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BIOLOGICAL OCEANOGRAPHY CRUISE REPORT

LF 16/96

15 April 1996

PERSONNEL

B Stewart (SIC), SSO, DANI.  
 P Elliott SO, DANI.  
 S Bloomfield ASO, DANI  
 Jian Xiong Student, State Oceanic Administration, China  
 J Bacheller Res. Assist. QUB  
 J Guillot Res. Assist. QUB

OBJECTIVES

- i. To assess temperature, salinity and nutrient distributions over a grid of stations in the north western Irish Sea.
- ii. To recover, service and redploy moorings and instrumentation located at station 45 on the sampling grid.
- iii. To assess nutrient release from sediment at stations 45 and 47.

CRUISE NARRATIVE

Sunday 14 April 1996

In preparation for the cruise, all DANI scientific crew were onboard by 2000 hrs when equipment and instrumentation was tested and confirmed to be functioning properly. Following a talk on ship safety and a demonstration of life saving equipment, the RV Lough Foyle departed Belfast at 2130 hrs and sailed overnight in a strong south easterly wind to station 38 (see attached sampling grid).

Monday 15 April 1996

The ship arrived on station 38 at 0630 hrs. The weather was wet and cold with a strong south easterly wind. Work commenced at 0700 hrs with the deployment of the rosette water sampler, CTD and sediment corer. Station 38 was completed at 0830 hrs and the vessel sailed to arrive on mooring station 45 at 0930 hrs. In a strong force 5-6 wind, the mooring with water samplers attached (buoy id. No. 1) was successfully recovered to the ship deck, on the second attempt, at 1120 hrs. Following deployment of the rosette water sampler and sediment corer, the wind increased and the vessel sailed to anchor, close to the Irish coast at 1630 hrs. In the relatively calmer sea, the water samplers were serviced and mooring components inspected for corrosion. Gale force winds prevented redeployment of the mooring and work for the day finished at 2100 hrs.

*4-connection. It indicates that powder in 1996 commenced off shore at sta 38 decreases in contrast to onshore from observations in earlier years. This is most likely to be related to the availability of light. Sta 33 although deep (c.100) also is stratified due to a wedge of de saline water. Shallowes near shore may be very likely to have had considerable resuspension of sediment due to periodic E to NE wind fields. Such episodic effects of wind fields may have profound importance as well as consequences for nutrient models. Don Murray 7.5.96*

Tuesday 16 April 1996

As strong winds and heavy seas, again prevented redeployment of the mooring at station 45, sampling commenced on coastal station 48 at 0710 hrs and continued along a coastal grid of stations 59, 47, and 36. At this point the wind began to ease and the vessel sailed to station 45, where the mooring was successfully deployed at 1730 hrs on position  $53^{\circ} 43' .07N$   $05^{\circ} 32' .19W$ .

DANI mooring (buoy id. No 2), recovered and serviced by MAFF personnel from the RV Cirolana on 15 April 1996, was redeployed on position  $53^{\circ} 43' .44N$   $05^{\circ} 31' .87W$ . Work continued with the sampling schedule from station 45 at 1800 hrs and continued in a southerly direction to stations 50 and 57, finishing for the day on station 62 at 2130 hrs. Over night the vessel sailed slowly northwards, in calm seas, towards station 33.

Wednesday 17 April 1996

Work commenced on station 33 at 0700 hrs and continued in a northerly direction along a grid of stations 24, 26, 22, 21, 16, 15, 14 and 6 to finish on station 4 at 1720 hrs. The vessel sailed to dock in Belfast at 2015 hrs where scientific and mooring equipment was dismantled and prepared for unloading.

Thursday 18 April 1996

Unloading of scientific and mooring equipment commenced at 0830 hrs and was completed at 1030 hrs. The scientific crew disembarked at 1100hrs.

#### **PARAMETERS MONITORED**

The CTD/rosette water sampler was deployed at all stations on the sampling grid to acquire nutrient, chlorophyll *a*, temperature and salinity data from the depth profile. Samples were taken every 10 metres over the depth profile at stations 38, 45 and 50. Daylight permitting, Secchi disc readings were also taken at each station. For the nutrient release study, three sediment cores with overlying seawater were successfully taken at station 38 and incubated onboard ship at seawater temperature. Additional cores were taken at 38 and also at 47 and subsampled for C/N analysis. At station 38, 45 and 50, samples were taken every 10 metres for the determination of oxygen by the Winkler method.

