MRV LOUGH FOYLE CRUISE REPORT
8.4.91.-11.4.91.

Cruise Personnel:

S I Heaney	SPSO (SIC)
B Stewart	HSO
R Hensley	HSO
A Fitzsimons	HSO
P Elliott	ASO

Cruise Objectives:

To undertake cruise 2/91 of Biological Oceanography project; to map spatial distribution of physical, chemical and biological variables in the western Irish Sea.

Cruise narrative:

An attempt was made to repeat the March 1991 Biological Oceanographic cruise programme but to omit the day-grab samples. This entailed following the sampling grid shown on Figure 1 and collecting surface samples at each of the numbered stations. It was intended to take vertical profiles for light measurements at stations 26, 51, 62 and for temperature and water samples at stations 27, 44, 62 and 9 locations between stations 5 and 9. In vivo fluorescence of Chlorophyll *a*, temperature, conductivity, salinity and oxygen concentration were continuously monitored from the ship's clean sea water supply. Discrete samples for analysis of chlorophyll *a* by hot methanol extraction, plant nutrients and suspended solids were also obtained from the clear water supply at the stations sampled. The bongo nets for zooplankton samples were to be deployed at stations indicated by squares on Figure 1 for samples of zooplankton. Phytoplankton samples were obtained using ship's clean sea water supply.

Report:

The ship departed Belfast dock at 10.30 h BST on Monday 8 April in dry weather with a moderate southerly wind. Good progress was made until Tuesday afternoon with the wind strength increasing from the south. At stn 24 at 12.34 h on 9 April the bongo nets were deployed off Annalong. It transpired that the winch meter on the aft port winch was not working and length of cable played out was simply guessed at 30 m. The net was deployed in approximately 15 m depth of water and touched the sea bed. This resulted in both nets

being severely damaged beyond repair. The nets were recovered full of brittle stars. Mr Walsh of Heyn was immediately advised by Telex of the faulty winch meter in order that a repair could be effected before the next cruise to Loch Linnhe. A further comment on the bongo nets was that only one of the pair had the zip collar fitted. This incident reinforces the urgent need for adequate storage of ship's equipment.

At stn 26 a light profile was not taken because of a 2-3 m swell and deteriorating weather. On moving south off the Chickens at the Isle of Man towards stn 29 at 16.30 h the weather had seriously deteriorated with strong force 6+ winds from the south and shelter was sought in Ramsay Bay.

A light profile was obtained at 13.00 h in Ramsay Bay whilst at anchor.

At 14.00 h it was decided to continue the sampling programme but omitting the transverse leg containing samples 29-35 and commence sampling at stn 41, collecting 3 samples down the east coast of the Isle of Man en route i.e. samples (a) 54° 13.22′ N, 04.17.79′ W (b) 54.06.14 N, 04.23.09 W, (c) 53° 58.34′ N, 04.29.55′ W.

Stn 41 was reached at 18.50 h and a westerly course was set. By 22.16 at Stn 38 severe southerly winds arose rapidly causing much discomfort and movement of fluorometer and CTD lashed to the port side of the ship in dust bin. At 23.24 the dustbin and instruments were blown over in heavy seas. The instruments were safely recovered by the crew due to prompt and commendable action by Philip Elliott informing the SIC.

At Stn 37 with worsening sea conditions and gale warnings, Captain McCormick proceeded S Westerly to Stn 47. At this point the decision was taken to abort the remainder of the cruise in view of deteriorating weather conditions and gale warnings for force 9 southerly winds in the Irish Sea. The ship returned through heavy following seas, berthing at Belfast docks at 10.40 h on 11 April.

The 8 hours on, 8 hours off, shift working appeared to work satisfactorily. The crew and scientific staff performed very well under difficult conditions.

