DATA REPORT

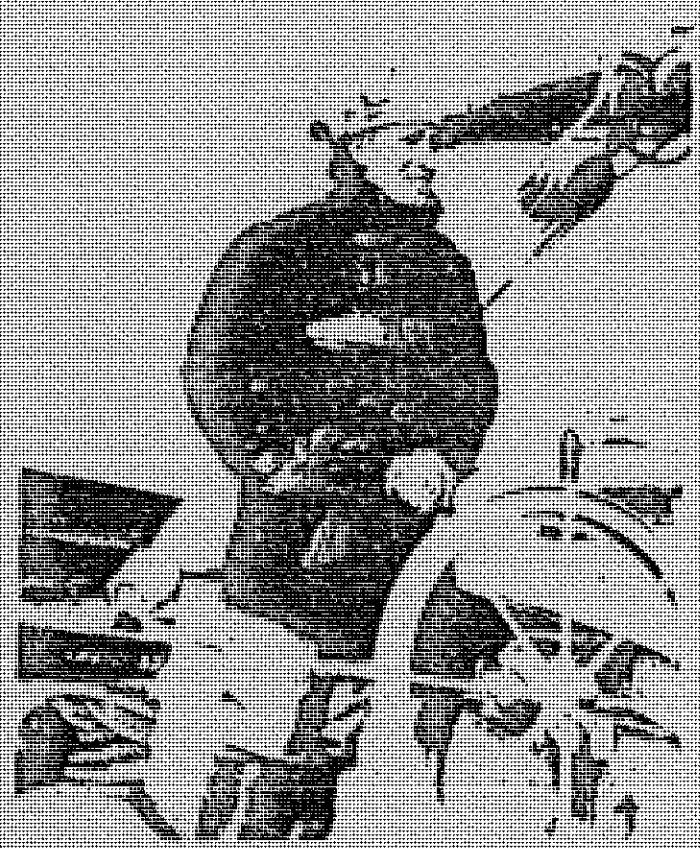
R/V GYRE
MONHEGAN FRONTAL STUDY

1 - 3 JUNE 1981

edited by

D. Phinney, E. Longton

Technical Report No. 25



Henry Bigelow

BIGELOW LABORATORY
for
OCEAN SCIENCES

a division of northeastern research foundation inc.

Technical Report #25

R/V *GYRE*

Monhegan Frontal Study

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Bigelow Laboratory for Ocean Sciences

McKown Point

West Boothbay Harbor, Maine 04575

April 1982

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TABLE OF CONTENTS

Bigelow Participants

Clarice M. Yentsch	Principal Investigator
David A. Phinney	Fluorescence profiles
John C. Laird	Pumping system
Rhonda Selvin	Phytoplankton samples
Frederick D. King	Zooplankton enzyme activities
John P. Christensen	Zooplankton enzyme activities
Terry Cucci	Zooplankton enzyme activities

INTRODUCTION

Bigelow scientists were guests of Dr. David Brooks, Physical Oceanographer at Texas A&M University, College Station, Texas aboard the R/V GYRE. The physical oceanographic research objective, supported by NSF Physical Oceanography, was to describe the coastal circulation in the western Gulf of Maine. The biological objectives were threefold.

Objective I was to determine the spatial distribution of total phytoplankton biomass in general and *Gonyaulax tamarensis* var. *excavata* in specific (the toxin-producing red tide dinoflagellate). This repeated the efforts of Dr. Patrick Holligan, Marine Biological Association of the United Kingdom, along the transect in 1979. In the present study, high resolution hydrography obtained using a Plessey Model 90/40 STD, courtesy of Dr. Brooks and co-workers, was coupled with vertically profiled temperature and chlorophyll fluorescence from a submersible pumping system.

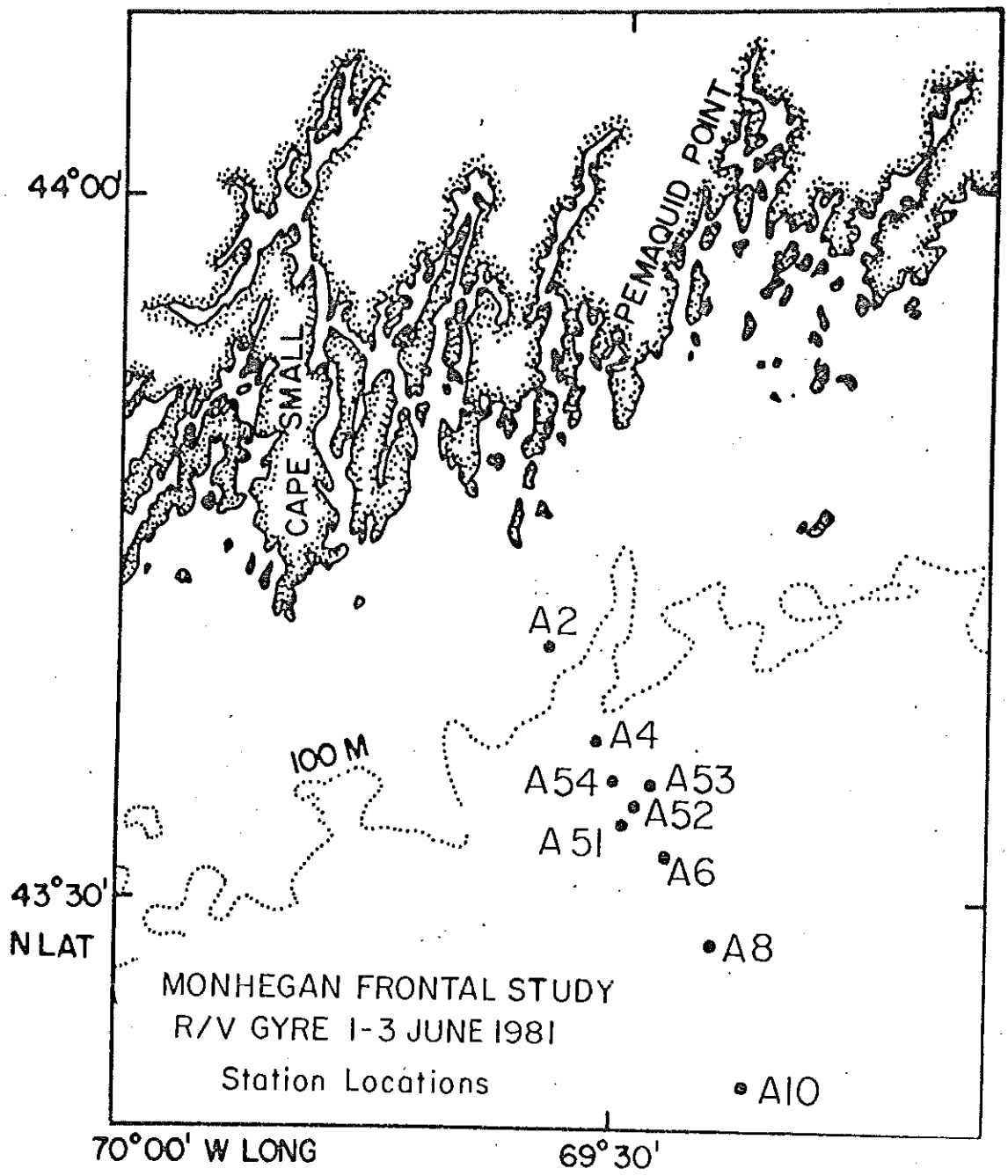
Objective II was to investigate the temporal distribution of phytoplankton biomass and *G. tamarensis* var. *excavata* over a diel cycle. A high productivity station, A5, was occupied for 24+ hours with high resolution hydrography and vertical pump profiles occurring every 6 hours. This data was collected to help resolve questions with regard to vertical migrations.

Objective III was to determine the frequency of dividing cells in *G. tamarensis* var. *excavata* populations located at pycnocline depths. The question remains open as to whether these abundant populations are actively growing or merely accumulations of rather inactive populations which are persisting in the environment.

In support of these objectives, discrete cell count samples from Niskin bottle casts and pump profiles, discrete nutrient samples from Niskin casts (D. Murphy, University of Maine, Orono) and zooplankton enzyme activities from pump profile samples were collected.

We are grateful to Dr. Brooks for the opportunity to participate in this cruise, a unique occasion for biological oceanographers to have access to real-time high resolution hydrographic data in support of their work.

Bigelow participation was funded in part by NSF Grant No. EXP8011448, NASA Grant No. NAS5-22948 and the State of Maine.


44°00'
43°30'
N LAT
70°00' W LONG
69°30'
SMALL CAPE
PEMAQUID POINT
100 M
A2
A4
A54
A53
A52
A51
A6
A8
A10
MONHEGAN FRONTAL STUDY
R/V GYRE 1-3 JUNE 1981
Station Locations

METHODS

I. Pumping station procedure

The surface 100 m is continuously profiled using a large volume pumping system which enables onboard analysis of biological, chemical and physical parameters. The system components include a Flygt Model B205 submersible pump, 125 m of two inch diameter flexible hose and a deck distribution tank which supplies a constant flow to the instruments. The hose intake is secured to a STD fish and lowered to the desired depth. The 200 ℓ/minute flow from the pumping system is fed to the distribution tank where a constant 5 ℓ/minute rate is established to a flow-through fluorometer and thermistor placed in series. When the entire system has flushed, sampling begins by raising the STD fish 1 meter every 30 seconds until it reaches 2 m in depth, where the system is again allowed to flush. Depth corrections are applied to instrument readings to compensate for delay time through the pumping system.

II. Discrete phytoplankton chlorophyll

The fluorometric determination of chlorophyll as described by Yentsch and Menzel (1963) is followed. Phytoplankton are harvested on a Millipore HA cellulose acetate membrane filter, pore size 0.45 μ. The filter and particulate material are homogenized in 85% acetone for 1 minute, extract volume brought to 12 ml and centrifuged at 3000 rpm for 5 minutes. Fluorescence of the supernatant is measured in a Turner Model III fluorometer outfitted with a red sensitive photomultiplier tube, CS5-60 blue excitation filter and CS2-64 red emission filter. Three drops of 1N HCl are added directly to the cuvette and fluorescence again measured after 1 minute for phaeopigment determination.

The fluorometer is calibrated with prepared chlorophyll *a* purchased from Sigma Chemical Corp.

Yentsch, C.S. and D.W. Menzel. 1963. A method for the determination of phytoplankton chlorophyll and phaeophytin by fluorescence. *Deep-Sea Res.* 10: 221-231.

III. *In vivo* chlorophyll fluorescence

Water supplied by the pumping system is passed through a Turner Designs Model 10-005R fluorometer outfitted as described above. Voltage output is displayed on a strip chart recorder. Periodic samples taken from the outflow are processed as above to provide frequent calibration points for the *in vivo* measurement.

IV. Zooplankton profiles

ETS Activity, glutamate dehydrogenase, and protein

Zooplankton samples were collected by diverting approximately three-quarters of the total pump effluent into 30 cm (diameter) 153 µm mesh plankton nets suspended in a large (800 liter) polyethylene tank placed on deck. Flow rates of the diverted affluent were determined before each sampling sequence by measuring the time taken to fill the 800 liter tank. Flow rates varied from 140 - 170 liters per minute depending on the length of hose used and the position of the sub-surface pump in relation to the surface (1-3 m). Samples were collected at 10, 15 or 20 m intervals as indicated by the amount of wire out. Sampling depths were corrected for the travel-time through the hose. No

corrections were made for wire angle. The flow rate and measured filtration times allowed the determination of the volume of water filtered for each sample.

