MINISTRY OF AGRICULTURE FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT SUFFOLK NR33 0HT

1996 RESEARCH VESSEL PROGRAMME

REPORT: CIROLANA 1/96

STAFF

		4-11 Jan	11-19 Jan	19-25 Jan	26-31 Jan
P Gurbutt		x	x	x	x
D Kirkwood			x	x	x
N Pearson		x			x
K Medler		x	x	x	
J Read		x	x	x	x
J Aldridge		x			
J Rees		x			x
A Emery		x			
D Mills				x	
S Jones		x	x	x	x
L Poole			x	x	
J Taylor			x	x	
P Murray	(U Cambridge)	x			
R Wilton	(UCNW)			x	
C Fletcher	(HR Wallingford)				x
N Feates	(HR Wallingford)				x

DURATION

Sailed from Lowestoft	2003	4 January 1996
Docked in Barrow	1352	11 January 1996
Sailed from Barrow	1605	11 January 1996
Docked in Lowestoft	2358	24 January 1996
Sailed from Lowestoft	1359	27 January 1996
Docked in Lowestoft	0600	31 January 1996

LOCATION

North Sea, English Channel and Irish Sea

AIMS

1. To recover the Tetrapod, Quadrapod, 4 minipods and 6 current meter moorings at the end of their 2 month deployment to measure the impact of trawling and storms on the remobilisation of radionuclides from the Sellafield mudpatch (AE0135). This will assist in the continuing provision of the highest quality protection to the environment to safeguard human health, especially in relation to past discharges of radionuclides to the Irish Sea.

2. To undertake CTD and surface water sampling to measure the nutrient concentrations in the waters around England and Wales as part of the National Monitoring Programme (AE0503). This will help to establish the quality of the water around the UK in support of the UK's position in fora such as the Oslo and Paris Commission and the Ministerial North Sea Conference.

3. To deploy minipods and undertake sediment sampling on dredged spoil disposal grounds off Harwich and the Tees to determine the behaviour of sediments after disposal (AE0227). This will provide information to aid licensing decisions under FEPA II both for offshore disposals of dredged material and for the beneficial uses of such material in the near shore zone.

4. To deploy and recover a NAS2 (automatic monitoring nitrate analyser) and other instruments for the Joint Nutrient Study (JoNuS - AE0504, Smart Biophysical Moorings) and for National Monitoring Programme (AE0503). Successful trials should lead to improved temporal monitoring and a reduction in the costs of future monitoring.

5. To undertake a preliminary sediment coring survey near major estuaries in preparation for JoNuS 2 (AE0529(P)). This will guide the detailed selection of sites for the main programme commencing in April 1996 and ensure the successful and timely delivery of the scientific programme. The JoNuS 2 programme will help to establish the impact of nutrients discharged from land on coastal and offshore waters in support of UK policy development and in support of contributions to such fora as the Oslo and Paris Convention and the Ministerial North Sea Conference.

NARRATIVE

RV Cirolana sailed from Lowestoft at 2003 on 4 January and proceeded via the English Channel to the Irish Sea, arriving off Anglesey on 7 January. The day was spent sheltering in anticipation of the severe gales forecast. As these did not arrive, RV Cirolana proceeded to the working area off Sellafield for first light on 8 January. Two minipods and 1 guard buoy were successfully recovered in winds of force 7. The missing guard buoy was reported washed ashore in Luce Bay the following day.

On 9 January, current meter moorings Q, R, S, T and U were recovered together with the minipods near moorings R and U. Mooring V had been reported missing in December.

On 10 January, the Tetrapod, Quadrapod and two guard buoys were recovered. The third guard buoy, which had been seen on 8 January, was missing. A side scan sonar survey was made of the line taken by a trawler in December past the Tetrapod and a minipod. This was part of the experiment to compare the effects of storms and trawling on resuspension of mud. A further search was then made, without success, for the missing current meter mooring V using a 300 kHz mini sector scanner.

RV Cirolana docked in Barrow in Furness on 11 January to change scientific staff and to unload some of the recovered equipment. After leaving port, the National Monitoring Programme (NMP) stations were commenced with a CTD dip off Morecambe Bay (NMP 795) and then a 7 hour CTD anchor station in the Lune Deep (NMP 785). This was followed by another 7 hour CTD anchor station in Burbo Bight (NMP 705) and a CTD station also in Liverpool Bay. Cores were collected at each of these positions using a NIOZ corer as part of the pre-JoNuS 2 survey.

The NMP survey continued with CTDs and anchor stations in the eastern Irish Sea, Cardigan Bay and the Bristol Channel. A NIOZ core was collected from Cardigan Bay. The winds dropped sufficiently for the 'open sea' station at 48° 30'N 8°W where a full depth CTD station was worked on 15 January. The programme continued with CTD and anchor station of Plymouth and a CTD mid Channel on 16 January, an anchor station near Selsey Bill and CTD at South Varne on 17 January and an anchor station in the Thames on 18 January.

Two scientists were picked up by SeaRider from Gt. Yarmouth before RV Cirolana proceeded north working CTD stations at 3 off shore NMP sites. A 7 hour CTD station was started at the Tyne but increasing winds meant that it was only possible to take surface water samples for the latter part of this time and at the Tees and Humber anchor station positions. A crew member was put ashore by pilot boat on the Humber before RV Cirolana proceeded south to a CTD station at the Outer Dowsing followed by one in the inner Wash and an anchor station in the outer Wash on 21 January. RV Cirolana steamed overnight to the Outer Gabbard NMP station where a single CTD station was worked, thus completing the NMP nutrients survey.

A mooring, consisting of a NAS2 in situ nitrate analyser, fluorimeter, current meter and a number of acoustic and data logging tags, was prepared and launched on 22 January. As the swell was too large to safely deploy the CTD and rosette, hourly stations were worked with a single Niskin bottle on the hydrowire for the next 24 hours. By this method, water samples were collected from the depth of the NAS2 analyser for chlorophyll and nutrient determination at the scheduled sampling time of the instrument. Before leaving the mooring on 23 January, the acoustic release was interrogated and an attempt made to locate the 300 kHz transponding tag using the mini sector scanner.

On 24 January, a Day grab survey of the Roughs Tower spoil disposal site was undertaken prior to RV Cirolana returning to Lowestoft on the midnight tide of 24/25 January. Three minipods recovered from the Irish Sea on the first part of the cruise were put on board, and there was a scientific staff change.

RV Cirolana was delayed from sailing until 1400 on 27 January because of strong easterly winds. She went south to the Roughs Tower spoil disposal site off Harwich where a side scan sonar grid was worked on arrival. On 27 January, two minipods were launched, each with 2 guard buoys, one to the south and one to the north of the disposal area. With winds increasing to gale force, attempts to collect cores with the NIOZ corer and to do further side scan survey work were abandoned.