#### **SUMMARY OF RESULTS**

From the acquired nutrient and CTD profile data, saline stratification, occurring at depth 30 metres, was again observed at open sea stations 38, 45 and 50. Typical salinity above and below the halocline was 34.35 and 34.77 ppt respectively, whereas temperature remained constant at typically  $7.7^{\circ}C$  throughout the profile. In the surface layer inorganic nitrogen levels were depleted to  $1-3 \mu\text{mol N l}^{-1}$ , while increased levels of chlorophyll *a*,  $7-8 \mu\text{g l}^{-1}$  were recorded. Despite the absence of thermal stratification, the saline stratification which has persisted

throughout the winter period, has provided stability in the surface layer for the algal spring bloom to occur.

Otherwise, the remaining stations on the sampling grid were generally mixed and exhibited similar nutrient, chlorophyll a and salinity values to those reported from the February cruise. (See attached nutrient profile data).

#### Moored McLane water sampler

On recovery, both the "nutrient" water sampler and "biological" water sampler were found to have successfully taken 41 samples, as programmed, during the 6 week period of deployment. Both water samplers were reprogrammed to sample daily at slack tide, which ensured as much as possible, that all samples were taken at the same depth. The samplers were redeployed at 1730 hrs on 16 April 1996. Results from samples analysed for inorganic nitrogen and orthophosphate, confirm the start of the spring algal bloom on 6 April 1996 (as indicated by the uptake of inorganic nitrogen), 5 days earlier than recorded last year. Results are shown in Figure 1.

#### Nutrient release from sediment cores

Mr Xiong has concluded his study on nutrient release from Irish Sea sediment cores and is currently preparing the data for a report. Preliminary results showed only limited nutrient release occurring from the sediment.

#### **ACKNOWLEDGEMENTS**

I am grateful to Mr Xiong, Mr Bacheller and Ms Guillot for their help during this cruise.

The ship's master, officers, engineers, catering staff and crew are also thanked for their cooperation during this cruise.

Finally, I wish to acknowledge the excellent liaison between the scientists and crew of the Lough Foyle, which contributed to the successful recovery and deployment of the mooring in unfavourable weather conditions.



**B M STEWART**

30 April 1996

BIOLOGICAL OCEANOGRAPHY CRUISE LF 16/96

15 - 19 April 1996

PROPOSED WORK SCHEDULE

STATION	Lat.	Long.	Activity
36	53 51	06 11	CTD, Secchi
47	53 43	06 09	CTD, Secchi, corer + sediment C/N & Chl <u>a</u> .
48	53 37	06 03	CTD, Secchi.
59	53 28	06 03	CTD, Secchi
62	53 21	05 30	CTD, Secchi
57	53 28	05 28	CTD, Secchi
45	53 43	05 32	CTD, Secchi, corer + sediment C/N & Chl <u>a</u> , & mooring service (C/N & Oxygen @ 10 m intervals)
50	53 37	05 28	CTD, Secchi (C/N & Oxygen @ 10 m intervals)
38	53 51	05 34	CTD, Secchi & corer (C/N & Oxygen @ 10 m intervals)
4	54 41	05 20	CTD, Secchi
6	54 36	05 10	CTD, Secchi
16	54 21	05 10	CTD, Secchi
21	54 13	05 16	CTD, Secchi.
26	54 06	05 21	CTD, Secchi
33	53 58	05 50	CTD, Secchi
24	54 06	05 52	CTD, Secchi
22	54 13	05 31	CTD, Secchi
15	54 21	05 25	CTD, Secchi
14	54 28	05 23	CTD, Secchi