Entire samples were ground in appropriate volumes of tris buffer (pH - 8.6 containing 0.2% Triton-X 100) to provide an approximately 10% (V:V) homogenate. An aliquot of this extract was used to measure the activity of the enzyme glutamate dehydrogenase (GDH) by the method of Bidigare and King (in press). A second aliquot was diluted 20 to 50 times in phosphate buffer ("ETS homogenizing buffer", see Owens and King, 1975) and analyzed for the activity of the respiratory electron transport system (ETS activity) by the method of Owens and King (1975). Incubations for the determination of GDH and ETS activities were performed at 15°C. The remainder of the homogenate was frozen for the determination of gut chlorophyll (not reported here) and protein by the method of Lowry *et al.*, 1951).

Bidigare, R.R. and F.D. King. in press. The measurement of glutamate dehydrogenase activity in *Praunus flexuosus* and its role in the regulation of ammonium excretion. *Comp. Biochem. Physiol.*

Lowry, O., N. Rosebrough, A. Farr and R. Randall. 1951. Protein measurement with the folin phenol reagent. *J. Biol. Chem.* 193: 265-275.

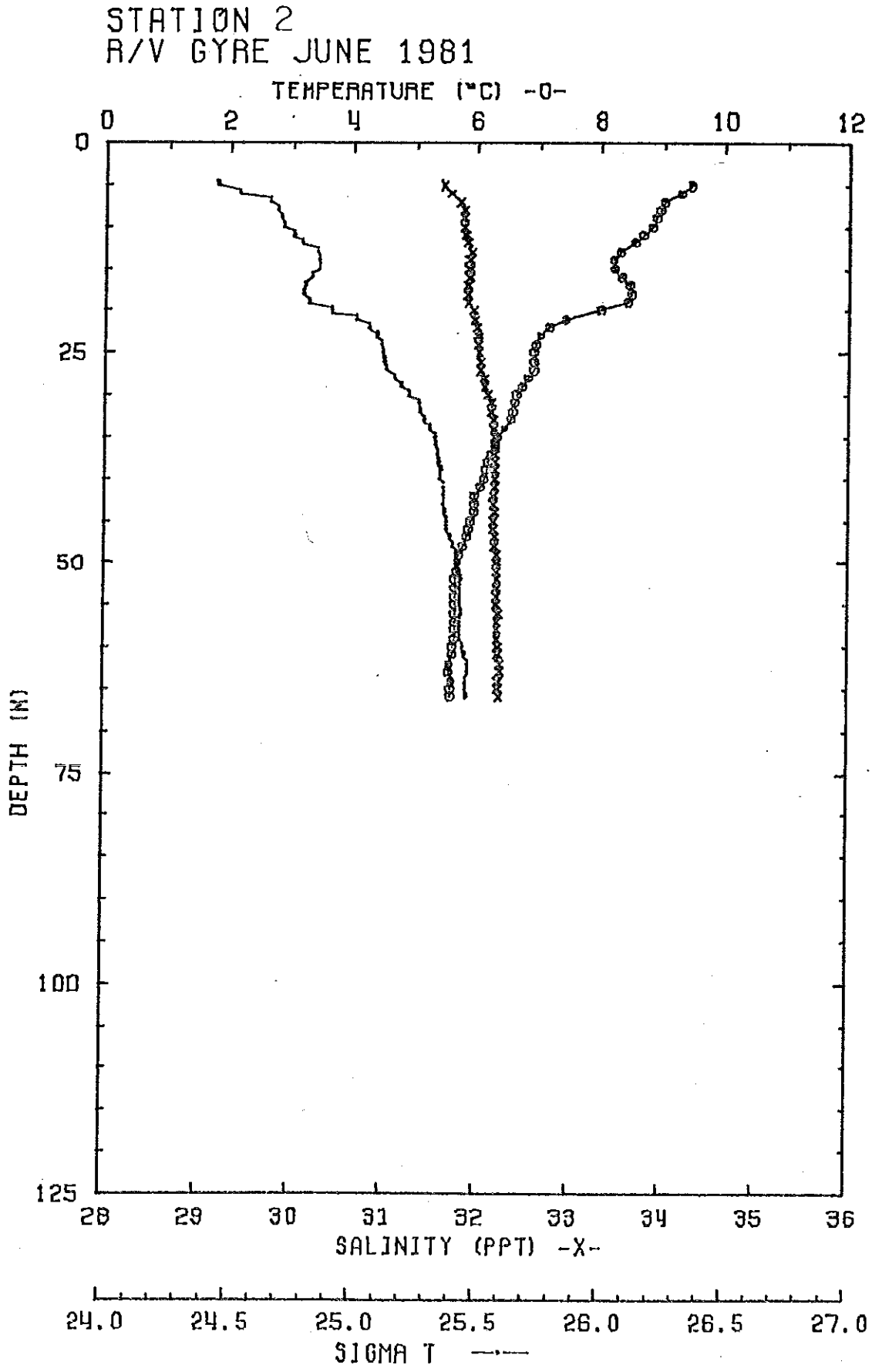
Owens, T.G. and F.D. King. 1975. The measurement of respiratory electron-transport-system activity in marine zooplankton. *Mar. Biol.* 30: 27-36.

V. Phytoplankton preservation

Whole water samples for phytoplankton identification were fixed with Lugol's solution. To resolve the question of active vs. inactive dinoflagellate populations at pycnocline depths, samples were collected so that a separation in time of DNA molecular duplication, nuclear division and cellular division could be discriminated. At station A5 (diel cycle), large volumes of water were pumped from depth every six hours and filtered through 20 μ Nitex netting. Samples were split and prepared in two ways, one for nuclear acetocarmine stain and one for the DNA-specific stain mithramycin. Thus, both microscopic and flow cytometric techniques will be applied to the samples. At the time of this writing, cell counts and flow cytometry have not been completed. Data will eventually be available from C.M. Yentsch and D. Blasco for those persons interested.

Editors Note:

Primary temperature and salinity data are those obtained from the Plessey STD system which appear in the first graphic for each station and the digital printout. A semi-conductor temperature transducer, i.e. thermistor, was also placed in series with the fluorometer and indicates effects of warming and smoothing of physical structure due to mixing within the pumping system. This data appears in the second graphic for comparison, no digital data is reported.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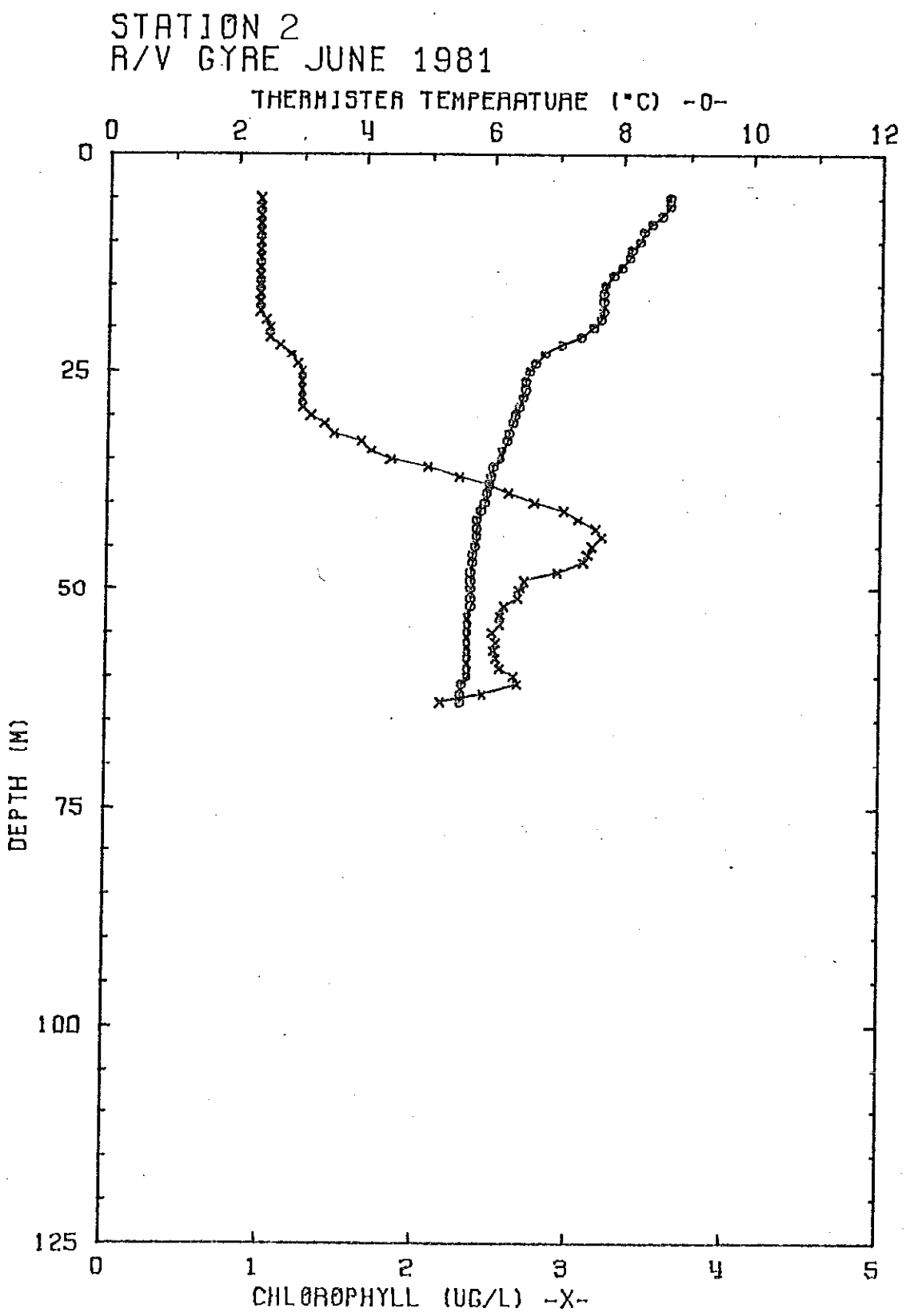
TEMPERATURE (°C) -O-
0
2
4
6
8
10
12
0
25
50
75
100
125
DEPTH (M)
28
29
30
31
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T —·—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THERMISTER TEMPERATURE (°C) -O-
0
2
4
6
8
10
12
DEPTH (M)
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25
50
75
100
125
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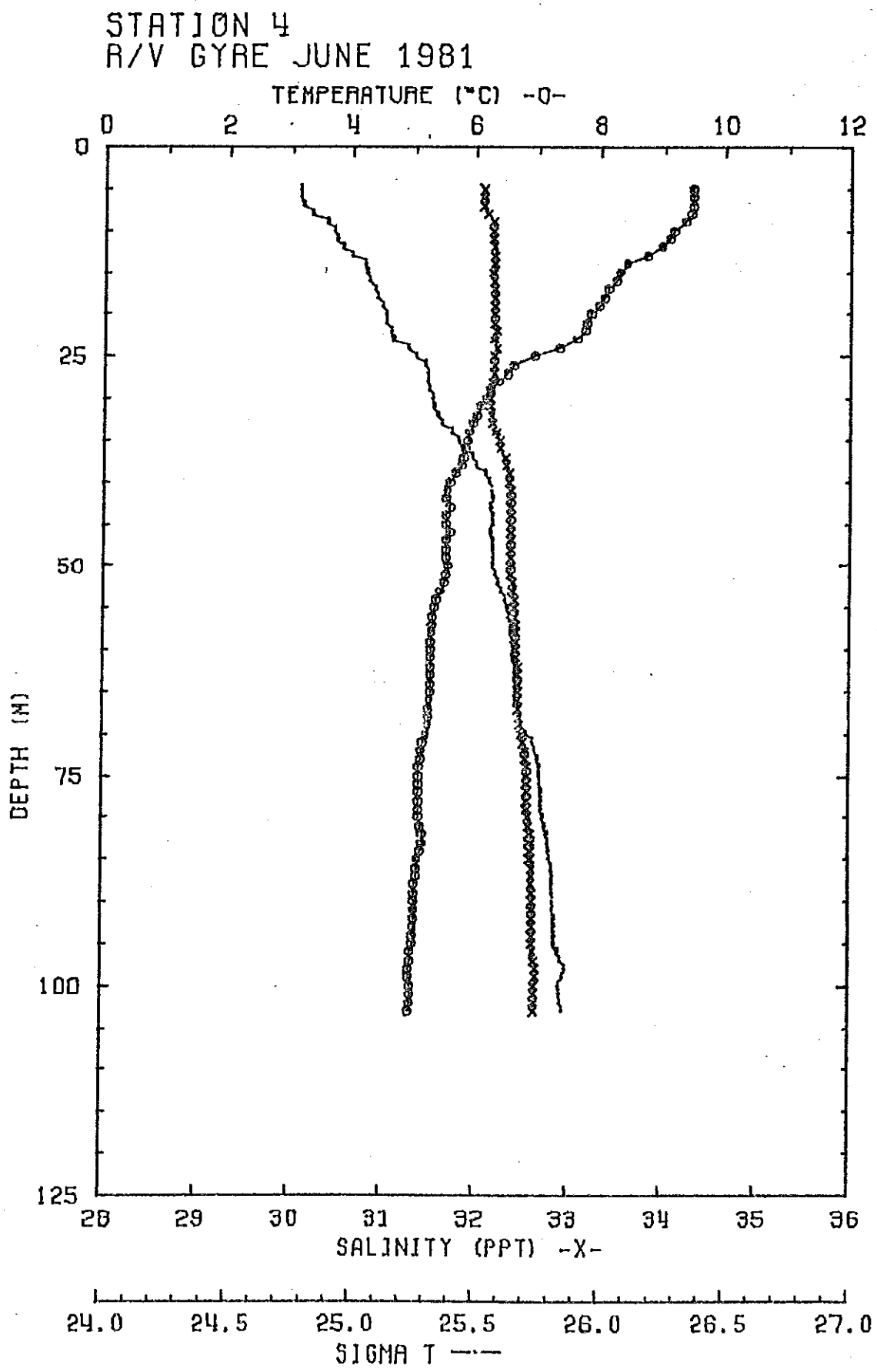
3
4
5
CHLOROPHYLL (UG/L) -X-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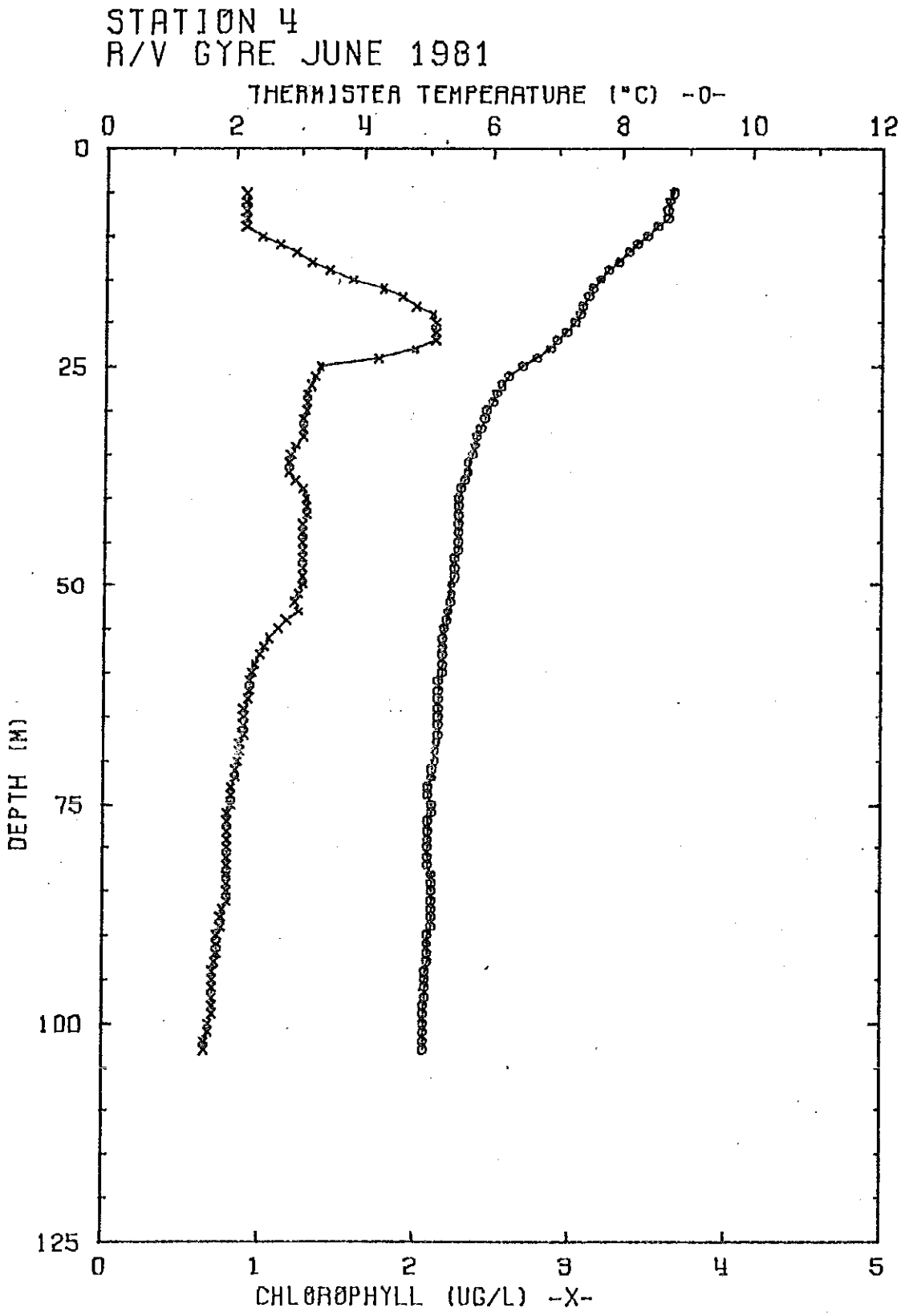