Overnight, RV Cirolana sailed to the NAS2 mooring location at the Outer Gabbard. On arrival, water samples were collected hourly from the depth of the NAS2 nitrate analyser using a Niskin bottle on the hydrowire. An attempt was also made to locate the 34 kHz tag on the mooring using the ship's SM600 sonar. The mooring was then recovered and RV Cirolana set course for the Tees.

On arrival on 30 January, 4 cores were collected using the NIOZ corer. These were sub-sampled for flume tests at HR Wallingford. The minipod and two guard buoys were launched as close to position as practical, given the large number of ships anchored in the area. A side scan sonar survey was commenced but then abandoned because of a poor quality signal. With insufficient time to investigate the problem further, RV Cirolana set course for Lowestoft. She docked on the morning tide of 31 January.

RESULTS

1. The cruise track is shown in three parts (Figure 1): (a) recovery of moorings after transit from Lowestoft (4-11 January); (b) the NMP survey (11-24 January) and (c) the deployments off Harwich and the Tees (27-31 January).

2. All of the 8 current meters recovered from 5 moorings (Q, R, S, T and U - Figure 1a) had functioned correctly. Moorings R, S and U each had 2 current meters and moorings Q and T each had one meter. Mooring R had been in position since 9 November 1995 and each current meter had 61 meter-days of data. Moorings Q, S, T and U had been serviced during December. Moorings S and U had meters each with 31 meter-days of data and moorings Q and T meters each with 33 meter-days of data. The residual flow for the common period of all the current meters 4 m above the seabed was towards the south east (Figure 2), although there was a flow reversal at some just prior to recovery.

3. At each of the NMP stations, samples were filtered for suspended load determination and for nutrient analysis. All the analyses for total oxidised nitrogen, nitrite, orthophosphate, ammonia and silicate were completed on board, as were most of the salinity determinations. Examples of the results for the surface concentration of total oxidised nitrogen in $\mu mol\ l^{-1}$ rounded to the nearest integer are presented in Figure 3. Where several samples were taken at the same location (e.g., an anchor station) the mean surface value is given. Whereas most concentrations are within about 10% of those in January 1995 (some higher some lower).

4. Cores were collected from Liverpool Bay, Cardigan Bay, Selsey Bill and the Thames in preparation for JoNuS 2. These were subsampled and returned to Lowestoft for further analysis.

5. The Tetrapod was deployed on Corystes 11b/95 with 4 BASS (Benthic Acoustic and Stress Sensor) and a 3 frequency ABS (Acoustic Backscatter Sensor) in addition to normal suite of sensors. As there had been no 'storms', the ABS logger was full but this was with data from the end of the deployment.

6. The Quadrapod worked successfully, firing all its syringes in response to some storm activity.

7. All four minipods were recovered successfully, the westerly one (M3 in Figure 1a) having fired one syringe. The pressure record from this minipod showed a typical spring-neaps cycle (Figure 4a), as did the MOBS (Miniature Optical Backscatter Sensor) (see Figure 4b - arbitrary units - uncalibrated). The gap in the middle of this record occurred when the minipod was serviced in December. The storm event on 6 December 1995 (Figure 4b) gave significantly higher suspended load. Minipods from the northern and southern lines (Figure 1a) logged a total of 386 and 351 hourly bursts of data before their loggers 'froze'. The minipod nearest the coast (M1 in Figure 1b) only recorded 5 bursts.

8. A sidescan sonar survey was undertaken of the line which was trawled in December with the Tetrapod and minipods adjacent to it. These images, which showed signs of trawling activity, will be compared with the images collected both pre- and post-trawling in December.

9. A sidescan survey of the Roughs Tower spoil disposal ground was worked. This indicated sites of possible disposals. The Day grab survey had revealed that most of the area was sand and gravel. However, in areas of disposals there was clay and black muddy sand.

10. The mooring with the NAS2 nutrient analyser, fluorimeter and current meter and a number of data storage tags for fish was recovered successfully. The fluorimeter and current meter had worked well but battery problems meant that the NAS2 collected few samples. The total oxidised nitrogen measurements made adjacent to the mooring for a 24 hour period after deployment showed a mean concentration of 8.3 μmol l^{-1} with a tidal variation of $\pm$0.2 μmol l^{-1}. Three samples taken at hourly intervals immediately prior to recovery showed a mean concentration of 8.5 μmol l^{-1}.

11. Cores taken on the Tees spoil disposal ground showed mixtures of sand, mud and coal dust. The muddy sediments tended to be deeper in the cores.

P A Gurbutt
(Scientist-in-charge)
09 April 1996

SEEN IN DRAFT Capt. D R McDarren (Master)

Mr M G C Reynolds (Fishing Skipper)

INITIALLED JEP

DISTRIBUTION

Basic List +

P Gurbutt	D Mills	
D Kirkwood	S Jones	
N Pearson	L Poole	
K Medler	J Taylor	
J Read	P Murray	(U Cambridge)
J Aldridge	R Wilton	(UCNW)
J Rees	C Fletcher	(HR Wallingford)
A Emery	N Feates	(HR Wallingford)

Figure 1(a)