S I Heaney

Copies to: Dr C H McMurray
Dr C Gibson
Mr W McCurdy

STATIONS 4/91

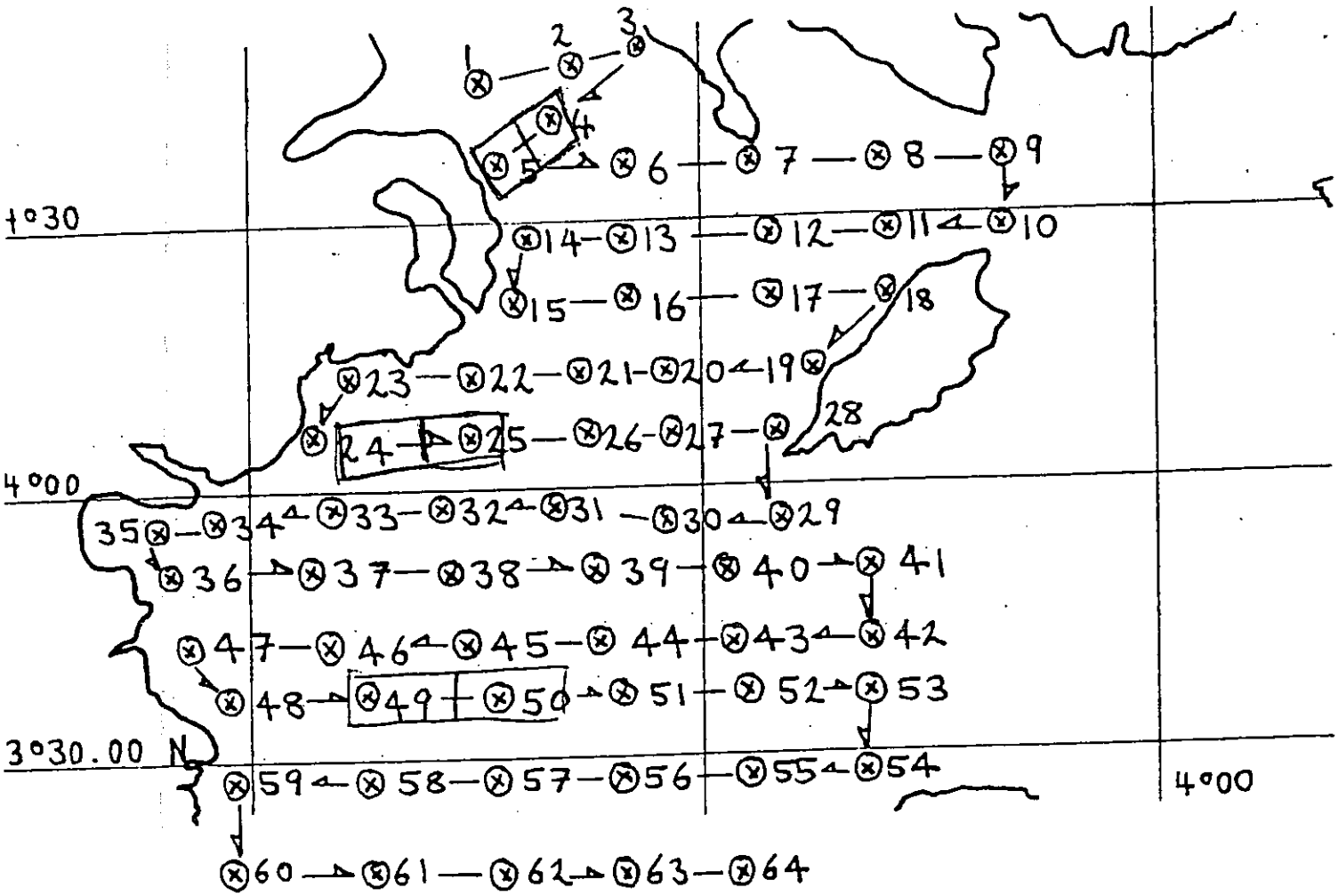
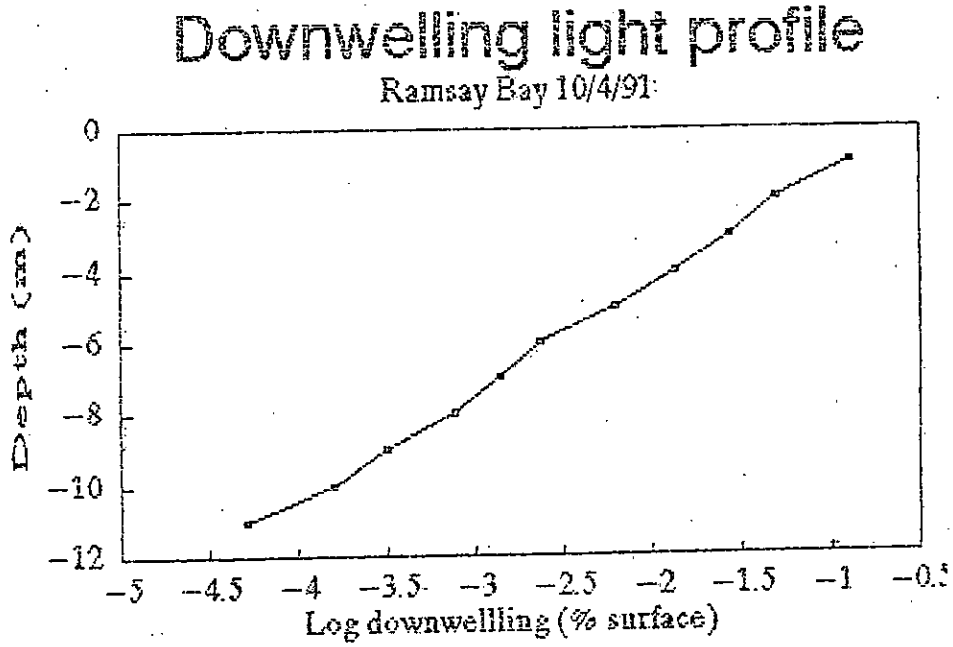


Fig. 1.

10/4/91 Ramsay Bay

DEPTH	AIR	DOWN	UP			
	Mean	Mean	Mean	down%	up%	up/down%
1	635.0	260.0	17.0	40.9%	2.7%	6.5%
2	645.0	175.0	11.5	27.1%	1.8%	6.6%
3	670.0	140.0	7.0	20.9%	1.0%	5.0%
4	715.0	110.0	7.5	15.4%	1.0%	6.8%
5	710.0	78.0	5.0	11.0%	0.7%	6.4%
6	690.0	49.5	3.6	7.2%	0.5%	7.3%
7	685.0	39.5	3.0	5.8%	0.4%	7.6%
8	640.0	28.5	2.0	4.5%	0.3%	7.0%
9	610.0	18.5	1.7	3.0%	0.3%	9.2%
10	605.0	13.5	1.3	2.2%	0.2%	9.8%
11	585.0	8.0	1.7	1.4%	0.3%	21.6%
12	570.0 B	O T	T O	M		

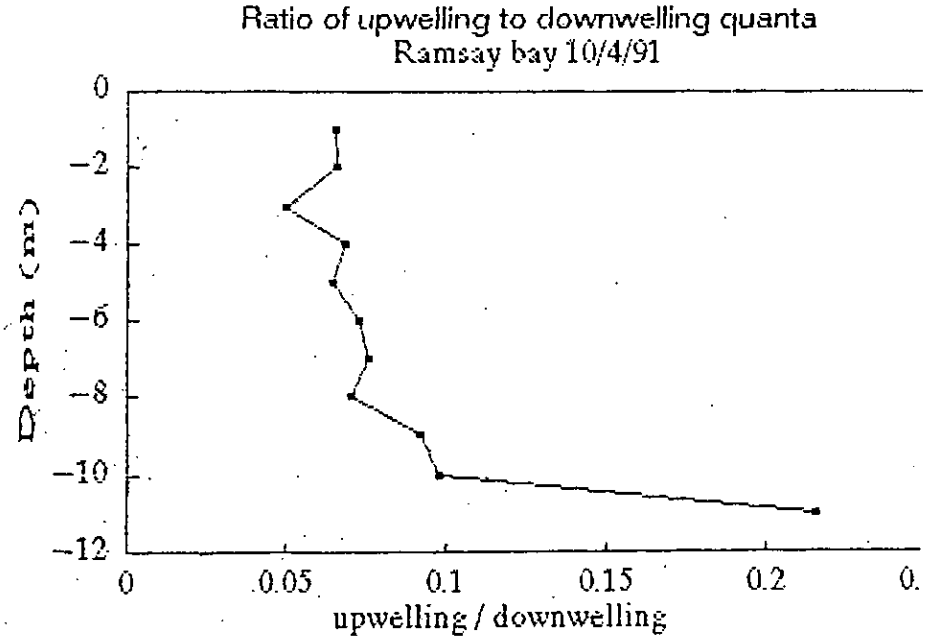


regression of log e % downwelling / depth m

Regression Output:	
Constant	4.7742
Std Err of Y Est	0.080718
R Squared	0.996528
No. of Observations	14
Degrees of Freedom	12
X Coefficient(s)	-0.31405
Std Err of Coef.	0.005352

regression of log e upwelling %

Regression Output:	
Constant	-3.51124
Std Err of Y Est	0.050315
R Squared	0.996491
No. of Observations	14
Degrees of Freedom	12
X Coefficient(s)	-0.19474
Std Err of Coef.	0.003336