4
6
8
10
12
0
25
50
75
100
125
DEPTH (M)
28
29
30
31
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T —·—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0
2
4
6
8
10
12
0
25
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75
100
125
DEPTH (M)
0
1
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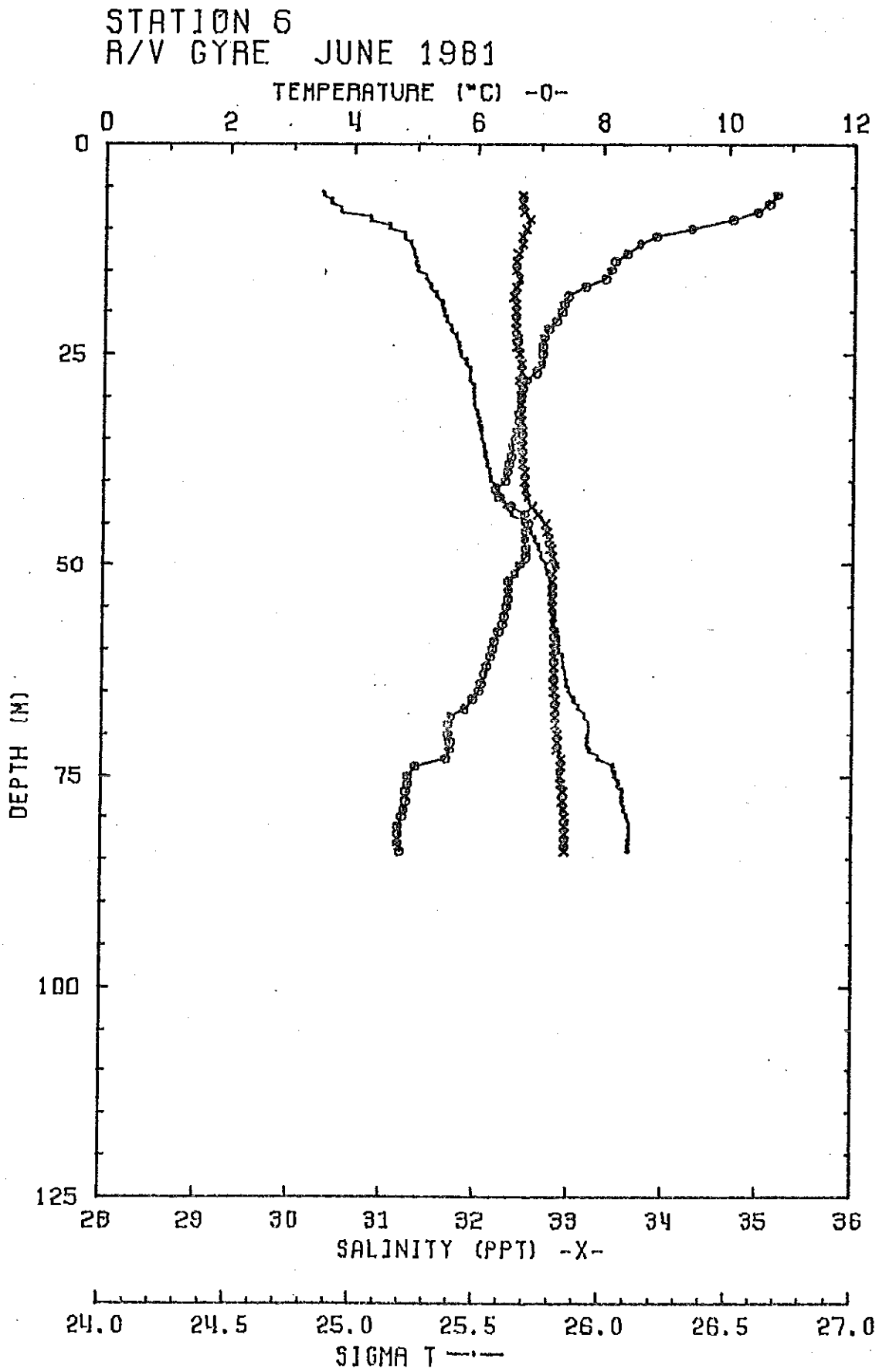
4
5
CHLOROPHYLL (UG/L) -X-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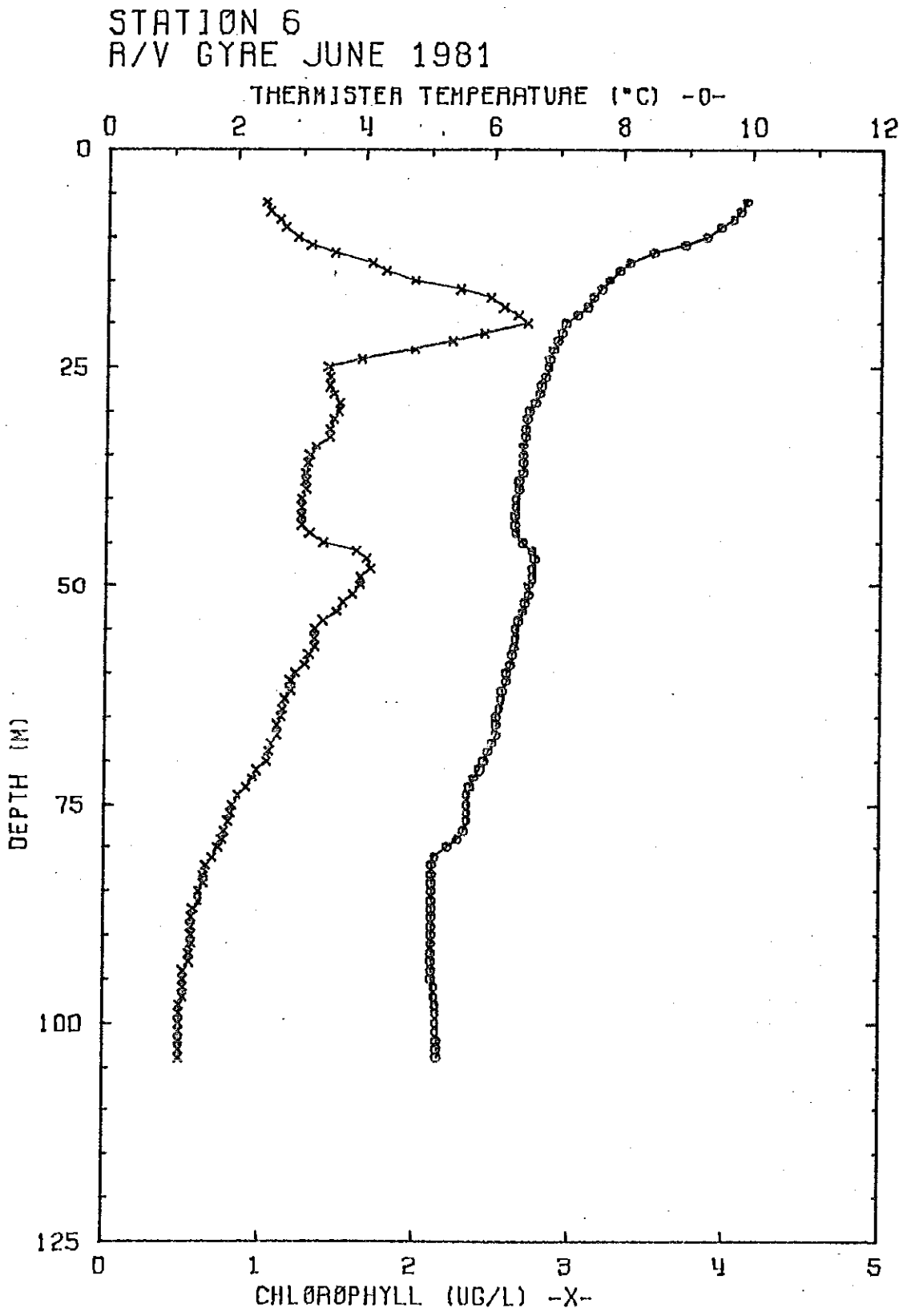
2
4
6
8
10
12
0
25
50
75
100
125
DEPTH (M)
28
29
30
31
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T —·—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THERMISTER TEMPERATURE (°C) -O-
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4
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8
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12
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75
100
125
DEPTH (M)
0
1
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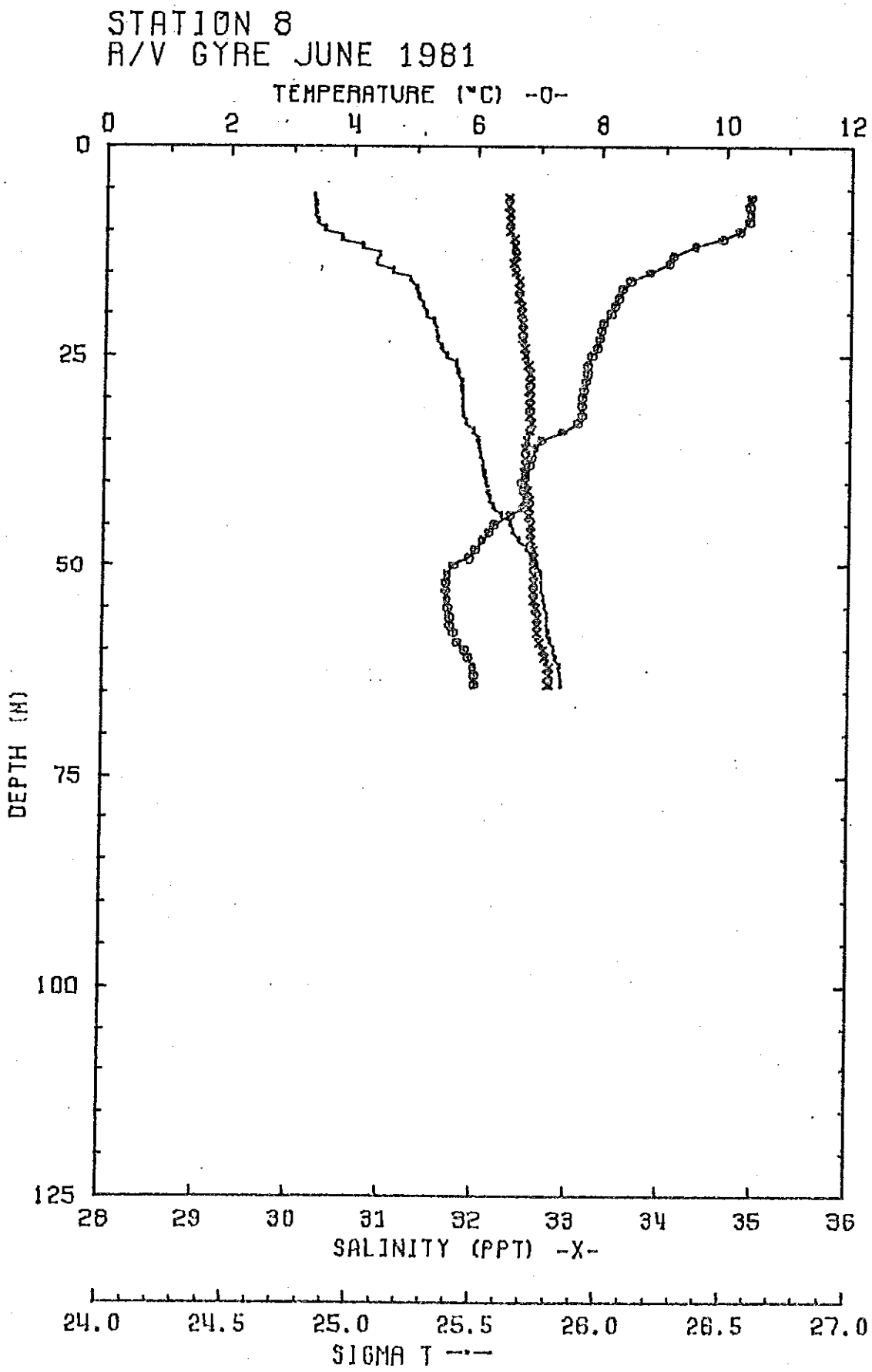