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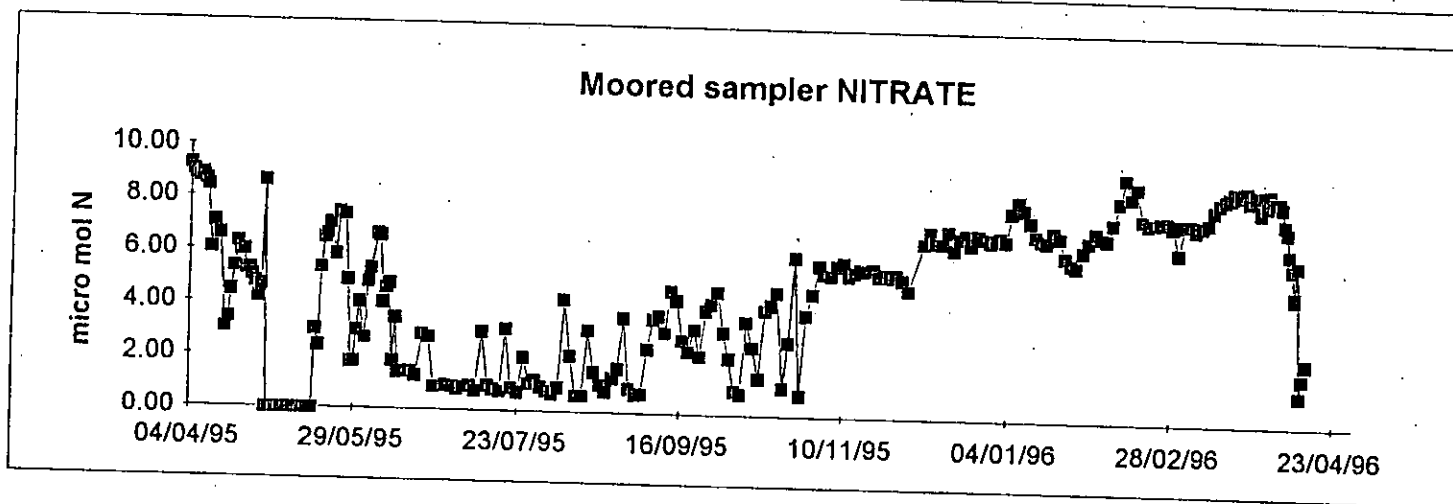
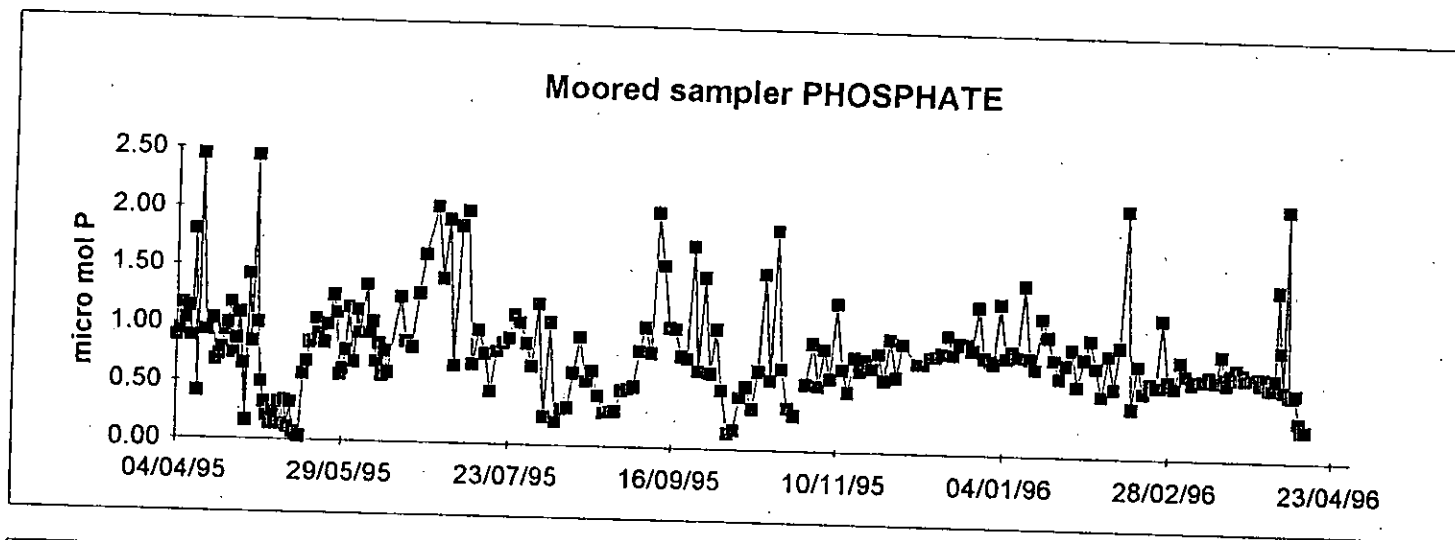