CIROLANA 1/96 - MOORING POSITIONS

SHOWING :
STATION POSITION
COASTLINE

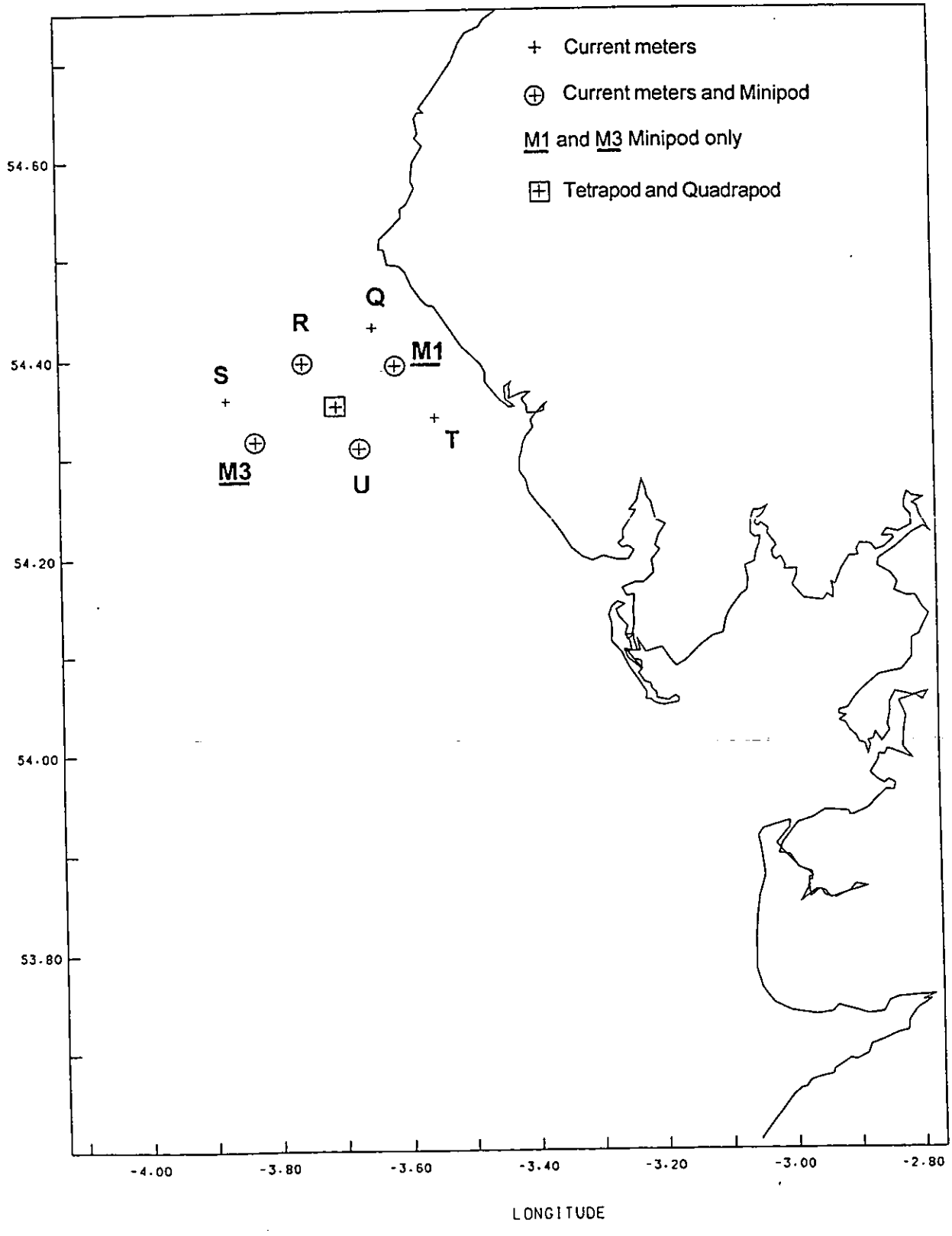


Figure 1(b)

CIROLANA 1/96 WATER SAMPLE STATIONS. CTD AND SURFACE

MULTIPLE PLOT : ⊙ CTD Stations

\+ Surface samples

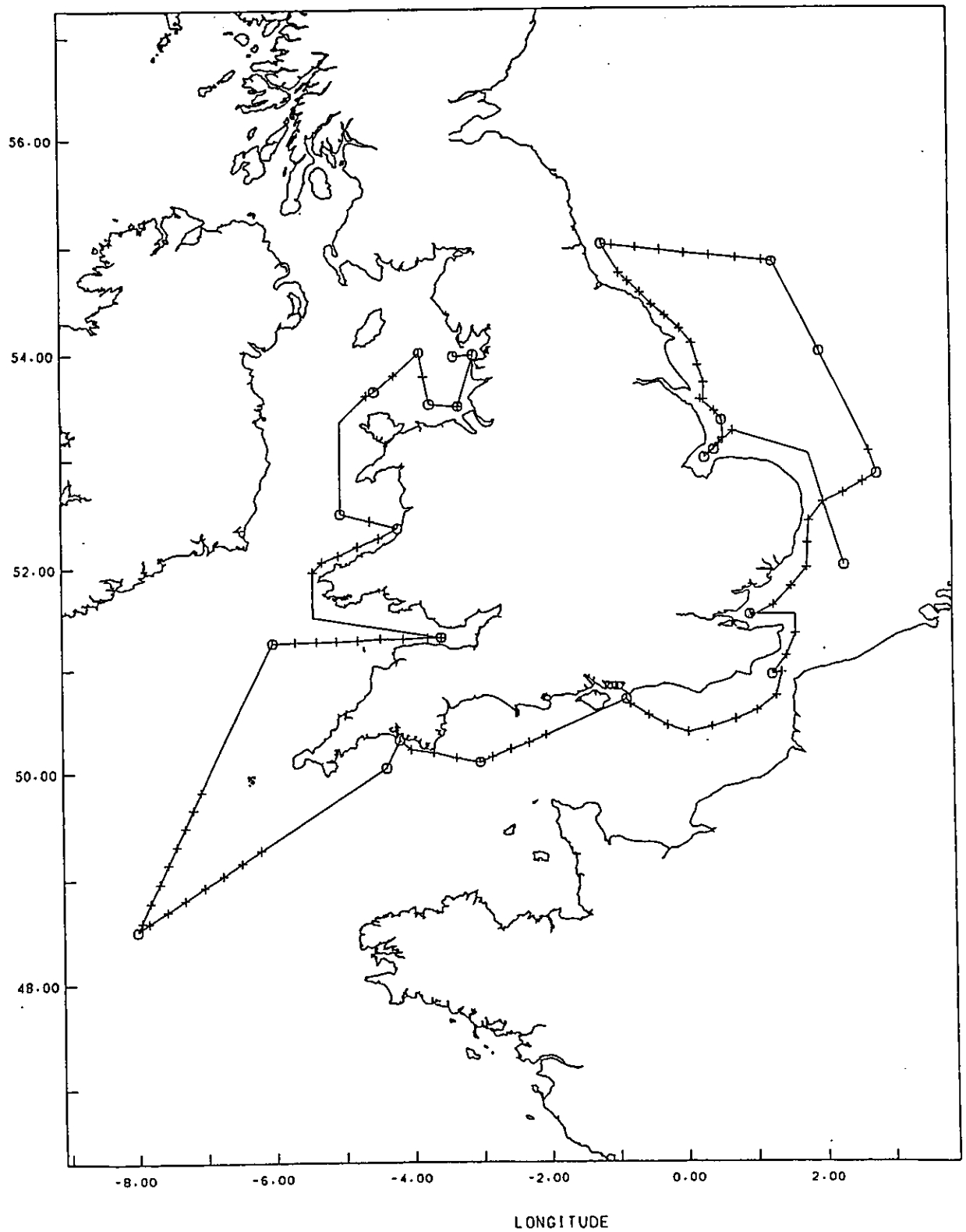
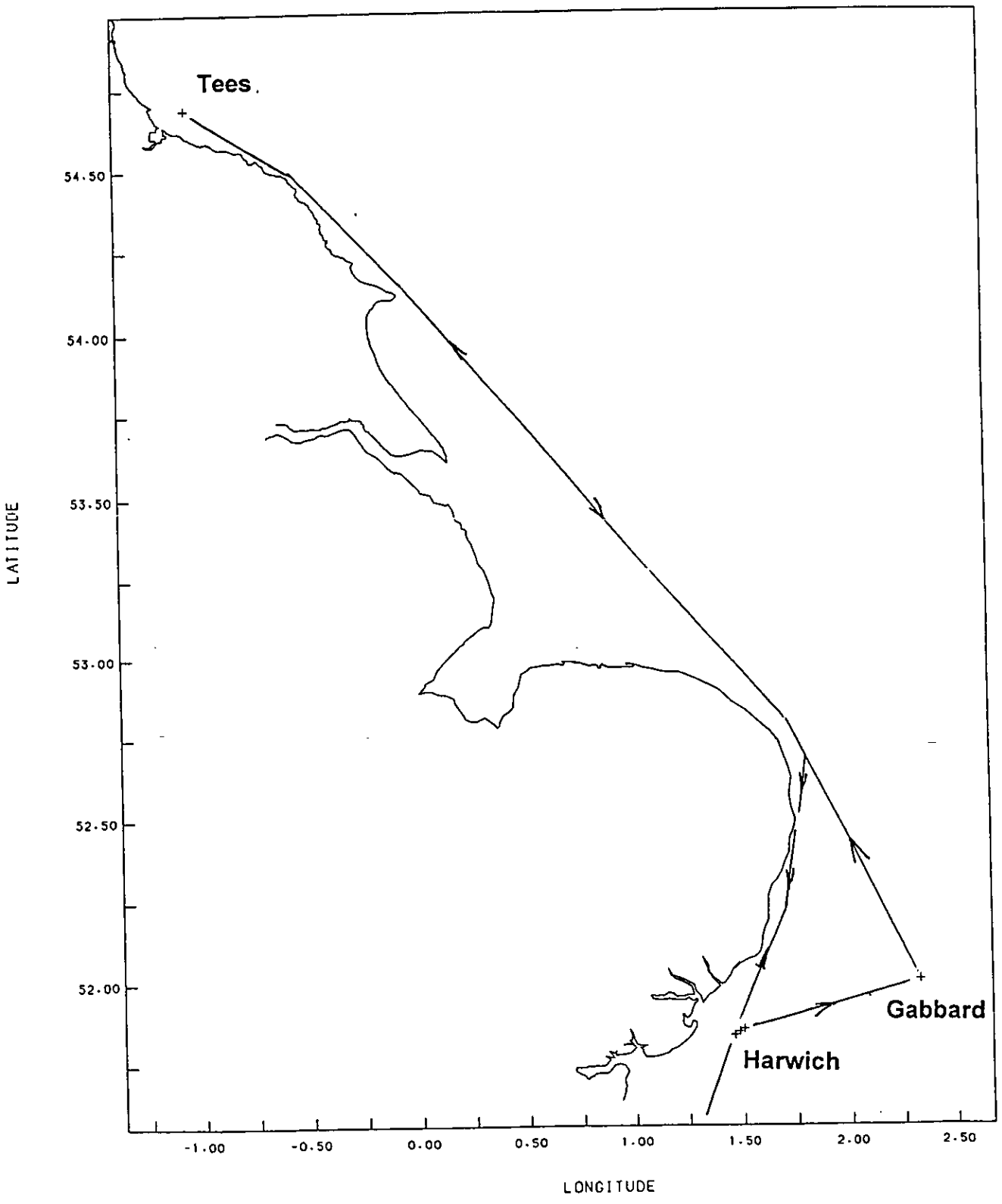
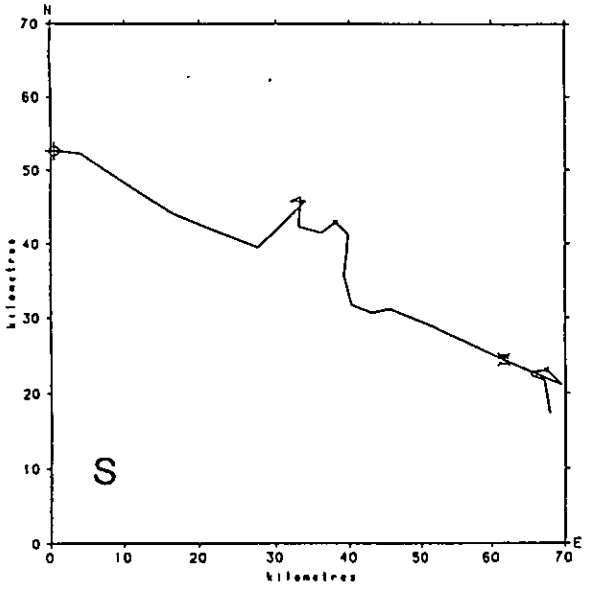