4
5
CHLOROPHYLL (UG/L) -X-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4
6
8
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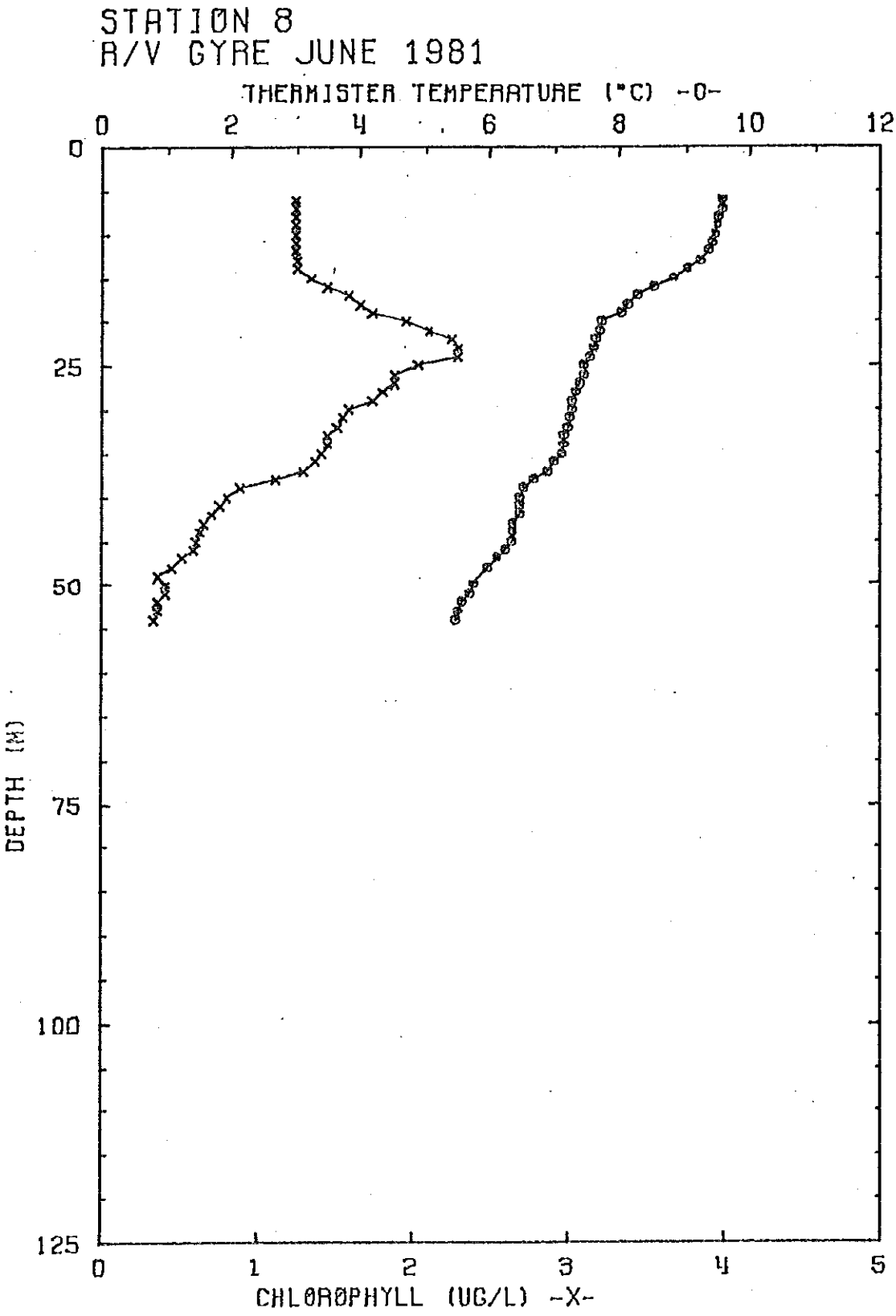
12
0
25
50
75
100
125
DEPTH (M)
28
29
30
31
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T —·—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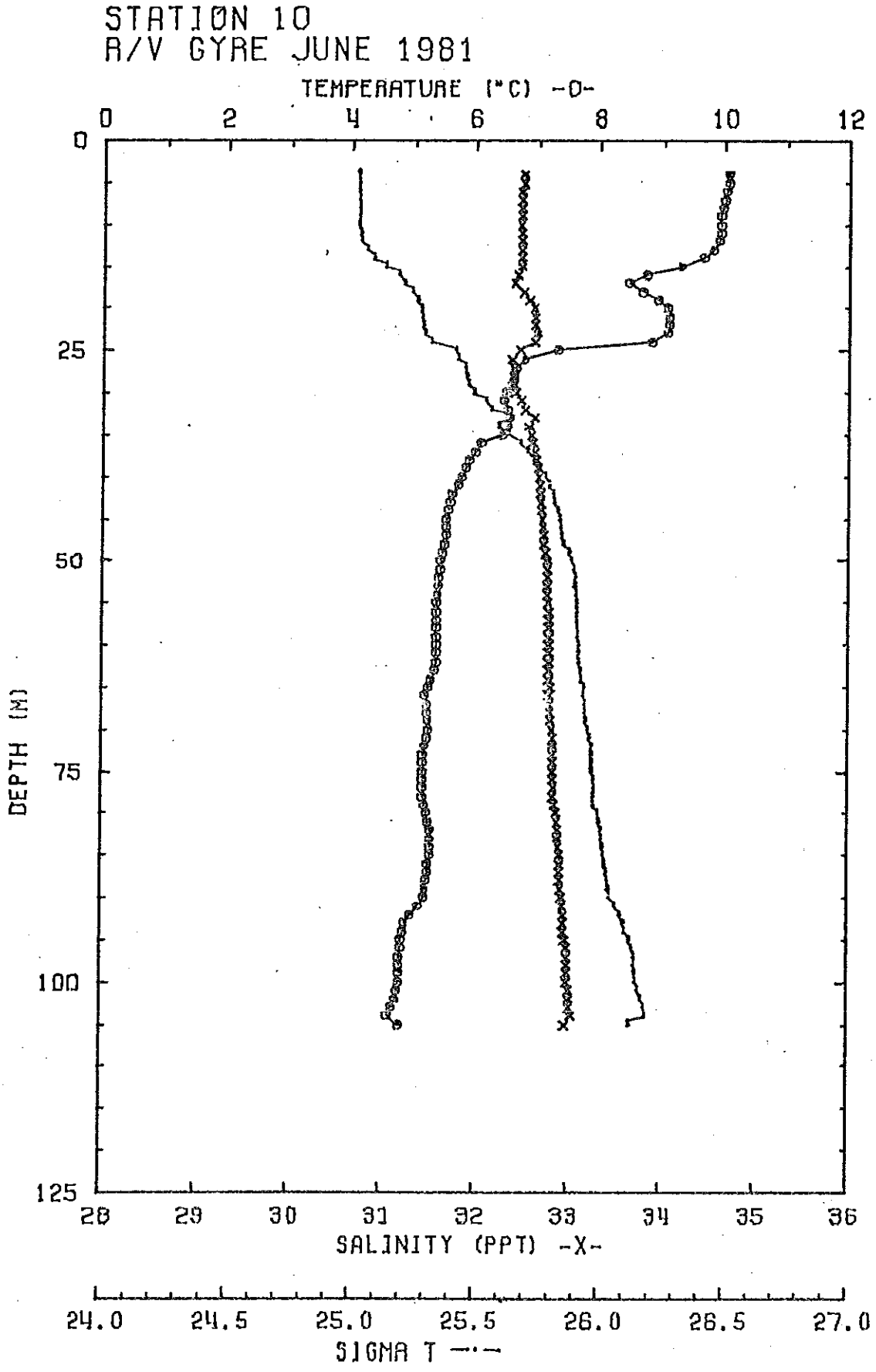
THERMISTER TEMPERATURE (°C) -O-
0
2
4
6
8
10
12
0
25
50
75
100
125
DEPTH (M)
0
1
2
3
4
5
CHLOROPHYLL (UG/L) -X-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R/V GYRE JUNE 1981
TEMPERATURE (°C) -O-
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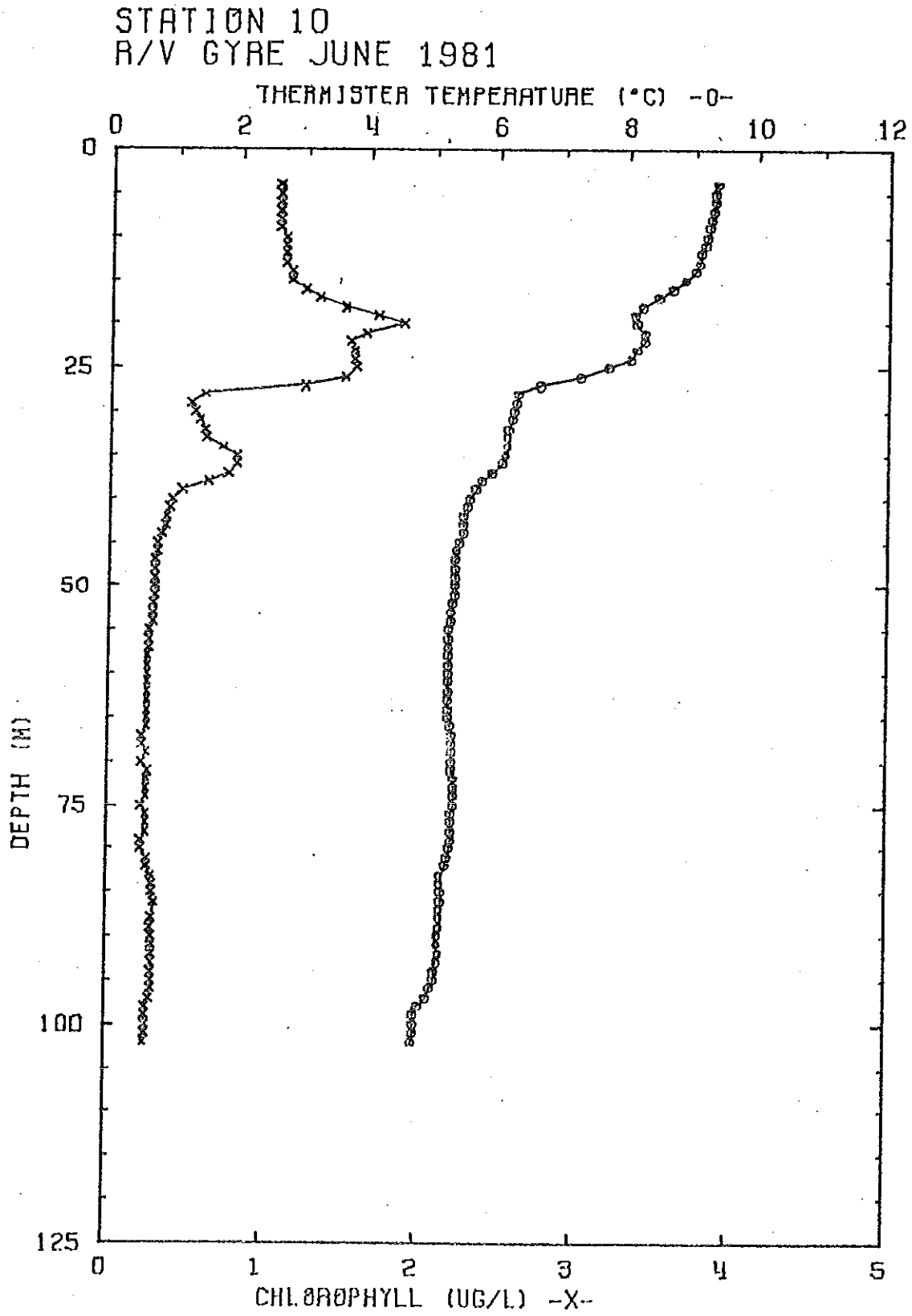
4
6
8
10
12
0
25
50
75
100
125
DEPTH (M)
28
29
30
31
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T —·—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THERMISTER TEMPERATURE (°C) -0-
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DEPTH (M)
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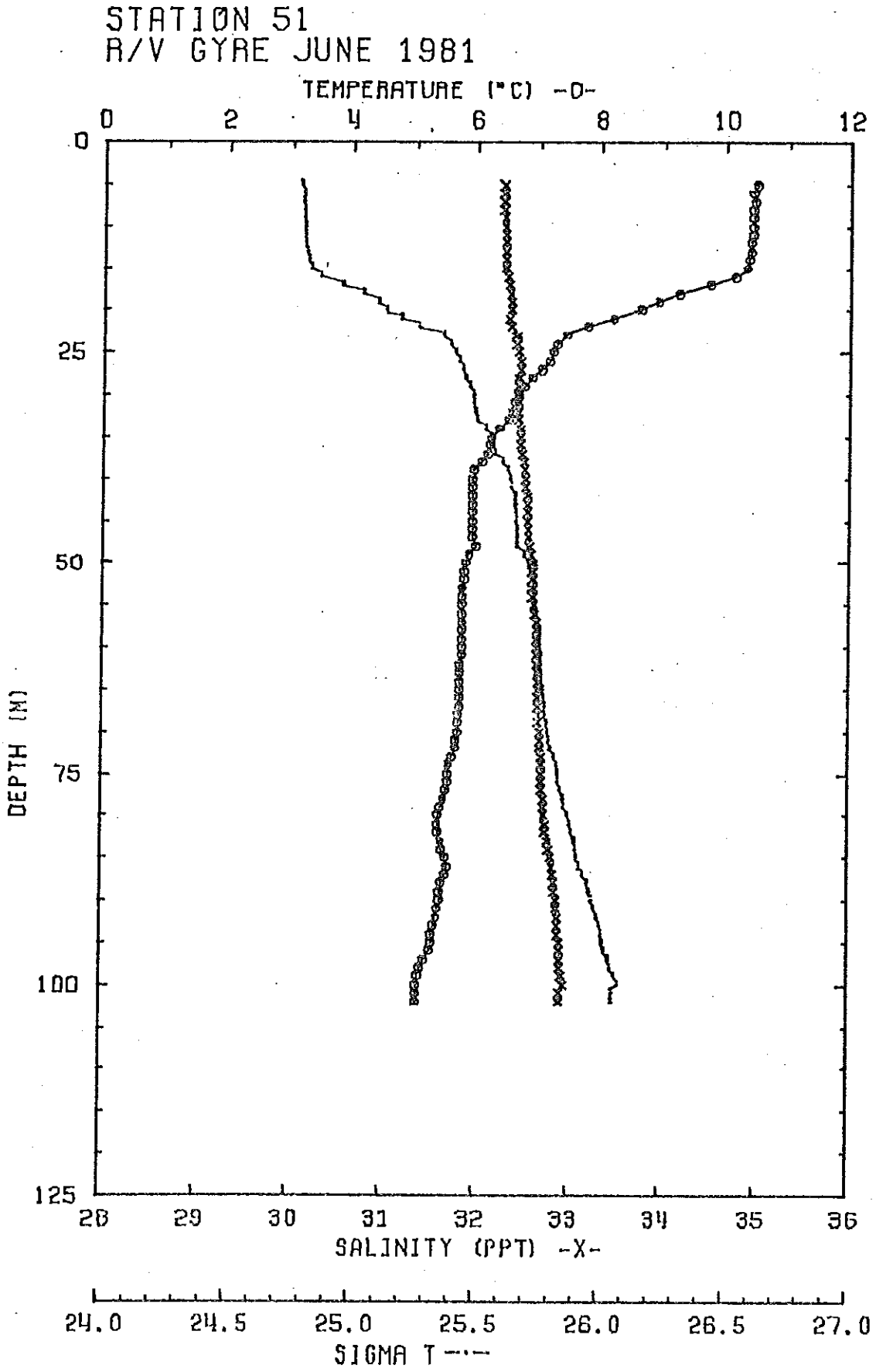