Ratio of upwelling to downwelling quanta
Ramsay bay 10/4/91
Depth (m)
0
-2
-4
-6
-8
-10
-12
0
.05
0.1
0.15
0.2
0.
upwelling / downwelling

regression of log e % downwelling / depth e

Regression Output:

Constant	-0.59014
Std Err of Y Est	0.064315
R Squared	0.996833
No. of Observations	11
Degrees of Freedom	9
X Coefficient(s)	-0.32639
Std Err of Coef.	0.006132

regression of log e % downwelling / omitting first three metres

Regression Output:

Constant	-0.55575
Std Err of Y Est	0.073082
R Squared	0.993059
No. of Observations	8
Degrees of Freedom	6
X Coefficient(s)	-0.3304
Std Err of Coef.	0.011277

regression of log e upwelling %

Regression Output:

Constant	-3.65841
Std Err of Y Est	0.220199
R Squared	0.935006
No. of Observations	11
Degrees of Freedom	9

regression of log e upwelling % omitting first three metres

Regression Output:

Constant	-3.96249
Std Err of Y Est	0.204092
R Squared	0.872384
No. of Observations	8
Degrees of Freedom	6

DATA FOR L.FOYLE CRUISE 8-11 APRIL 1991

Page A Nutrient data, suspended solids, mean salinity and fluorescence

FLUORIMETER
AIR BLANK 21.0
FILTERED SEAWATER 24.0

DATE	TIME	SAMPLE REF.	LAT.	LONG.	SRP ugP/l	NO3 ugN/l	NH4 ugN/l	SiO2 mgSiO2/l	Chl-a	480/665	DW	ASH	AFDW	SLNTY	FLUOR
080491	1345	1	54.44.17	5.28.51	29	156	47	0.34	0.90	1.81				33.497	36.90
080491	1440	2	54.46.89	5.17.50	29	148	36	0.36	0.71	1.75				32.901	38.00
080491	1520	3	54.48.87	5.07.61	32	168	48	0.35	0.74	1.84				32.550	33.50
080491	1620	4	54.40.90	5.20.04	31	158	85	0.33	0.78	1.67				33.136	36.00
080491	1738	5	54.35.92	5.26.78	29	201	34	0.40	0.77	1.75				33.596	36.00
080491	1835	6	54.36.13	5.10.59	37	234	42	0.38	0.85	1.80	0.10	0.05	0.05	33.087	38.00
080491	1937	7	54.95.37	4.53.14	35	225	34	0.49	0.78	2.00				33.230	38.00
080491	2040	8	54.36.00	4.36.72	44	239	46	0.55	0.51	2.01				32.229	39.80
080491	2150	9	54.36.90	4.20.69	55	289	47	0.45	0.85	2.10				31.764	40.70
080491	2314	10	54.28.00	4.20.90	44	216	52	0.47	0.77	1.90				32.827	41.00
090491	0004	11	54.27.99	4.35.25	45	237	47	0.40	0.66	1.93				32.456	40.00
090491	0051	12	54.28.00	4.51.12	38	191	37	0.34	0.61	1.88				32.966	39.00
090491	0155	13	54.28.04	5.11.19	28	158	55	0.33	0.67	1.86				33.619	37.50
090491	0235	14	54.27.88	5.23.06	28	167	70	0.34	0.53	1.85				33.669	38.00
090491	0326	15	54.20.99	5.24.88	28	154	65	0.34	0.55	2.01				33.591	38.50
090491	0426	16	54.20.95	5.10.15	29	150	46	0.31	0.48	1.30				33.677	36.50
090491	0523	17	54.21.07	4.51.25	28	146	53	0.27	0.62	1.93				33.816	38.50
090491	0627	18	54.21.13	4.35.25	23	126	66	0.28	0.73	1.88	0.77	0.73	0.04	34.029	40.50
090491	0731	19	54.13.14	4.44.94	24	147	53	0.35	0.56	1.47				33.943	39.50
090491	0843	20	54.12.92	5.04.15	28	176	63	0.34	0.60	1.02				33.582	37.50
090491	0930	21	54.12.97	5.16.11	28	8	50	0.34	0.53	1.43				33.606	35.80
090491	1023	22	54.12.47	5.16.11	25	216	55	0.28	1.25	1.44				33.376	42.00
090491	1120	23	54.12.92	5.46.49	21	135	51	0.38	1.50	1.33				33.262	43.00
090491	1234	24	54.05.83	5.51.72	23	133	60	0.33	1.59	1.23				33.472	43.75
090491	1357	25	54.06.03	5.30.72	26	134	45	0.33	1.00	1.62				33.550	41.50
090491	1530	27	54.06.00	5.04.00	29	155	44	0.33	0.75	1.80	0.30	0.29	0.01	33.631	38.00
090491	1619	28	54.06.08	4.50.26	28	135	50	0.26	0.75	1.77				33.932	37.00
110491	0350	33	53.58.00	5.50.00	21	100	50	0.17	3.06	1.18					48.00
110491	0210	36	53.51.04	6.11.08	21	157	44	0.26	2.19	0.98					49.00

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DATA FOR L.FOYLE CRUISE 8-11 APRIL 1991

Page A Nutrient data, suspended solids, mean salinity and fluorescence

FLUORIMETER
AIR BLANK 21.0
FILTERED SEAWATER 24.0

DATE	TIME	SAMPLE REF.	LAT.	LONG.	SRP ugP/l	NO3 ugN/l	NH4 ugN/l	SiO2 mgSiO2/l	Chl-a	480/665	DW	ASH	AFDW	SLNTY	FLUOR
100491	2324	37	53.50.42	5.51.91	18	139	59	0.18	1.86	1.25					
100491	2216	38	53.50.89	5.34.52	23	129	51	0.25	2.64	1.55				33.449	46.50
100491	2117	39	53.50.93	5.15.00	18	84	48	0.14	6.01	1.61				33.404	58.00
100491	2011	40	53.50.97	4.56.73	25	129	47	0.29	0.53	1.77				33.799	35.50
100491	1850	41	53.51.00	4.38.15	24	148	63	0.28	0.55	1.51				33.860	35.50
110491	0114	47	53.42.84	6.09.40	21	138	44	0.20	3.30	1.32	7.19	6.32	0.87		
100491	1513	A	54.13.22	4.17.79	24	118	34	0.29	1.17	1.47	1.93	1.72	0.21	33.817	44.00
100491	1615	B	54.06.14	4.23.09	24	134	57	0.27	0.70	1.52	2.36	2.13	0.23	33.863	39.50
100491	1724	C	53.58.34	4.29.55	26	116	34	0.27	0.75	1.48	2.60	2.28	0.32	33.864	38.00