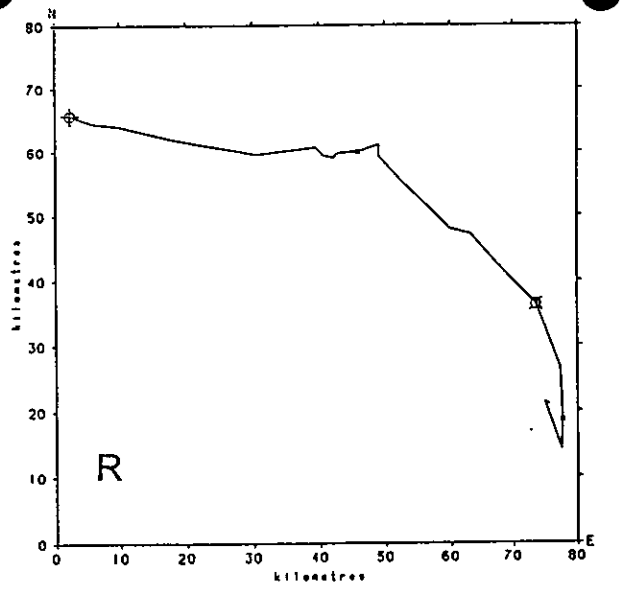
Figure 1(c)

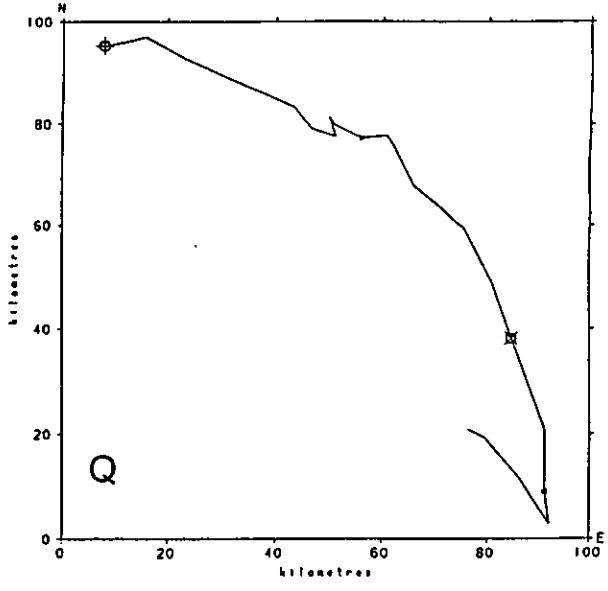
CIROLANA 1/96 - HARWICH, GABBARD and TEES