Figure 1

DEGREES NORTH

54.5

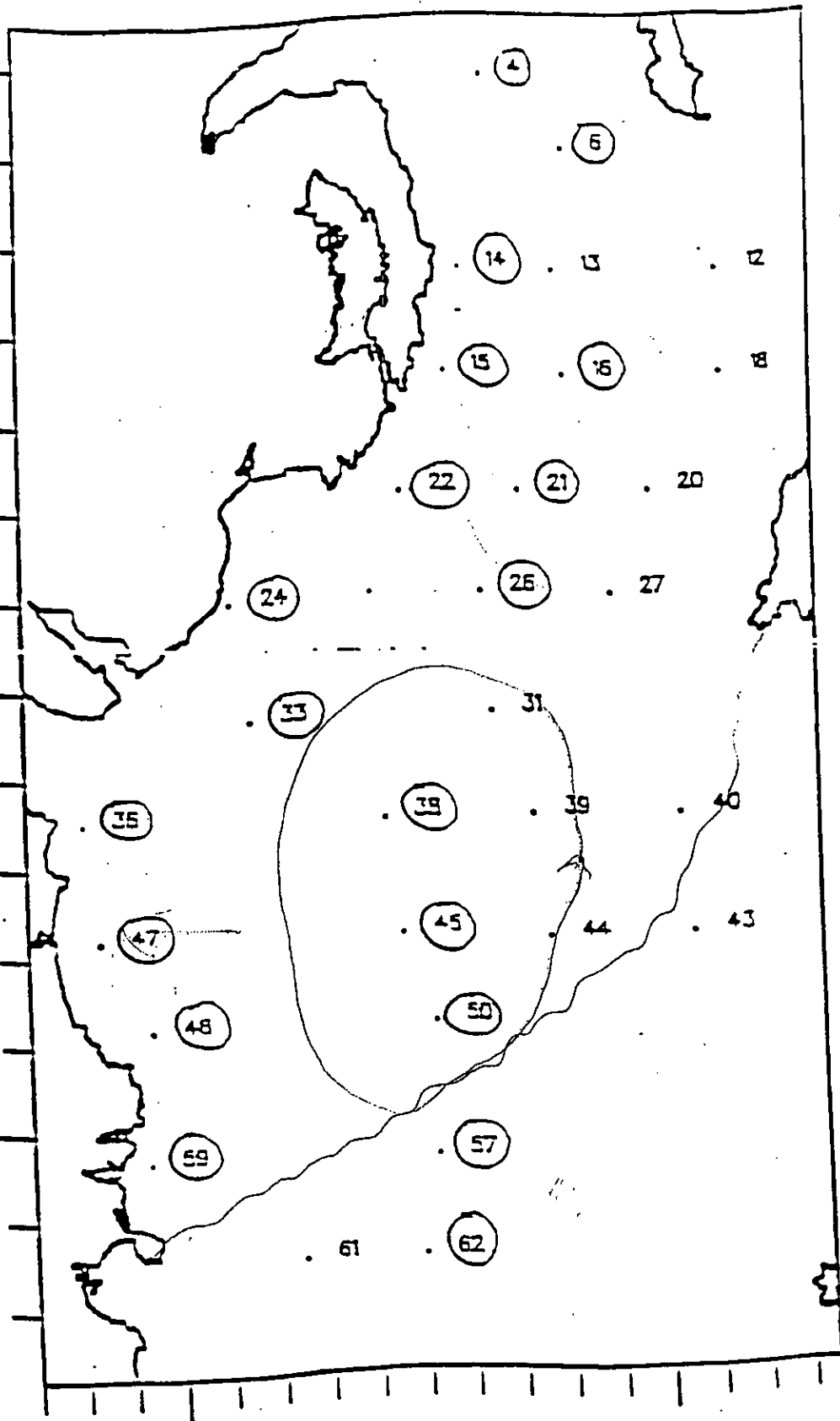
54.0

53.5

-6

-5

DEGREES WEST



SAMPLING SCHEDULE

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## IRISI SEA OCEANOGRAPHY 1996