DATA FOR L.FOYLE CRUISE 8-11 APRIL 1991

Page 8 Salinity and temperature

DATE	TIME	SAMPLE REF.	LAT.	LONG.	SLNTY	TEMP
080491	1345	1	54.44.17	5.28.51	33.497	7.569
080491	1440	2	54.46.89	5.17.50	32.901	7.663
080491	1520	3	54.48.87	5.07.61	32.550	7.563
080491	1620	4	54.40.90	5.20.04	33.136	7.633
080491	1738	5	54.35.92	5.26.78	33.596	7.718
080491	1835	6	54.36.13	5.10.59	33.087	7.549
080491	1937	7	54.95.37	4.53.14	33.230	7.520
080491	2040	8	54.36.00	4.36.72	32.229	7.280
080491	2150	9	54.36.90	4.20.69	31.764	7.236
080491	2314	10	54.28.00	4.20.90	32.827	7.372
090491	0004	11	54.27.99	4.35.25	32.456	7.424
090491	0051	12	54.28.00	4.51.12	32.966	7.532
090491	0155	13	54.28.04	5.11.19	33.619	7.646
090491	0235	14	54.27.88	5.23.06	33.669	7.592
090491	0326	15	54.20.99	5.24.88	33.591	7.689
090491	0426	16	54.20.95	5.10.15	33.677	7.610
090491	0523	17	54.21.07	4.51.25	33.816	7.728
090491	0627	18	54.21.13	4.35.25	34.029	7.948
090491	0731	19	54.13.14	4.44.94	33.943	7.948
090491	0843	20	54.12.92	5.04.15	33.582	7.664
090491	0930	21	54.12.97	5.16.11	33.606	7.645
090491	1023	22	54.12.47	5.16.11	33.376	7.799
090491	1120	23	54.12.92	5.46.49	33.262	7.896
090491	1234	24	54.05.83	5.51.72	33.472	7.767
090491	1357	25	54.06.03	5.30.72	33.550	7.815
090491	1530	27	54.06.00	5.04.00	33.631	7.790
090491	1619	28	54.06.08	4.50.26	33.932	7.924
110491	0350	33	53.58.00	5.50.00		
110491	0210	36	53.51.04	6.11.08		
100491	2324	37	53.50.42	5.51.91		
100491	2216	38	53.50.89	5.34.52	33.449	7.873
100491	2117	39	53.50.93	5.15.00	33.404	7.908
100491	2011	40	53.50.97	4.56.73	33.799	7.944
100491	1850	41	53.51.00	4.38.15	33.860	7.879
110491	0114	47	53.42.84	6.09.40		
100491	1513	A	54.13.22	4.17.79	33.817	8.142
100491	1615	B	54.06.14	4.23.09	33.863	8.132
100491	1724	C	53.58.34	4.29.55	33.864	8.108

STATION RAMSAY BAY DEPTH PROFILE
LAT 54.20.43 LONG 4.21.39 TIME 1300

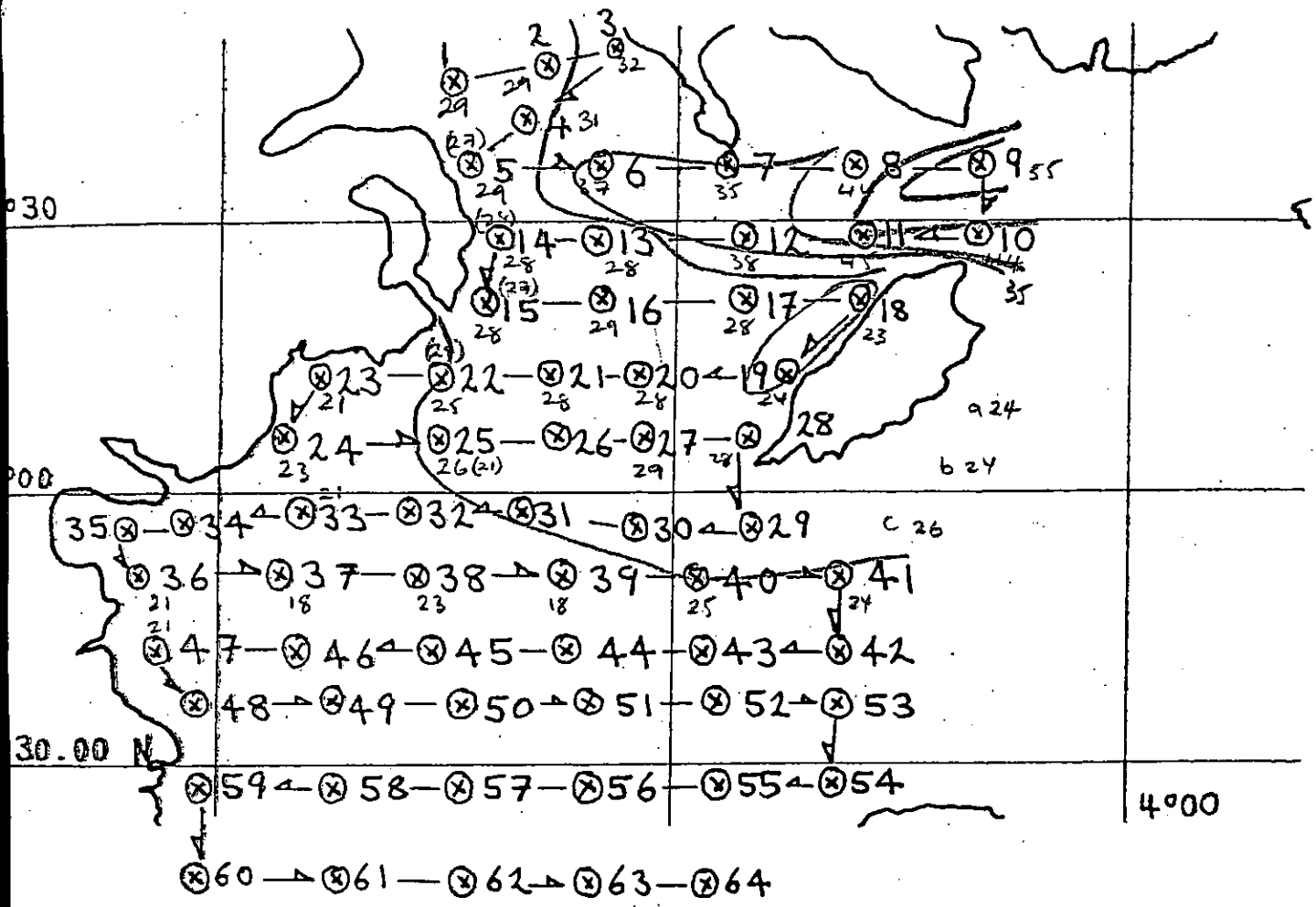
DEPTH (M)	AIR MEAN	DOWN MEAN	UP MEAN
1	635.0	260.0	17.0
2	645.0	175.0	11.5
3	670.0	140.0	7.0
4	715.0	110.0	7.5
5	710.0	78.0	5.0
6	690.0	49.5	3.6
7	685.0	39.5	3.0
8	640.0	28.5	2.0
9	610.0	18.5	1.7
10	605.0	13.5	1.3
11	585.0	8.0	1.7
12	570.0	BOTTOM	BOTTOM