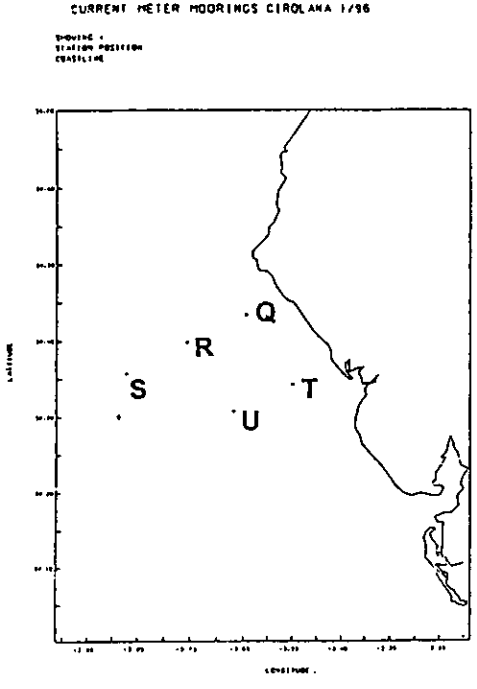
SHOWING :
STATION POSITION
COASTLINE

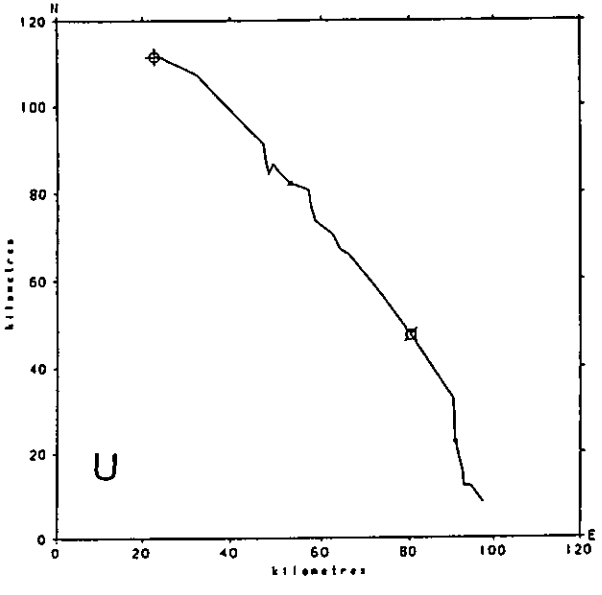












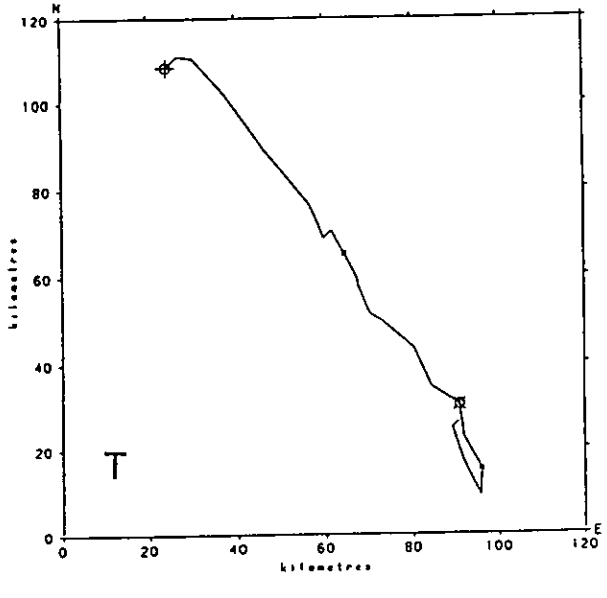


Figure 2

Daily residual currents 13 Dec. 1995 - 5 Jan. 1996 all meters 4m above seabed ⊕ = start.

Figure 3(a)

CIROLANA 1/96 IRISH SEA STATIONS

SHOWING :
STATION POSITION
DATA VALUES REPRESENTING : Surface TOxN (µmol l^{-1})
COASTLINE

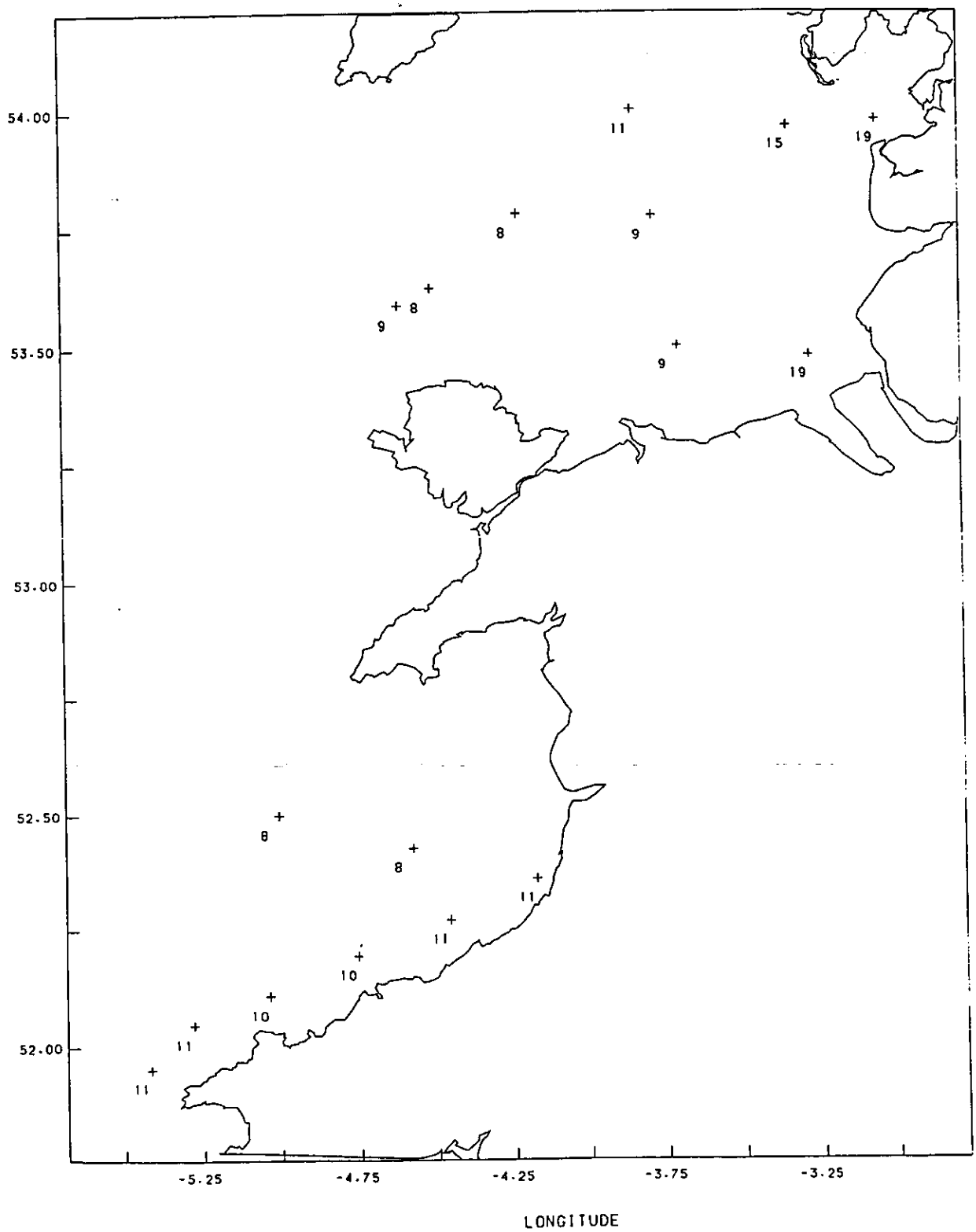


Figure 3(b)

