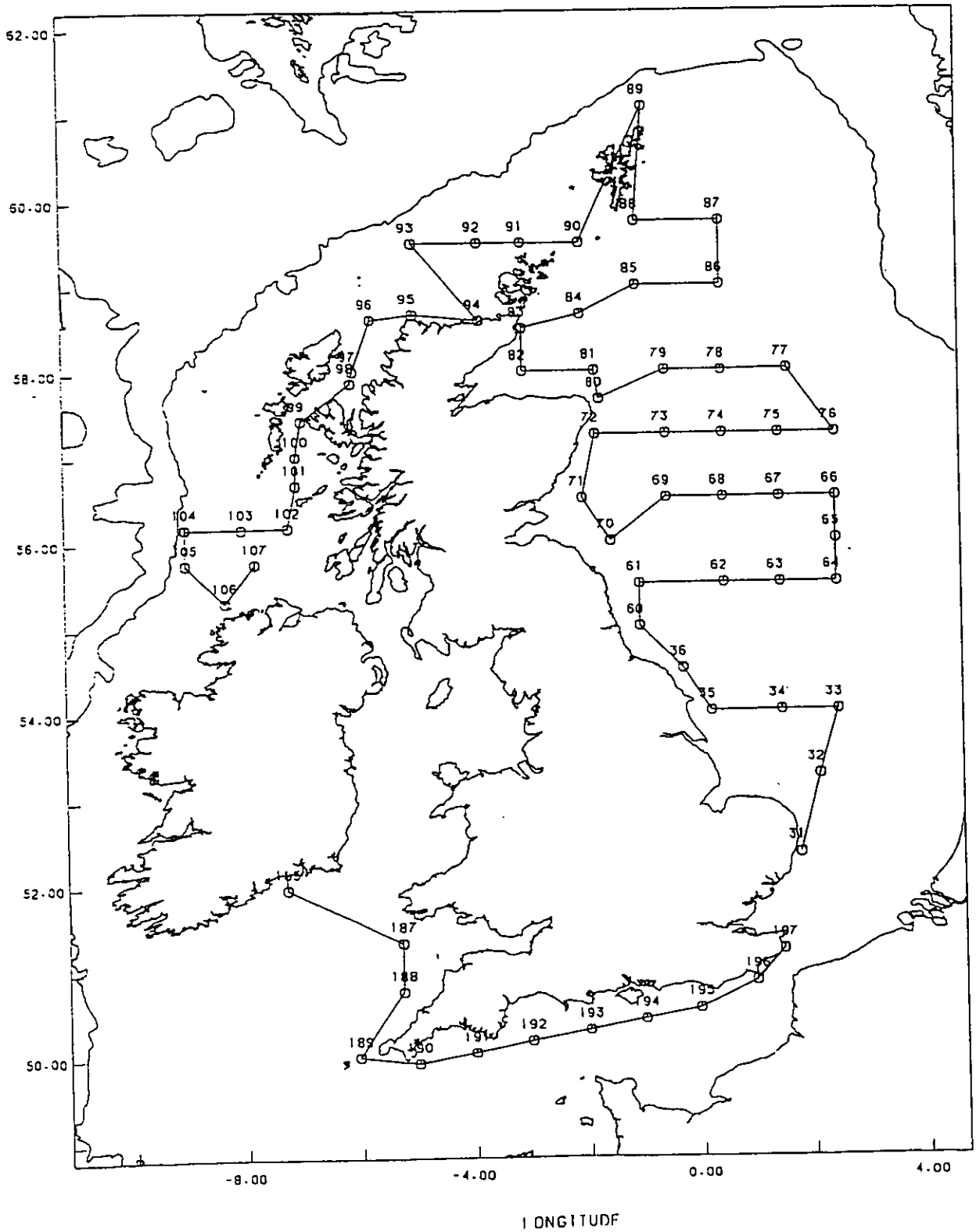

Figure 3. Tees Bay Work Area (Station Locations)