Z= ZOOPLANKTON P= PHYTOPLANKTON D= DIATOMS

DATE	TIME	SAMPLE REF.	LAT.	LONG.	SAMPLES TAKEN
080491	1520	3	54.48.87	5.07.61	P (2 1)
080491	1620	4	54.40.90	5.20.04	Z (15min-3knts)
080491	2150	9	54.36.90	4.20.69	P (2 1)
090491	0523	17	54.21.07	4.51.25	P (2 1)
090491	0627	18	54.21.13	4.35.25	P (2 1)
090491	0731	19	54.13.14	4.44.94	P (2 1)
090491	1120	23	54.12.92	5.46.49	P (2 1)
090491	1234	24	54.05.83	5.51.72	Z (15min-3knts)
100491	2117	39	53.50.93	5.15.00	D
100491	1513	A	54.13.22	4.17.79	D
100491	1615	B	54.06.14	4.23.09	D

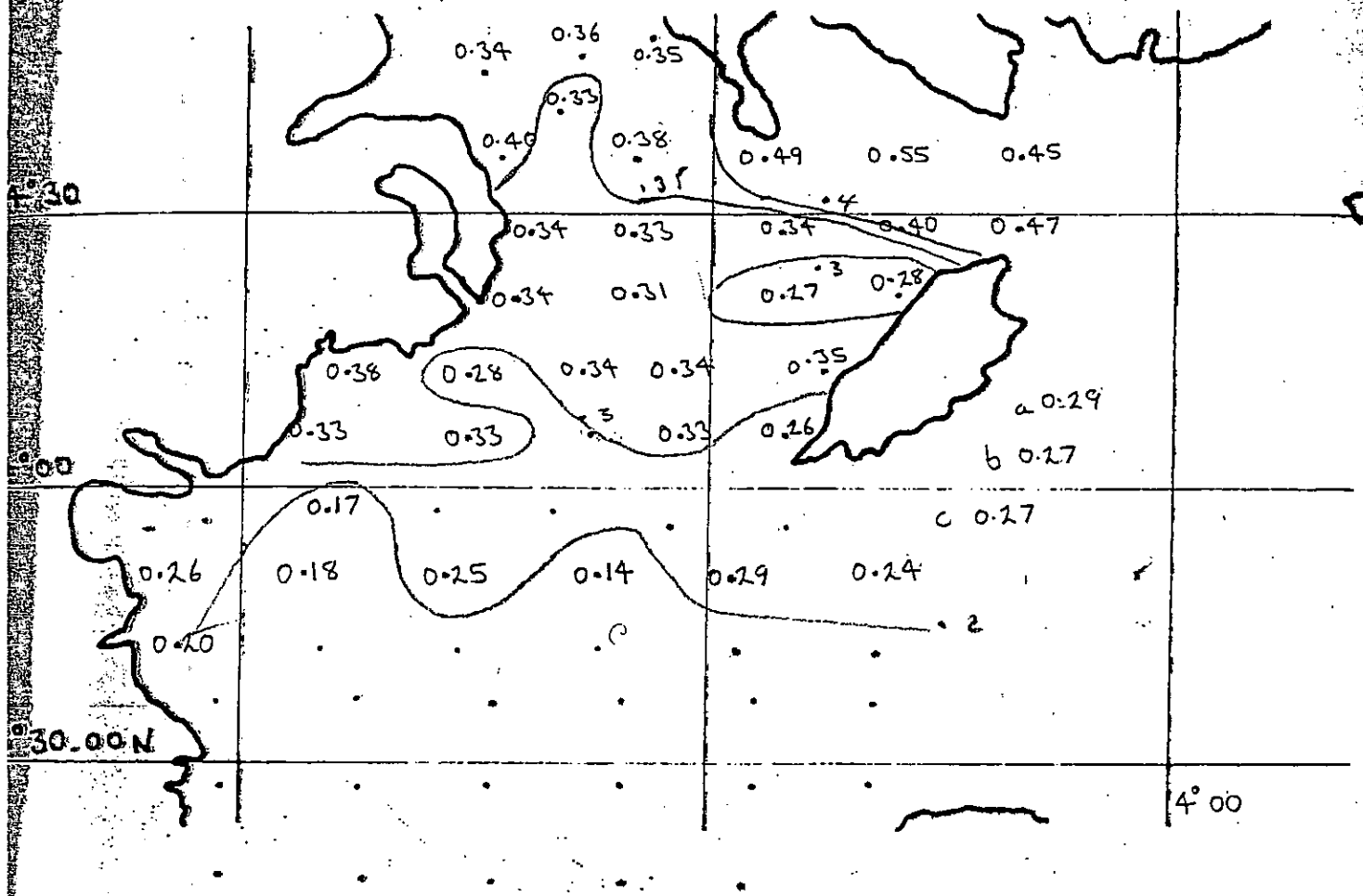
STATIONS 4/91

SRP µgP
(return journey inline)