CHLOROPHYLL (UG/L) -X-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R/V GYRE JUNE 1981
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6
8
10
12
0
25
50
75
100
125
DEPTH (M)
28
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30
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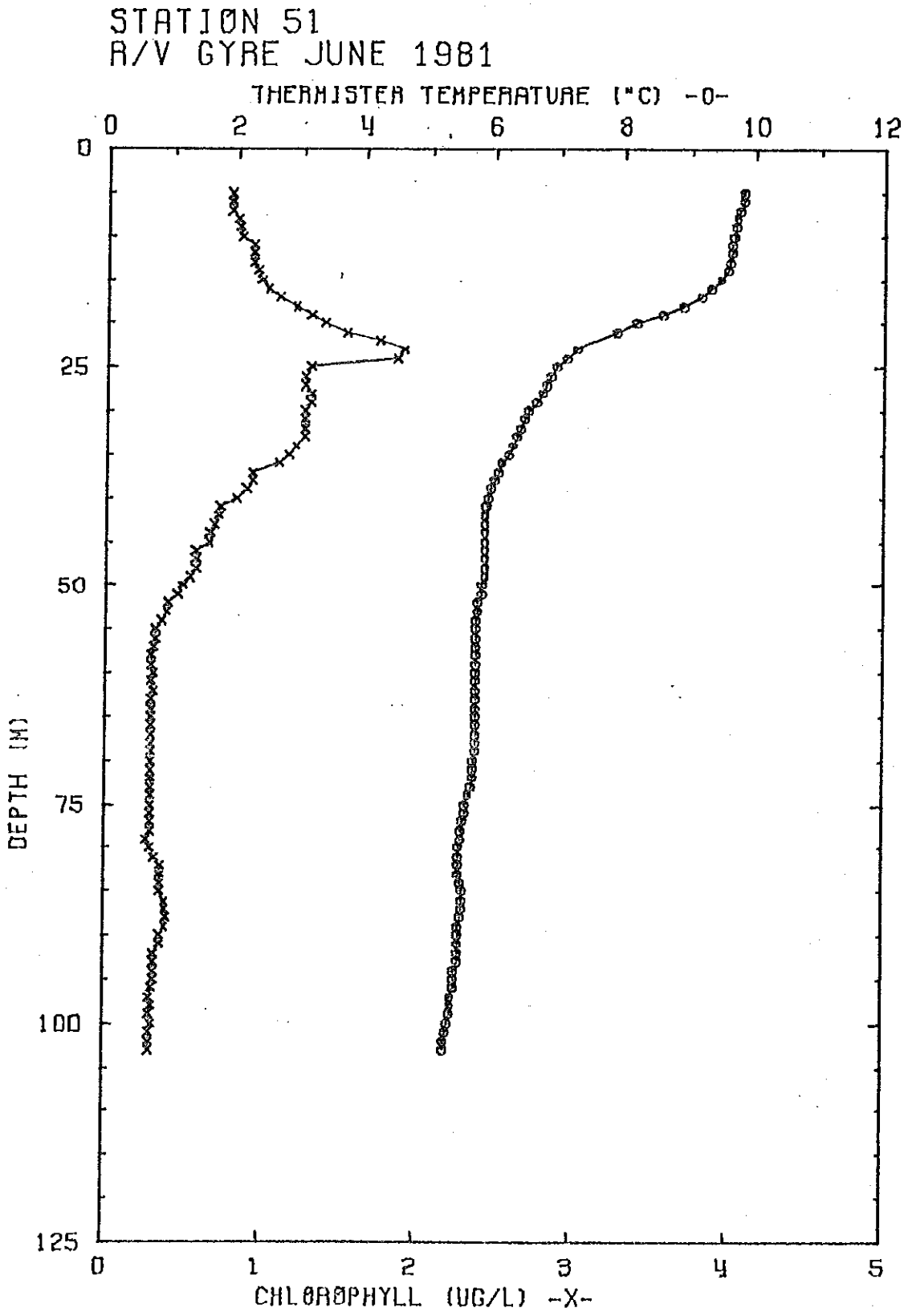
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T -·-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DEPTH (M)
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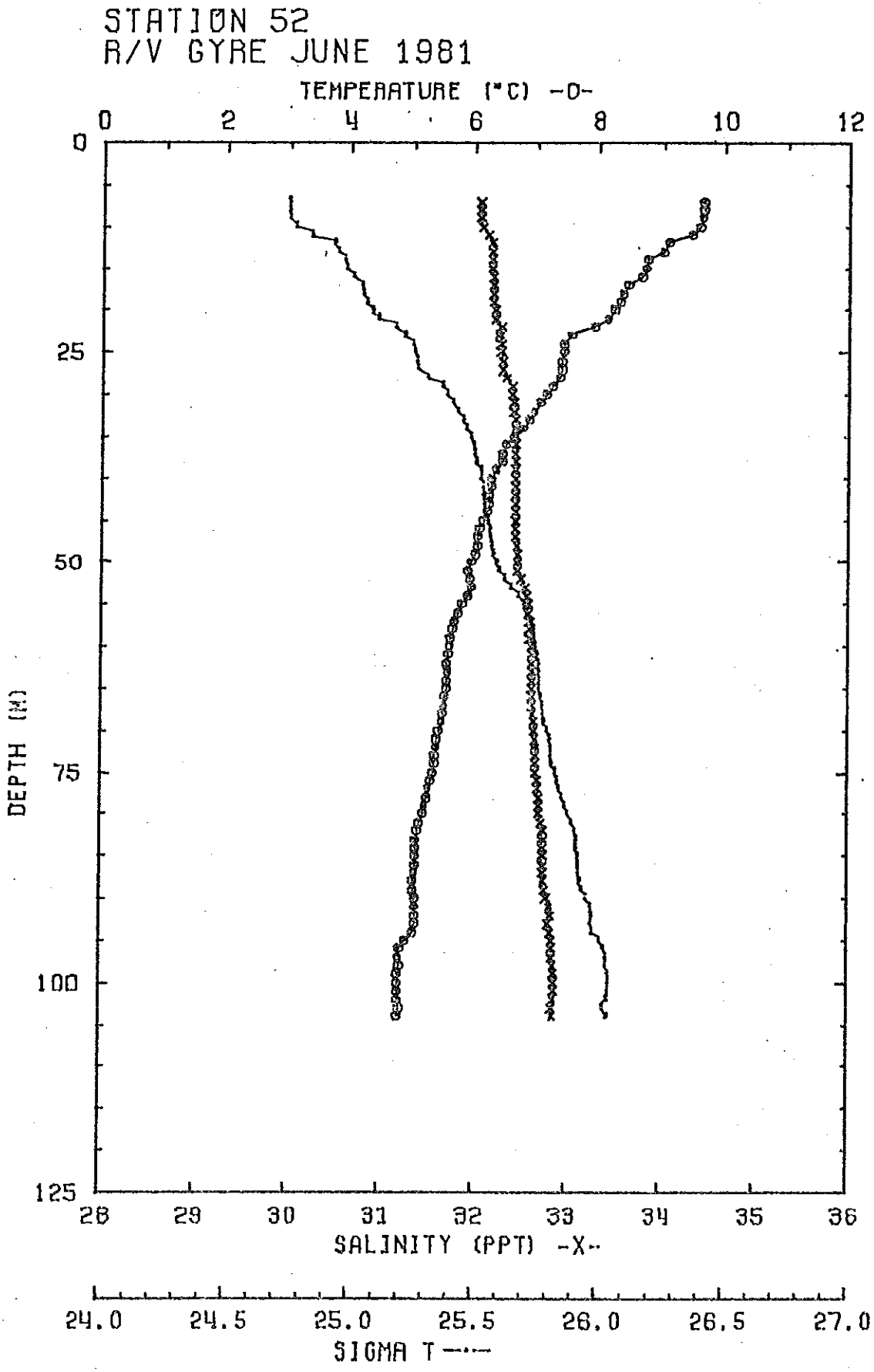
CHLOROPHYLL (UG/L) -X-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DEPTH (M)
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SALINITY (PPT) -X-
24.0
24.5
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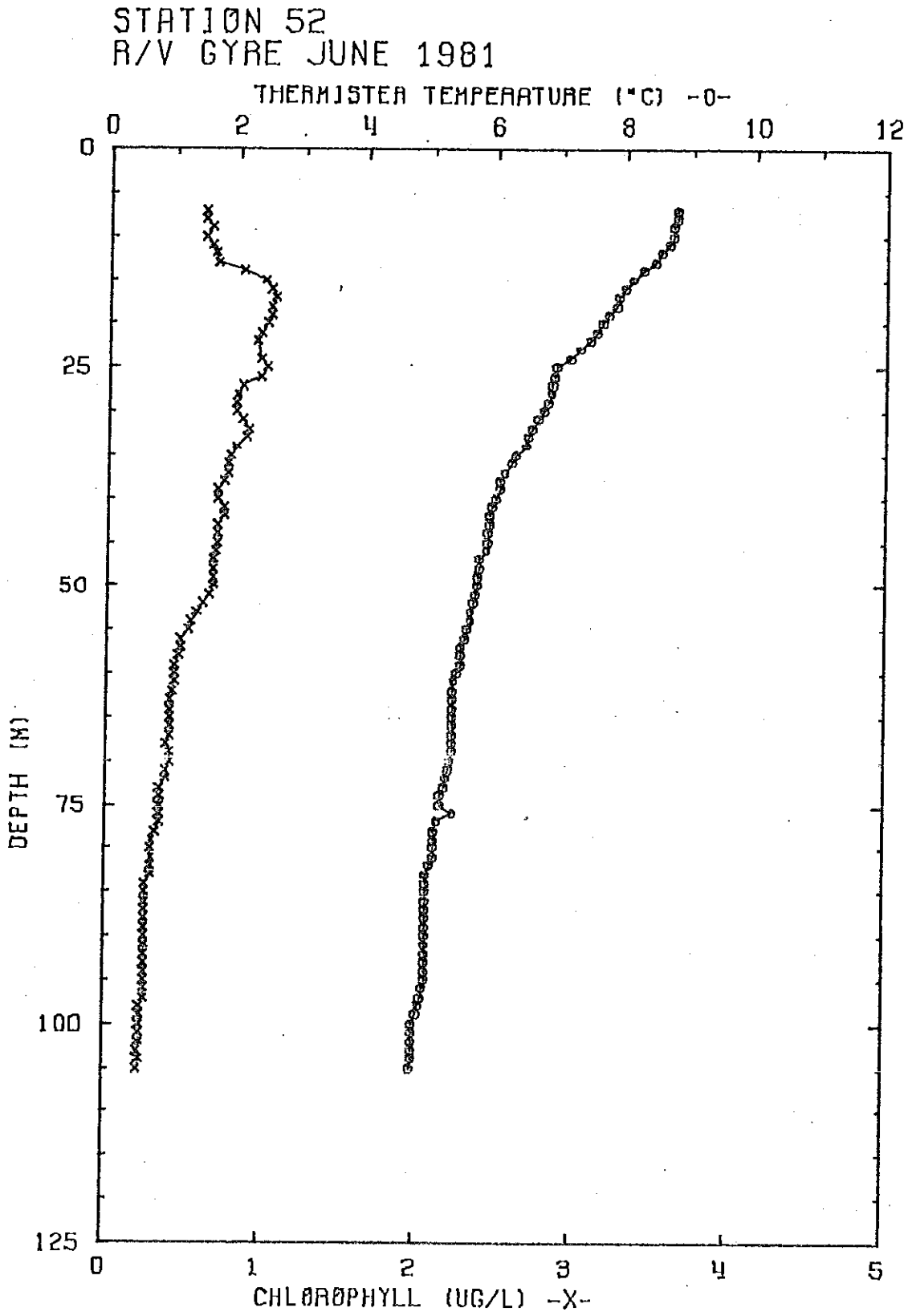
26.5
27.0
SIGMA T -·-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DEPTH (M)
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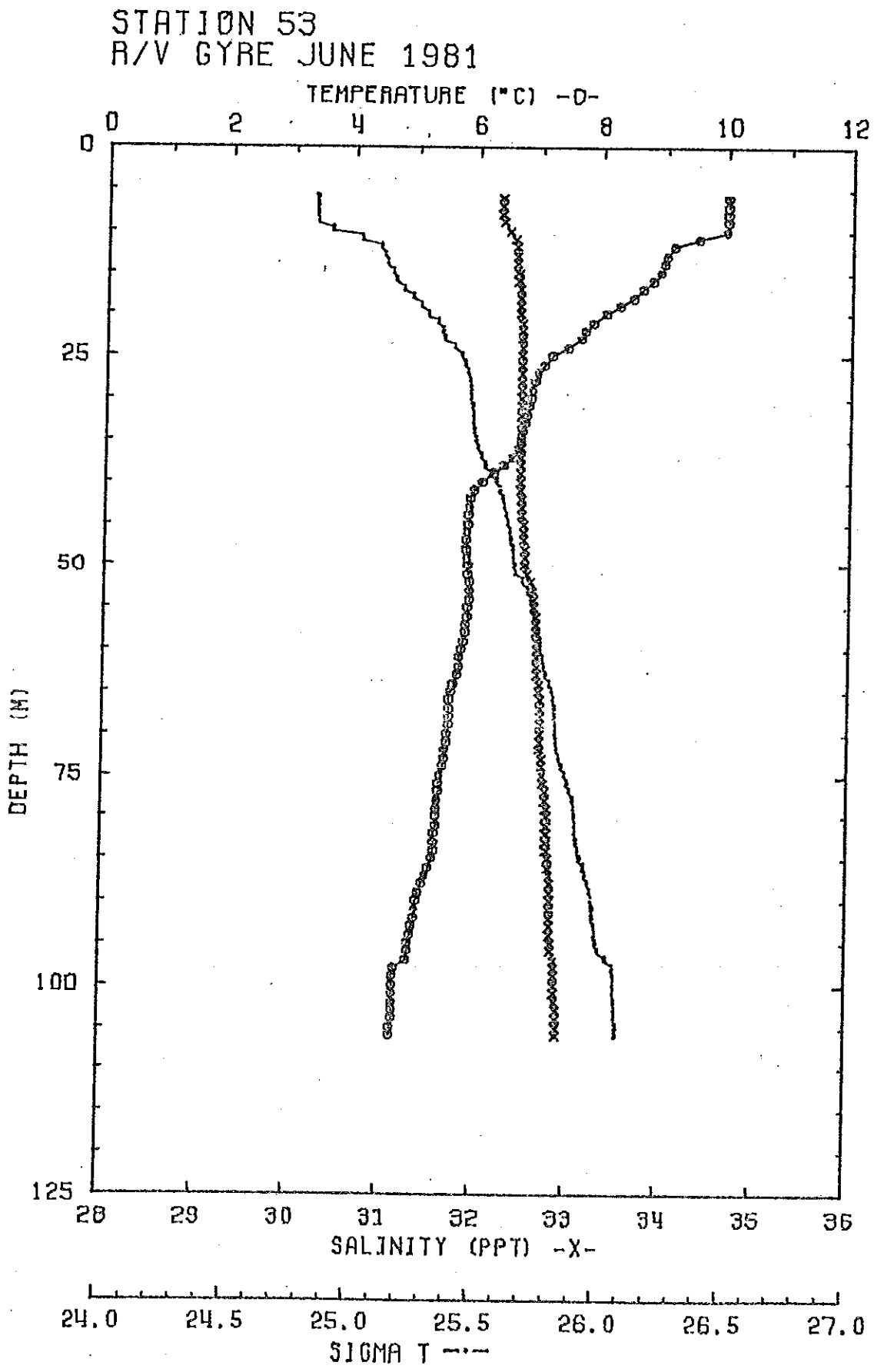
CHLOROPHYLL (UG/L) -X-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TEMPERATURE (°C) -O-