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SHOWING :
STATION POSITION

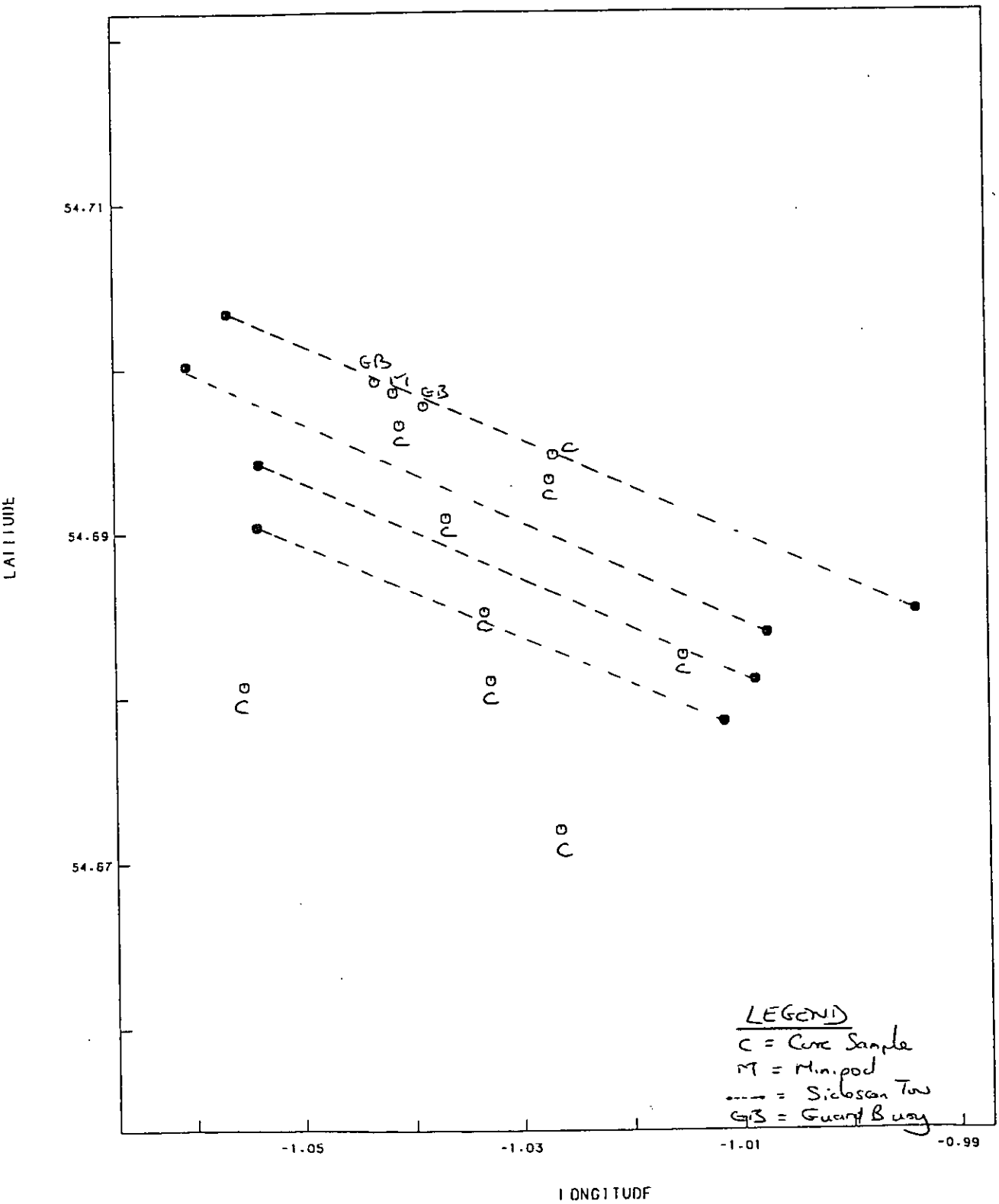
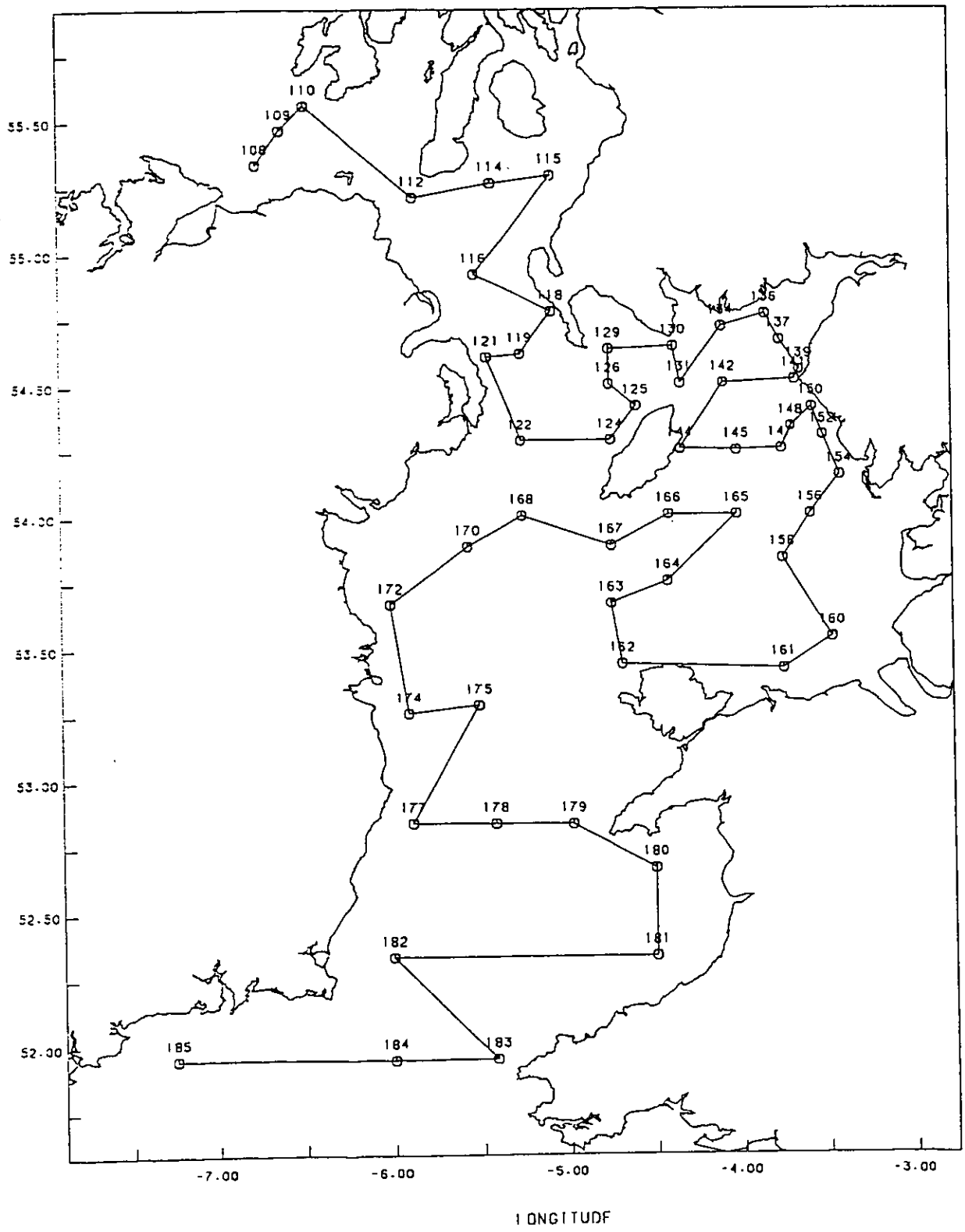