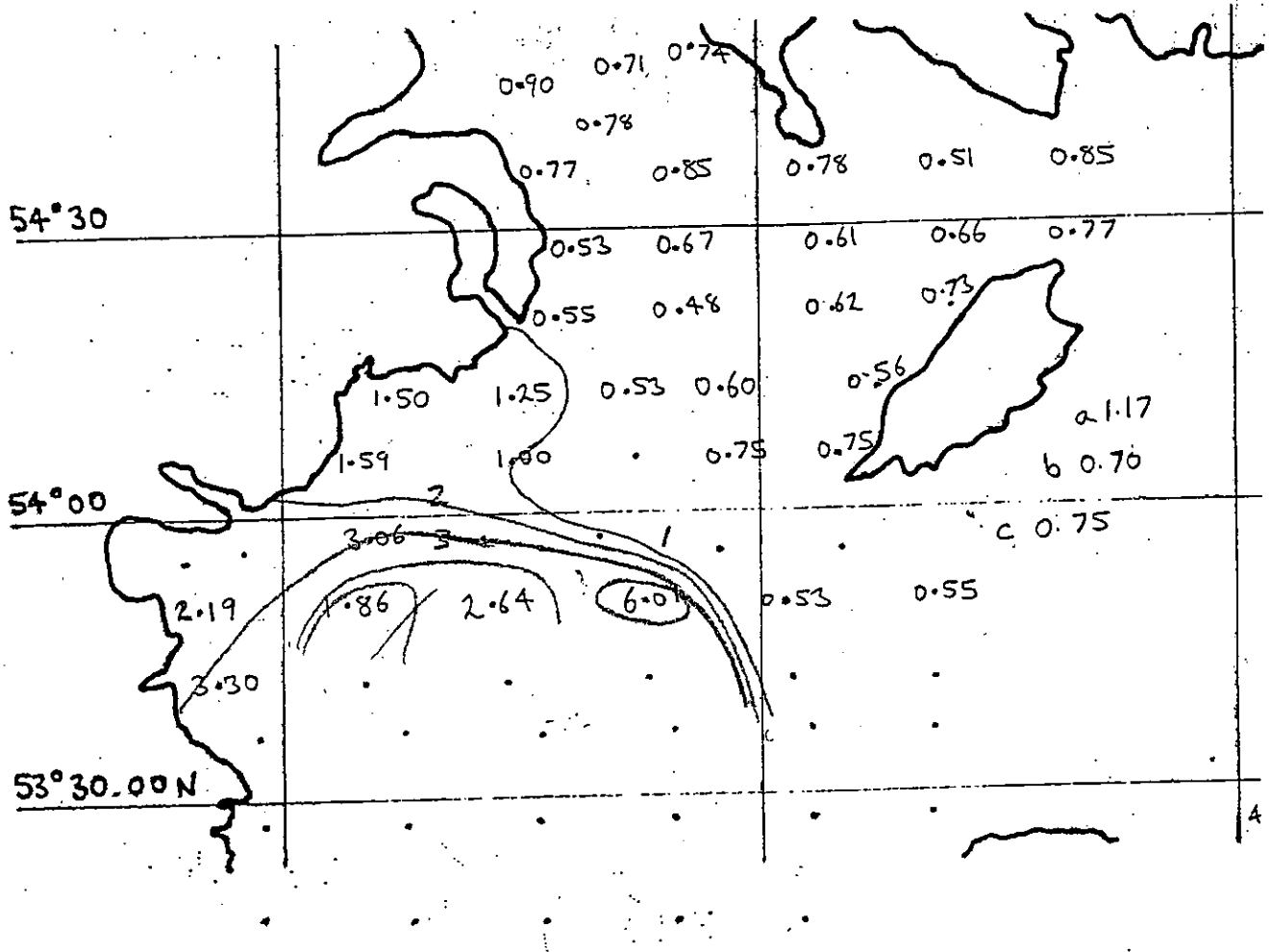
STATIONS 4/91

SiO_2 mgl^{-1}



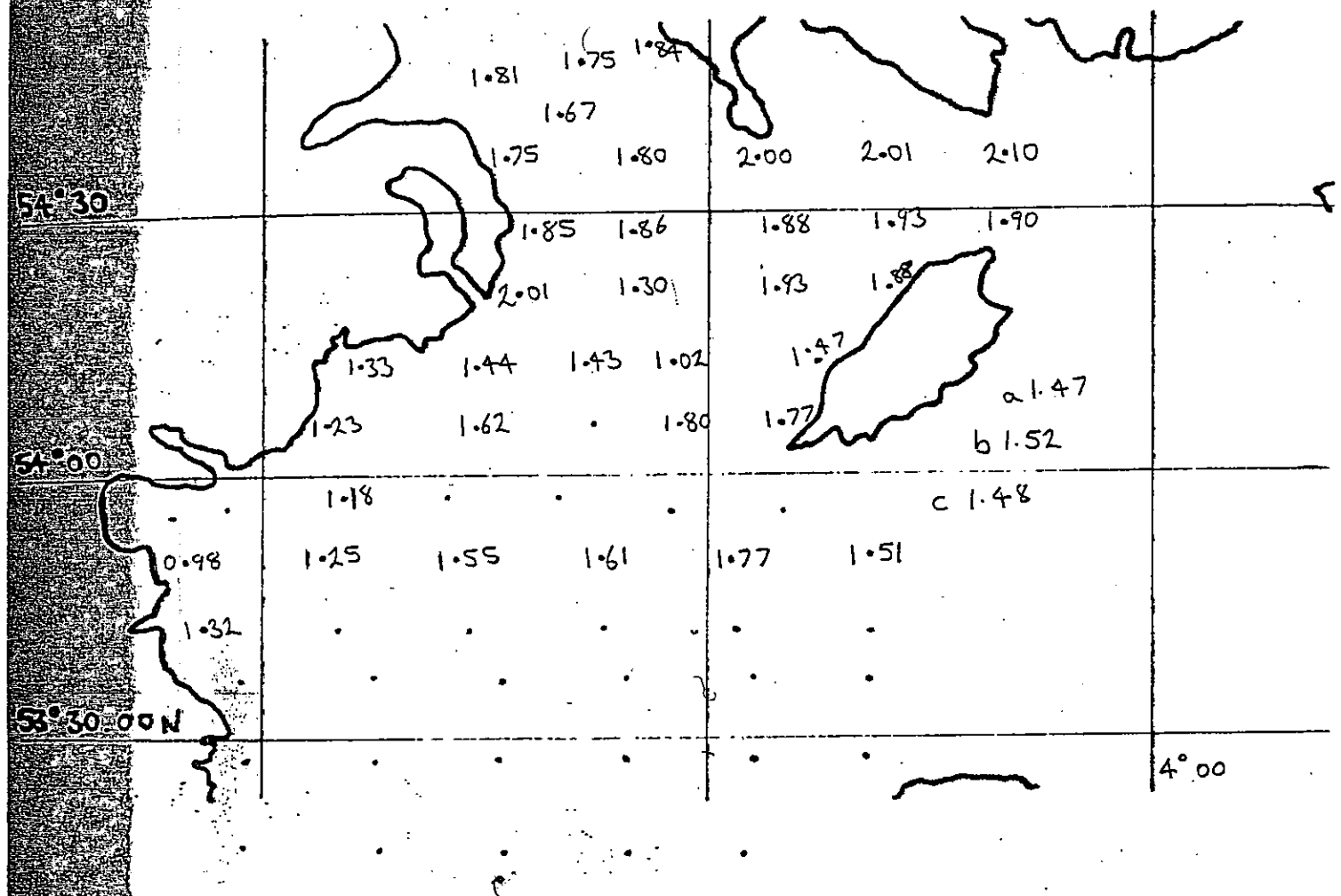
STATIONS 4/91

Chl $\mu g l^{-1}$