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DEPTH (M)
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SALINITY (PPT) -X-
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24.5
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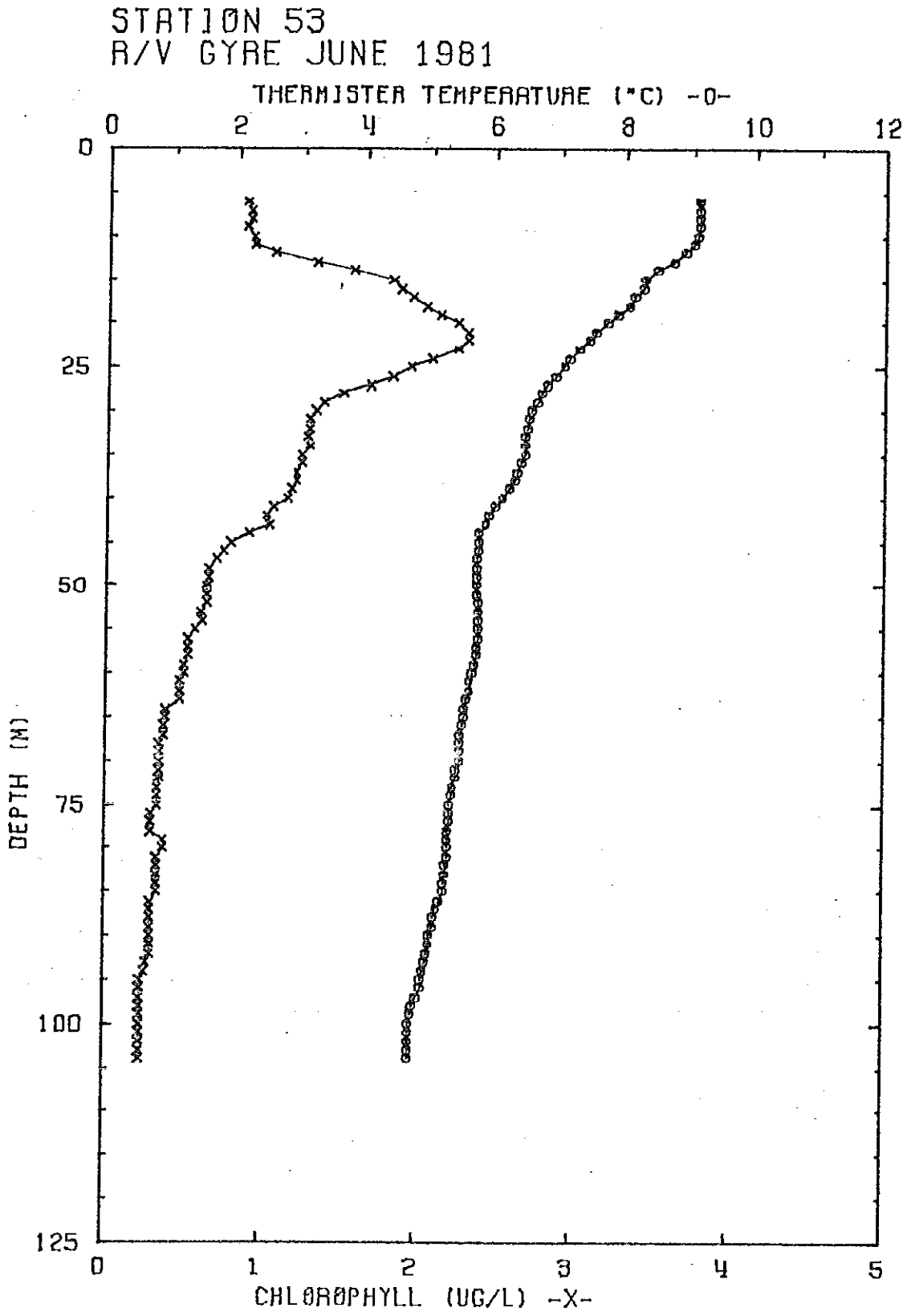
26.0
26.5
27.0
SIGMA T -·-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DEPTH (M)
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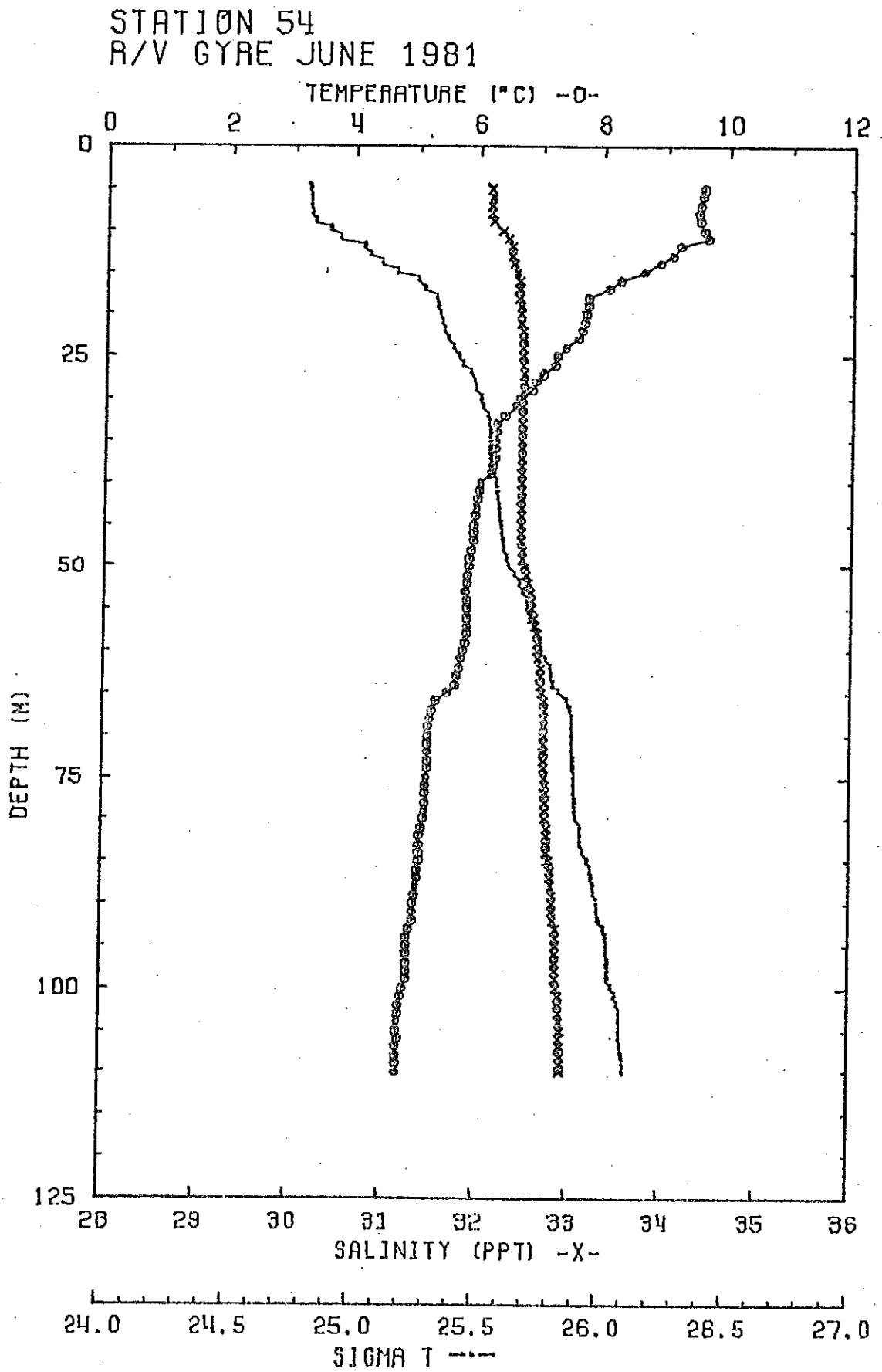
CHLOROPHYLL (UG/L) -X-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TEMPERATURE (°C) -O-
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2
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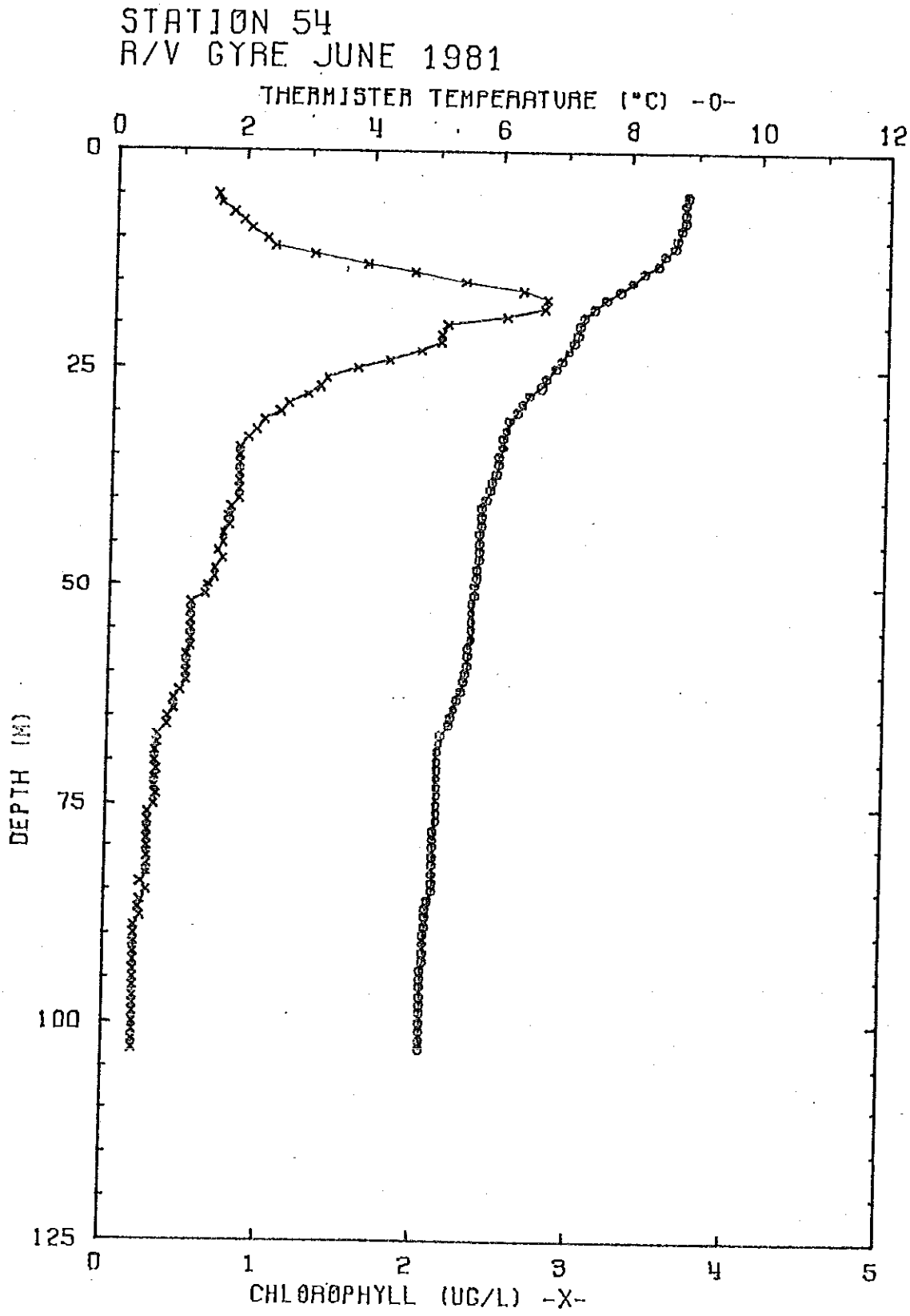
8
10
12
0
25
50
75
100
125
DEPTH (M)
28
29
30
31
32
33
34
35
36
SALINITY (PPT) -X-
24.0
24.5
25.0
25.5
26.0
26.5
27.0
SIGMA T -·-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R/V GYRE JUNE 1981
THERMISTER TEMPERATURE (°C) -O-
0
2
4
6
8
10
12
0
25
50
75
100
125
DEPTH (M)
0
1
2
3
4
5
CHLOROPHYLL (UG/L) -X-