CIROLANA 1/96 CELTIC SEA AND WESTERN ENGLISH CHANNEL

SHOWING :
STATION POSITION
DATA VALUES REPRESENTING : Surface TOxN (µmol l^{-1})
COASTLINE

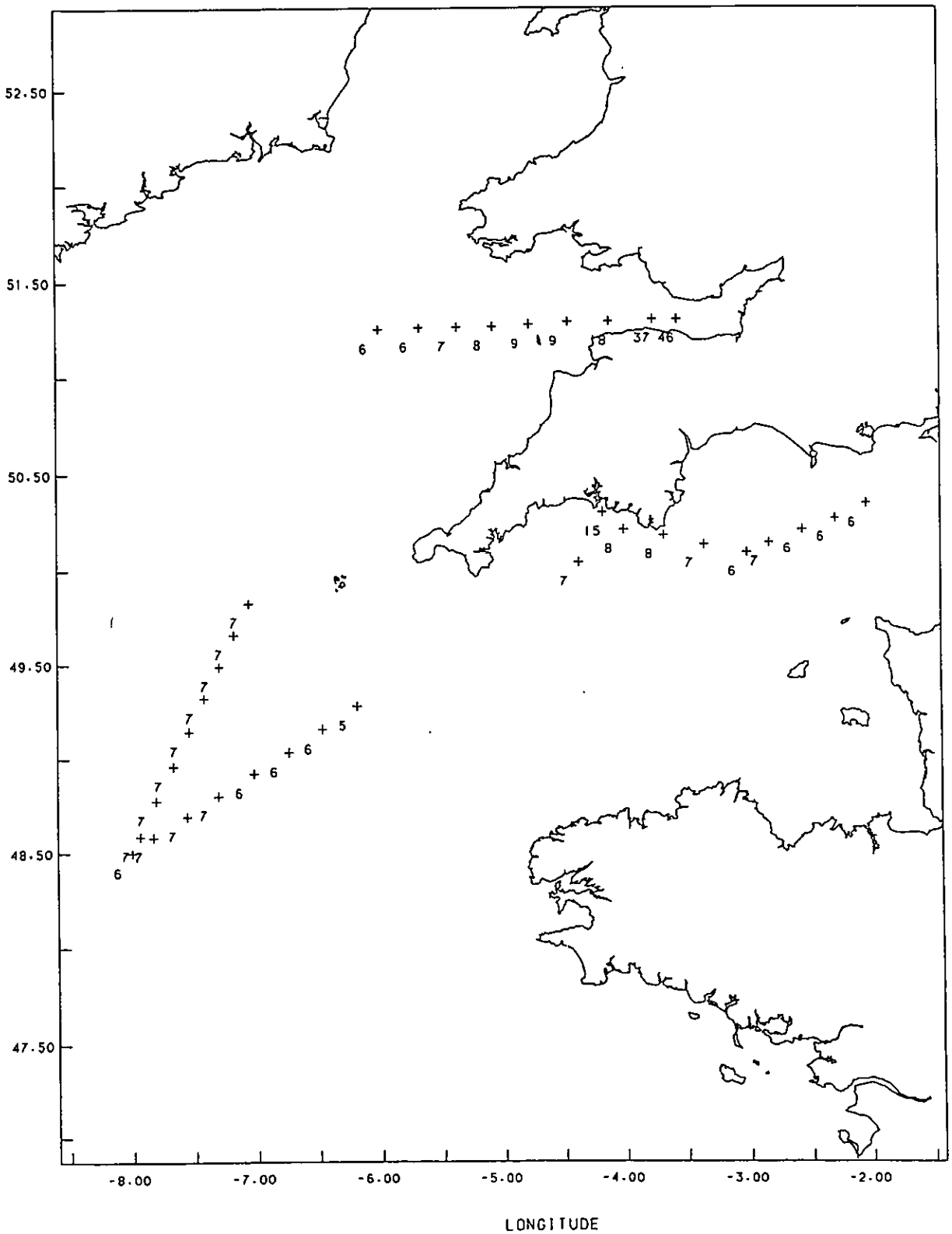


Figure 3(c)