## DEPTH PROFILE DATA ( 15 - 17 APRIL 1996 )

	DEPTH M	AMMONIA um N/l	PHOSPHATE um P/l	NITRATE um N/l	SILICA um SiO <sub>2</sub> /l	NITRITE um N/l
STATION 38 15/4/96	2.4	1.0237	0.2593	1.2411	1.1850	0.0654
	11.9	0.9475	0.2758	1.2673	1.0228	0.0836
	21.9	0.8745	0.1881	1.2461	1.1221	0.0523
	30.8	0.9829	0.1936	1.3198	1.2465	0.0608
	39.0	0.9558	0.7133	8.3013	6.6411	0.2606
	50.8	1.1169	0.7876	8.8968	7.3185	0.1359
	71.9	0.9804	0.7650	8.8957	6.9515	0.1443
	80.8	1.2769	0.7975	8.8878	6.6213	0.1854
	104.0	1.1115	0.7786	8.9816	6.5476	0.1356
STATION 45 15/4/96	1.8	0.8750	0.3585	3.3682	1.5336	0.1520
	11.8	0.7731	0.4247	3.4690	1.5666	0.1525
	22.5	0.9834	0.4302	4.3559	1.7969	0.1795
	32.5	1.1637	0.6923	8.6857	5.5665	0.1376
	42.0	1.1171	0.7408	9.0912	5.7736	0.1187
	51.5	1.1308	0.7498	9.1714	5.7693	0.1527
	61.5	1.1610	0.8281	9.4007	5.9185	0.1206
	71.7	1.0762	0.7312	8.9387	5.9283	0.0850
	79.6	1.1446	0.7248	8.9986	5.8027	0.1137
	90.7	1.0762	0.8630	9.0517	5.8980	0.1107
	105.1	1.0327	0.7909	9.0912	6.0961	0.1306
	STATION 50 15/4/96	2.4	1.4047	0.4884	5.0654	1.7582
11.7		0.8598	0.4843	4.9424	1.7835	0.1968
21.9		1.4381	0.4904	4.9685	1.8477	0.1982
31.9		1.1749	0.4769	4.8727	2.9620	0.1705
41.6		1.0983	0.7372	9.0517	5.3100	0.1296
50.9		1.1475	0.7403	9.1522	5.5286	0.1398
62.2		1.2879	0.7521	9.1511	5.7079	0.1465
70.8		1.1339	0.7465	9.0958	5.6967	0.1329
80.3		1.1230	0.7111	9.1082	5.4500	0.1316
89.4		1.3433	0.7665	9.0665	5.4813	0.1550
92.9		1.1094	0.7711	9.0857	5.4283	0.1502
STATION 57 16/4/96	2.9	1.0260	0.6545	9.8684	5.4317	0.3720
	6.0	0.9271	0.5711	7.7666	5.0598	0.2422
	10.8	0.9931	0.7185	9.6905	5.7800	0.1855
	32.7	0.8472	0.6563	9.4578	6.1271	0.2292
	54.5	1.1661	0.7478	9.4326	5.8158	0.1557
	88.7	0.9892	0.7378	9.3406	5.7453	0.1430