Figure 4. Artificial Radionuclide Sampling Stations

Cirolana 11/96 Irish Sea

SHOWING :
CRUISE TRACK
STATION POSITION
STATION NUMBER
COASTLINE



CIROLANA 11/96

PRELIMINARY REPORT Loss of NIOZ corer

As part of proposed programme, to collect sediment core samples for the analysis of ^{99}Tc (aim 2 - see cruise programme), the NIOZ corer was deployed at a planned site (T87) in the western Irish Sea. Due to parting of the cable wire, it was not possible to recover the corer.

Earlier in the cruise, during core collections in the North Sea, it was necessary to cut two lengths (one from either end) of the cable wire on the Cargo winch. On both occasions fraying of the cable wire was observed. The shortening of wire is a normal procedure and is necessary because of damage from continual usage. As a precautionary action, a verbal message was passed on by myself to RVSU (via one of the departing scientists - part SIC on CIROLANA 1/97) to recommend the purchase of a new wire to ensure that sufficient length of wire was available for the next and subsequent cruises. This recommendation was raised, before returning to Lowestoft, to prevent the likely problems caused by the Christmas break.

On 14 December the weather was WSW 3-4, overcast and clear. In order to collect two cores in the western Irish Sea, it was necessary to join the spare cable wire to the existing wire on the Cargo winch. This was carried out and the first of the two cores was successfully collected (Site T57). Without reason to expect any major problem, a similar deployment was carried out at Site T87. At 2100h the NIOZ core was carefully deployed. Immediately upon reaching the sea bottom the position details of the station were recorded (as 54 17.070 N, 05 14 850 W). At this point the tension of the wire was absent and the NIOZ lost. After inspection the wire had broken at the position of the join.

Continual trawling to retrieve the NIOZ corer, using a grappling anchor, were abandoned after 13 hours.

Recommendations

1. Immediately- Issue a Notice to Mariners stating the position of the obstruction on the sea bed.

2. Recovery of NIOZ - Attempt to recover using a Granton Trawl (with chain and ticklers) on revisiting site on CIROLANA 1/97.

3. Replace cable wire on Cargo winch for use on next and subsequent cruises.

4. Reconsider appropriate devices to track precise location of instruments deployed on ships' cables (corers and CTDs).

K.S.Leonard (SIC) 15/12/96
Seen by Captain R. Williams