CIROLANA 1/96 EASTERN ENGLISH CHANNEL AND NORTH SEA

SHOWING :
STATION POSITION
DATA VALUES REPRESENTING : Surface TOxN (µmol l^{-1})
COASTLINE

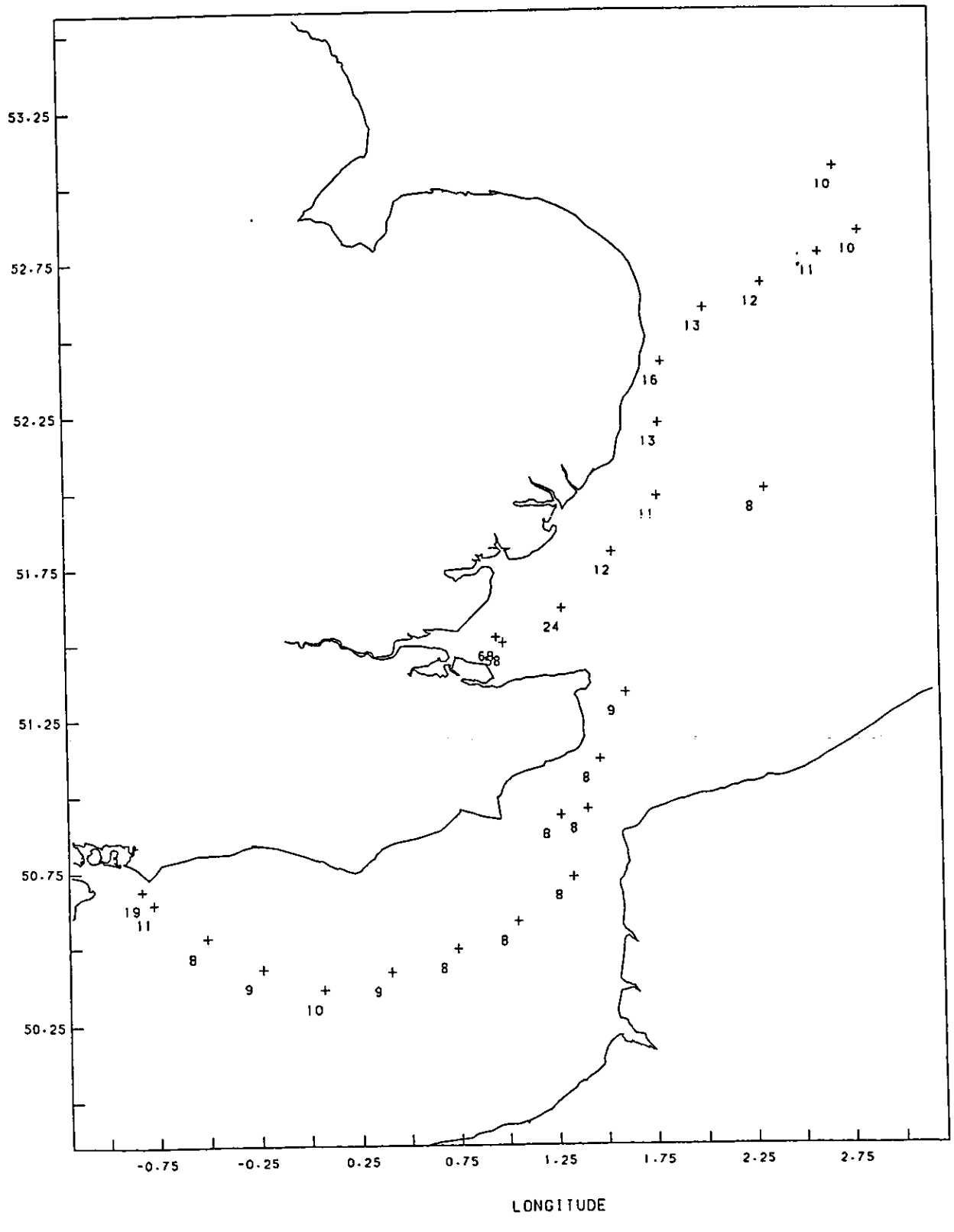
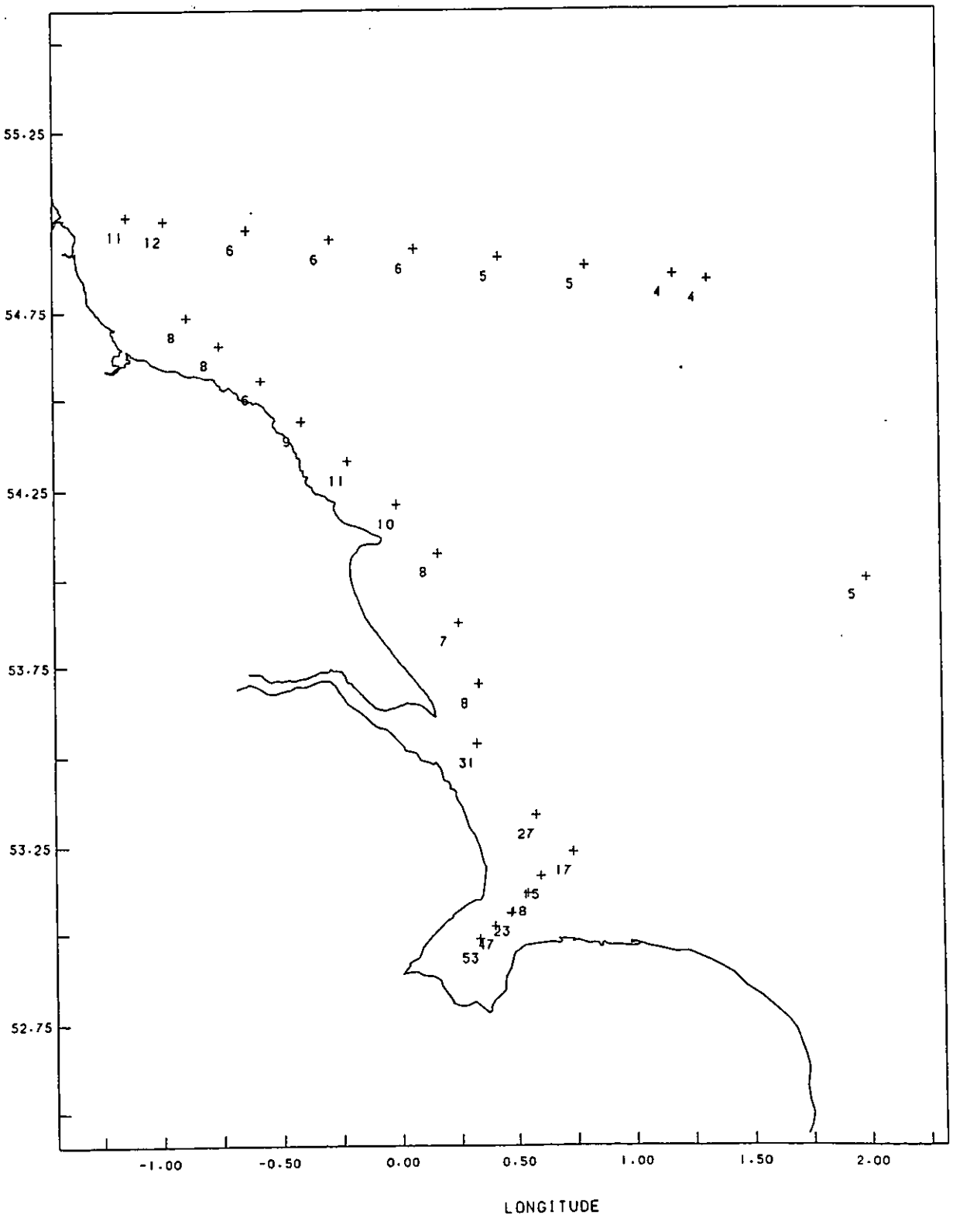


Figure 3(d)