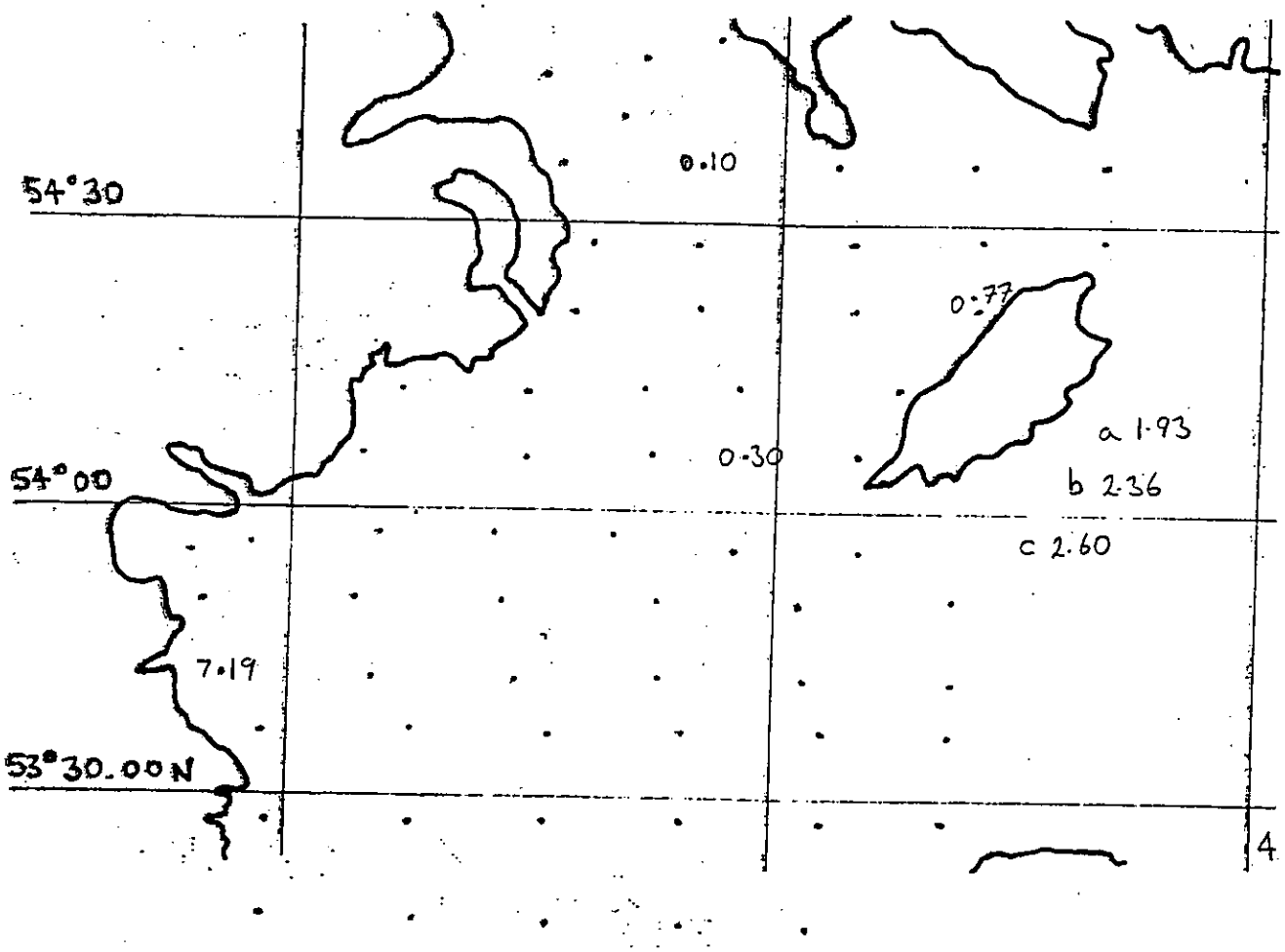
STATION 4/91

480/665 RATIO



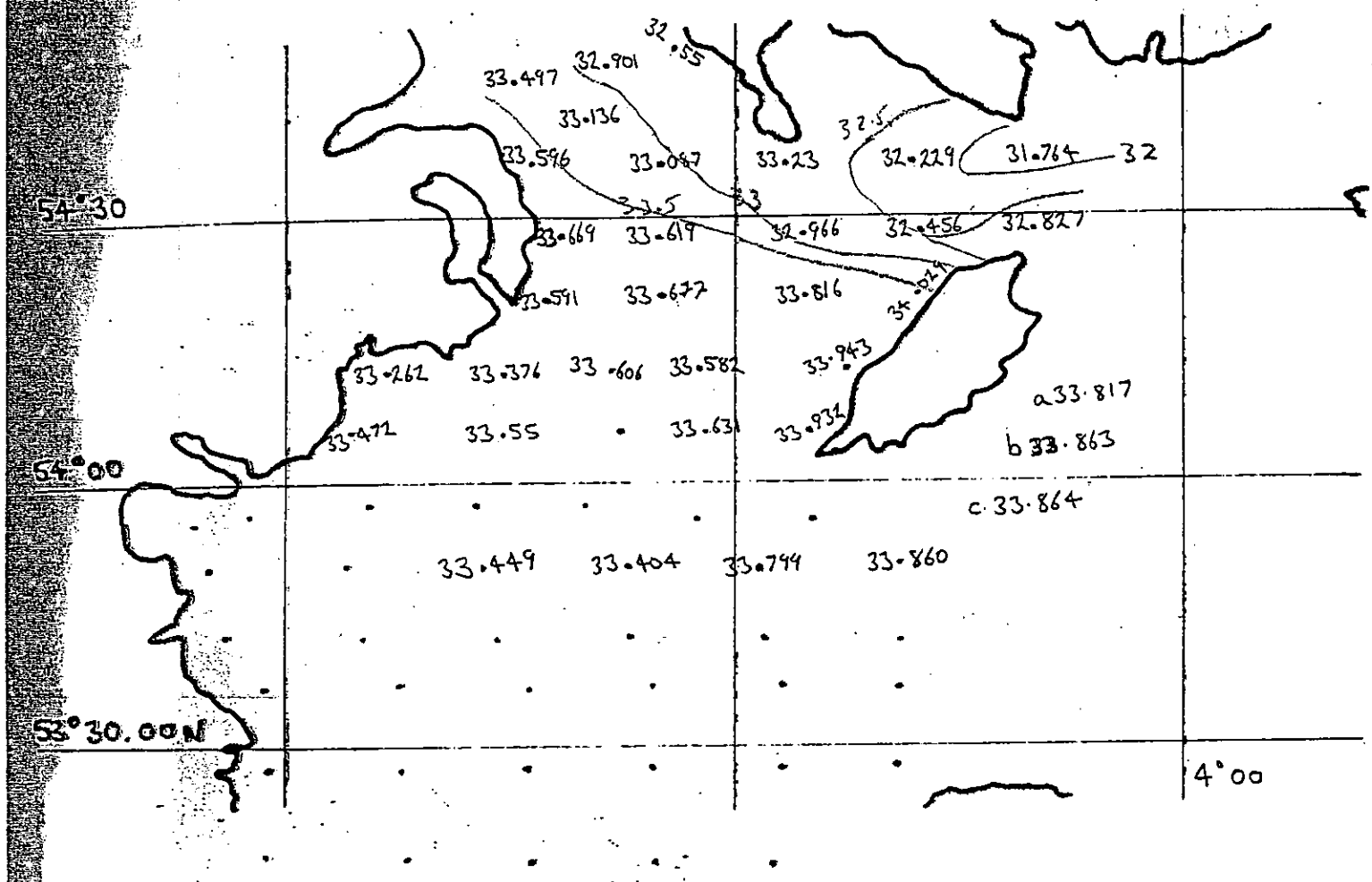
STATION 4/91