STATION 62 16/4/96	11.9	0.9986	0.6946	9.3589	5.6509	0.3506
	31.1	0.9373	0.6783	9.3806	5.9397	0.0816
	50.3	1.0934	0.7322	9.4022	6.2350	0.0945
	88.9	1.3538	0.7454	9.4772	5.9819	0.1364
STATION 59 16/4/96	3.2	1.6873	0.6793	7.6982	6.1019	0.1743
	7.5	2.6307	0.9350	13.4523	7.9349	0.2233
STATION 48 16/4/96	3.5	2.5299	0.9610	13.2595	7.1906	0.3533
	8.1	2.2306	0.9423	12.4945	6.7869	0.3749
	11.2	2.3891	0.8818	11.0795	5.5160	0.3455
	18.8	2.1157	0.9643	12.3274	6.5755	0.3222
STATION 47 16/4/96	4.3	2.2125	0.9719	13.0111	7.2766	0.2830
	9.1	2.1275	0.8147	8.6571	5.5998	0.3593
	16.1	2.2013	0.9124	12.2186	7.4167	0.2726
STATION 36 16/4/96	5.2	2.4270	0.9323	12.3675	7.3258	0.3546
	10.4	2.4342	0.9619	12.0826	7.3509	2.7416
	16.1	2.8973	1.0683	8.1757	7.1347	0.3512
STATION 33 17/4/96	4.3	1.7585	1.1290	0.8393	1.6013	0.0373
	6.9	1.0868	0.1080	0.7373	1.7088	0.0307
	23.1	1.3734	0.1947	1.8878	1.2797	0.0383
	42.2	1.1086	0.7804	7.8657	6.9376	0.2642
STATION 24 17/4/96	1.6	1.9900	0.3528	14.6449	4.8107	0.1115
	8.8	1.4259	0.4183	3.3476	2.3563	0.0768
	19.0	2.0761	0.6082	5.8880	4.5144	0.1205
STATION 26 17/4/96	4.5	0.9520	0.7042	8.2928	6.6833	0.1263
	12.3	1.1110	0.7058	8.3851	6.7175	0.1356
	34.3	1.2416	0.7546	8.5515	6.7243	0.1476
	62.0	0.9924	0.6740	8.3271	6.1119	0.1032
	106.0	1.1681	0.6841	8.1566	6.3728	0.1204
STATION 21 17/4/96	3.6	0.7802	0.7438	8.2520	6.0418	0.2534
	10.7	0.8975	0.7209	8.3647	6.0809	0.1650
	17.6	1.0698	0.7829	8.9703	6.2505	0.1972
	30.8	0.9647	0.7514	8.6171	5.9971	0.1828
	60.9	0.6960	0.7336	8.7365	6.0715	0.1851
	89.1	1.2743	0.8256	8.7344	6.2274	0.2005
STATION 22 17/4/96	3.3	1.1106	0.7583	8.3274	6.0405	0.1940
	10.6	1.2387	0.8294	8.4063	6.1081	0.1928
	21.1	1.3018	0.7923	8.3908	6.1085	0.2003
	37.3	1.0270	0.8239	8.4292	6.1089	0.2088
STATION 15 17/4/96	3.2	1.0204	0.7357	8.4504	6.0414	0.2064
	9.5	0.9504	0.7358	8.4010	6.1709	0.1928
	14.3	1.0395	0.7692	8.2231	5.6230	0.2065
	21.9	1.0287	0.7455	8.1805	5.4622	0.1622
	31.9	1.1047	0.7615	8.5976	6.4382	0.2076



STATION 16 17/4/96	2.0	0.9131	0.7422	8.9538	6.1798	0.1993
	11.0	1.0100	0.7236	8.9313	5.8824	0.2016
	19.8	0.9885	0.7533	9.0643	6.1070	0.1889
	50.0	1.1811	0.7549	9.0081	5.9530	0.1630
	87.1	1.0263	0.7543	8.8776	6.1465	0.1362
	142.5	1.1240	0.8127	8.7539	6.3157	0.1244
STATION 14 17/4/96	2.8	1.0337	0.7322	8.5062	6.0330	0.1964
	12.0	1.3680	0.7663	8.5176	6.0438	0.1960
	21.4	1.2521	0.7983	8.4546	6.1208	0.2106
	40.7	0.9475	0.7529	8.4119	6.1665	0.2094
STATION 6 17/4/96	3.9	1.1943	0.7128	7.9683	5.1130	0.1427
	10.9	0.7755	0.7384	8.1771	5.3844	0.1485
	37.3	1.1834	0.7473	8.2167	5.2556	0.1507
	45.3	1.2355	0.7337	8.2156	5.4221	0.1521
	81.5	1.1043	0.7536	8.6593	6.1816	0.2095
	132.7	1.0934	0.7385	8.5556	6.1612	0.2038
STATION 4 17/4/96	3.1	1.1367	0.7110	8.1363	4.7308	0.1701
	10.4	1.0332	0.7541	8.2639	4.9343	0.1821
	41.8	1.2520	0.7368	8.4321	5.0429	0.1843
	80.1	1.2879	0.7546	8.4825	4.9239	0.1791
	123.9	1.0877	0.7583	7.9423	4.4992	0.1994