CIROLANA 1/96 NORTH EAST COAST STATIONS

SHOWING :
STATION POSITION
DATA VALUES REPRESENTING : Surface TOxN (µmol l^{-1})
COASTLINE



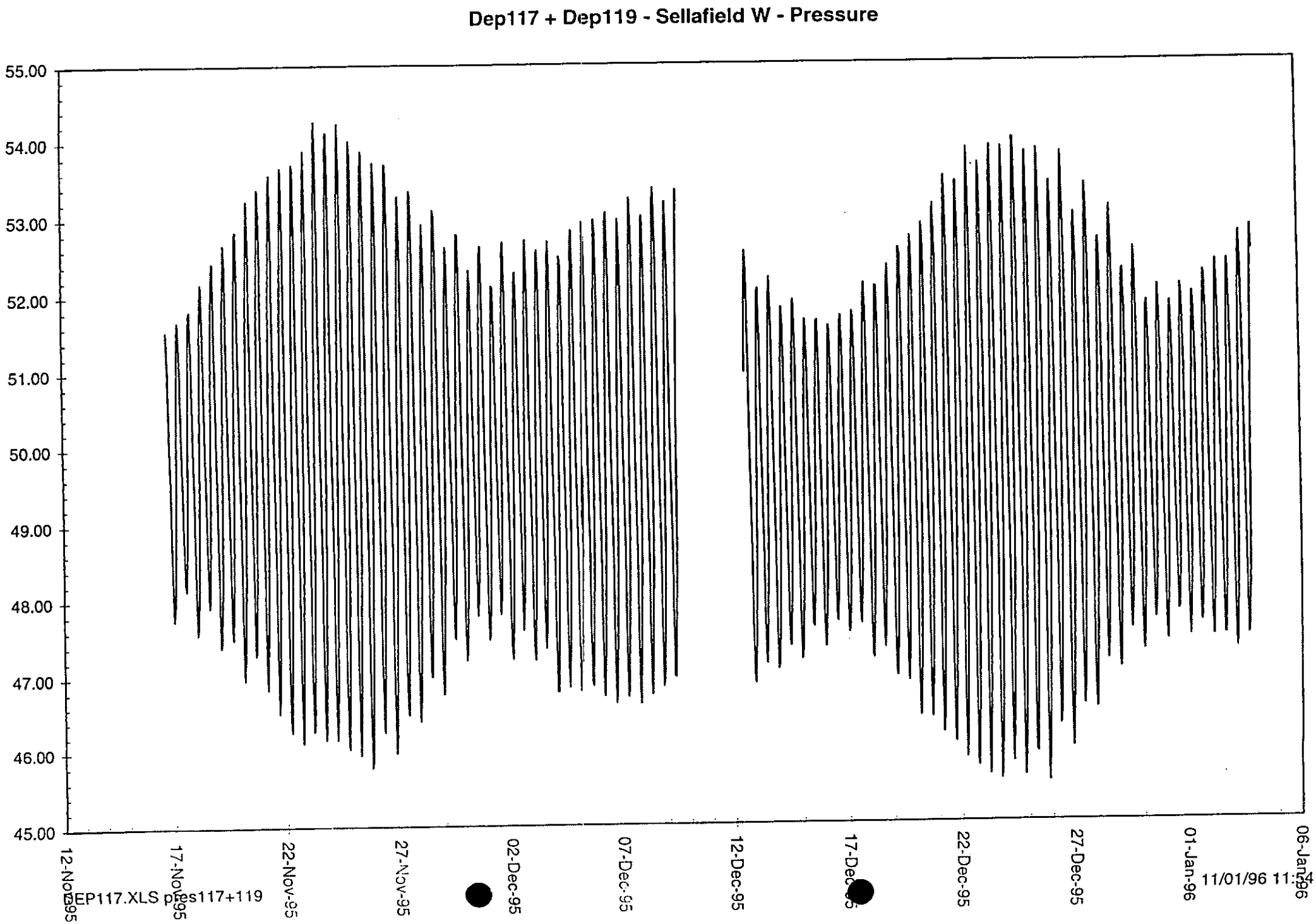

Dep117 + Dep119 - Sellafield W - Pressure
55.00
54.00
53.00
52.00
51.00
50.00
49.00
48.00
47.00
46.00
45.00
12-Nov-95
17-Nov-95
22-Nov-95
27-Nov-95
02-Dec-95
07-Dec-95
12-Dec-95
17-Dec-95
22-Dec-95
27-Dec-95
01-Jan-96
06-Jan-96
DEP117.XLS pres117+119
11/01/96 11:4

Figure 4(a)

Dep117 + Dep119 - Sellafield W - MOBS

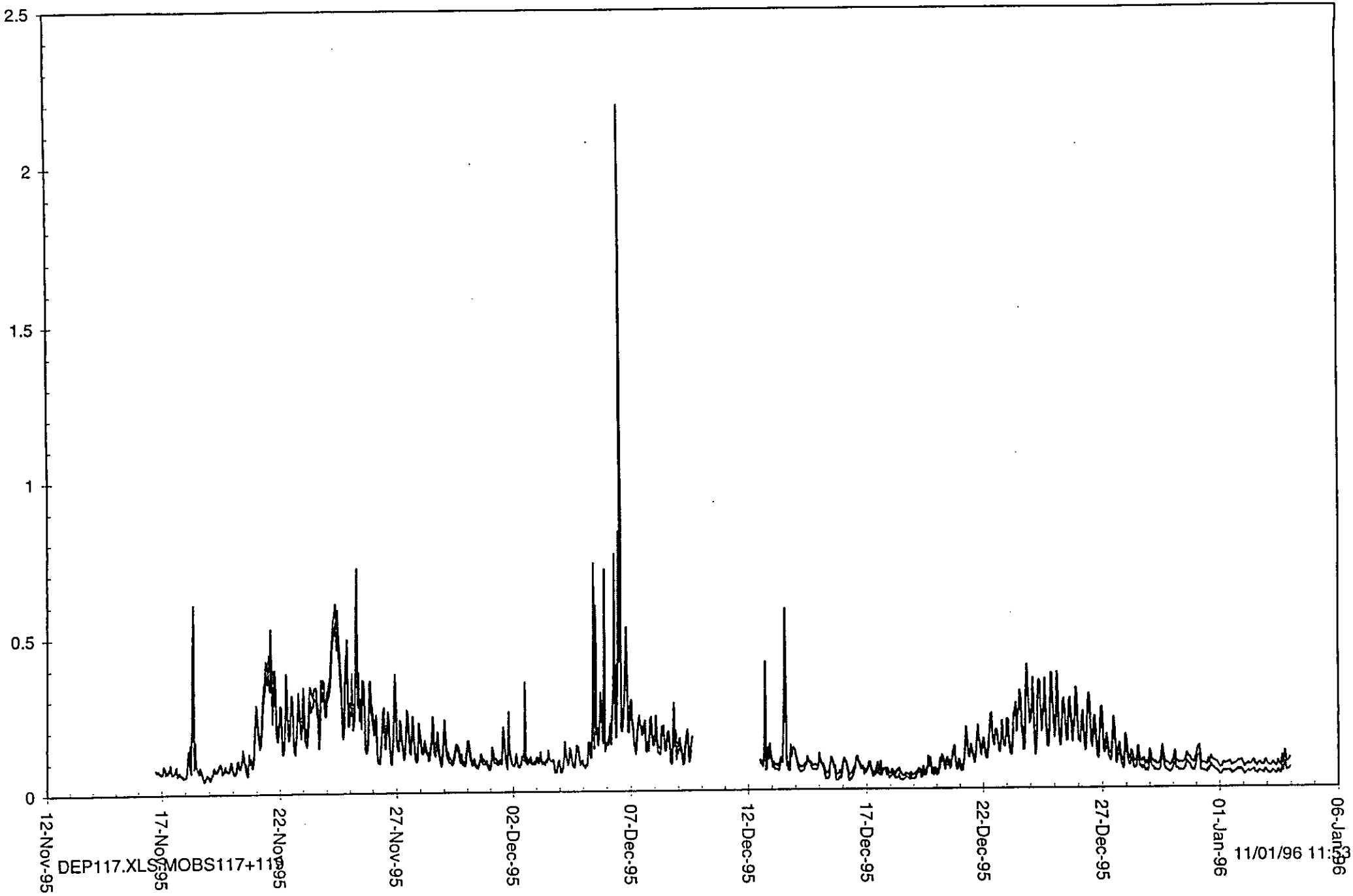


Figure 4(b)