SUSPENDED SOLIDS



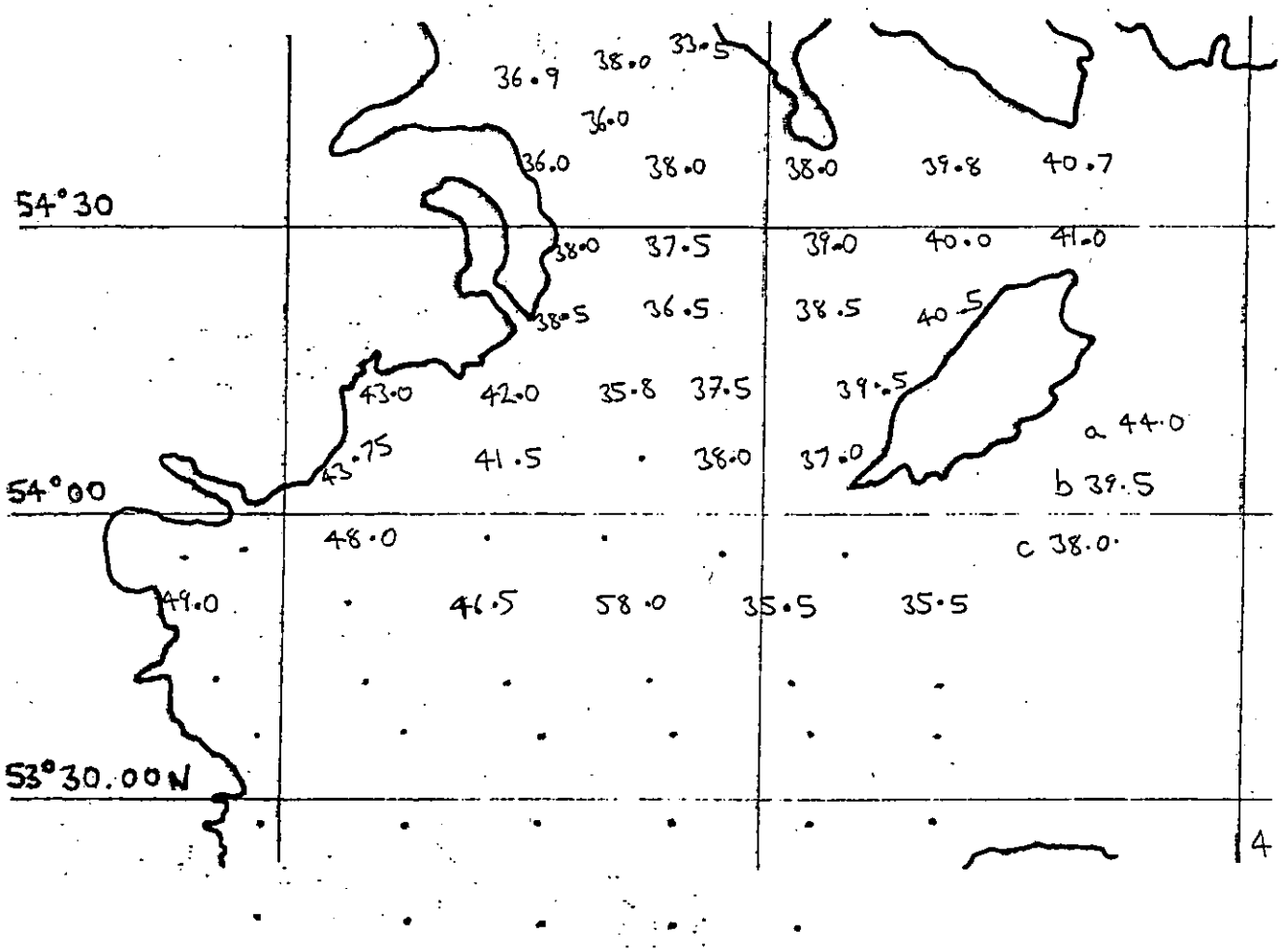
STATION 4/91

SALINITY



STATION 4/91

FLUORESCENCE



STATION 4/91

TEMPERATURE °C