STATION A02 CAST # 1 UPWARD LATITUDE 43 40.7N LONGITUDE 69 34.0W DATE 01/06/81 TIME 0228

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (O/OO)	SIGMA T
5.0	0.975	9.45	31.641	24.44
6.0	0.975	9.27	31.718	24.53
7.0	0.975	9.01	31.824	24.65
8.0	0.975	8.93	31.849	24.69
9.0	0.975	8.88	31.855	24.70
10.0	0.975	8.83	31.857	24.71
11.0	0.975	8.67	31.878	24.75
12.0	0.975	8.56	31.903	24.79
13.0	0.975	8.30	31.931	24.85
14.0	0.975	8.19	31.922	24.85
15.0	0.975	8.22	31.927	24.85
16.0	0.975	8.34	31.910	24.82
17.0	0.975	8.45	31.895	24.80
18.0	0.975	8.48	31.892	24.79
19.0	1.015	8.41	31.907	24.81
20.0	1.036	8.00	31.952	24.90
21.0	1.036	7.42	31.981	25.01
22.0	1.097	7.17	32.001	25.06
23.0	1.177	7.02	32.015	25.09
24.0	1.219	6.94	32.024	25.11
25.0	1.249	6.93	32.030	25.11
26.0	1.249	6.93	32.036	25.12
27.0	1.249	6.90	32.046	25.13
28.0	1.249	6.84	32.075	25.16
29.0	1.259	6.73	32.092	25.19
30.0	1.310	6.64	32.118	25.22
31.0	1.402	6.60	32.162	25.26
32.0	1.463	6.59	32.170	25.27
33.0	1.646	6.55	32.178	25.28
34.0	1.707	6.44	32.190	25.30
35.0	1.829	6.32	32.203	25.33
36.0	2.073	6.29	32.203	25.33
37.0	2.286	6.24	32.204	25.34
38.0	2.479	6.19	32.200	25.34
39.0	2.601	6.15	32.202	25.35
40.0	2.774	6.13	32.198	25.35
41.0	2.957	6.05	32.202	25.36
42.0	3.049	5.97	32.190	25.36
43.0	3.171	5.97	32.191	25.36
44.0	3.201	5.97	32.196	25.37
45.0	3.140	5.89	32.192	25.37
46.0	3.110	5.87	32.191	25.38
47.0	3.089	5.84	32.204	25.39
48.0	2.918	5.79	32.213	25.40
49.0	2.703	5.72	32.222	25.42
50.0	2.680	5.70	32.224	25.42
51.0	2.666	5.68	32.226	25.42
52.0	2.582	5.65	32.235	25.43
53.0	2.554	5.66	32.234	25.43
54.0	2.554	5.67	32.233	25.43
55.0	2.498	5.66	32.233	25.43
56.0	2.526	5.66	32.237	25.44
57.0	2.512	5.67	32.235	25.43
58.0	2.526	5.67	32.235	25.43
59.0	2.554	5.67	32.235	25.43
60.0	2.638	5.64	32.245	25.44
61.0	2.666	5.62	32.250	25.45
62.0	2.442	5.58	32.259	25.46
63.0	2.162	5.57	32.260	25.46
64.0		5.61	32.253	25.45
65.0		5.60	32.255	25.46
66.0		5.60	32.257	25.46

STATION A04 CAST # 2 UPWARD LATITUDE 43 36.6N LONGITUDE 69 31.0W DATE 01/06/81 TIME 0710

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
5.0	0.897	9.48	32.073	24.78
6.0	0.897	9.47	32.075	24.78
7.0	0.897	9.46	32.086	24.79
8.0	0.897	9.43	32.129	24.83
9.0	0.897	9.34	32.190	24.89
10.0	1.004	9.17	32.189	24.91
11.0	1.111	9.09	32.187	24.93
12.0	1.218	8.96	32.195	24.95
13.0	1.325	8.74	32.197	24.99
14.0	1.432	8.41	32.205	25.04
15.0	1.592	8.29	32.190	25.05
16.0	1.708	8.23	32.195	25.06
17.0	1.913	8.13	32.206	25.09
18.0	2.002	8.05	32.202	25.09
19.0	2.109	7.96	32.212	25.12
20.0	2.127	7.84	32.210	25.13
21.0	2.127	7.78	32.200	25.13
22.0	2.127	7.74	32.221	25.15
23.0	1.994	7.63	32.208	25.16
24.0	1.753	7.34	32.235	25.22
25.0	1.378	6.95	32.214	25.26
26.0	1.352	6.60	32.198	25.29
27.0	1.325	6.51	32.197	25.30
28.0	1.298	6.37	32.176	25.30
29.0	1.298	6.24	32.166	25.31
30.0	1.289	6.17	32.171	25.32
31.0	1.271	6.09	32.166	25.33
32.0	1.271	6.03	32.175	25.34
33.0	1.271	5.95	32.186	25.36
34.0	1.218	5.89	32.228	25.40
35.0	1.191	5.88	32.259	25.43
36.0	1.182	5.85	32.276	25.44
37.0	1.182	5.81	32.319	25.48
38.0	1.218	5.78	32.339	25.50
39.0	1.271	5.68	32.366	25.53
40.0	1.289	5.59	32.372	25.55
41.0	1.298	5.55	32.383	25.56
42.0	1.298	5.54	32.386	25.57
43.0	1.271	5.59	32.381	25.56
44.0	1.271	5.55	32.386	25.57
45.0	1.271	5.55	32.387	25.57
46.0	1.271	5.59	32.384	25.56
47.0	1.271	5.54	32.386	25.57
48.0	1.271	5.54	32.388	25.57
49.0	1.271	5.54	32.389	25.57
50.0	1.271	5.57	32.390	25.57
51.0	1.245	5.52	32.396	25.58
52.0	1.218	5.49	32.406	25.59
53.0	1.239	5.44	32.414	25.60
54.0	1.164	5.39	32.428	25.62
55.0	1.111	5.35	32.432	25.63
56.0	1.057	5.33	32.438	25.63
57.0	1.031	5.31	32.448	25.64
58.0	1.004	5.30	32.450	25.64
59.0	0.968	5.30	32.451	25.65
60.0	0.950	5.30	32.456	25.65
61.0	0.932	5.29	32.459	25.65
62.0	0.932	5.28	32.463	25.66
63.0	0.924	5.28	32.464	25.66
64.0	0.897	5.28	32.464	25.66
65.0	0.897	5.28	32.466	25.66
66.0	0.897	5.27	32.470	25.66
67.0	0.897	5.26	32.475	25.67
68.0	0.870	5.25	32.483	25.68
69.0	0.870	5.24	32.491	25.68
70.0	0.861	5.21	32.512	25.70
71.0	0.843	5.17	32.538	25.73
72.0	0.843	5.15	32.549	25.74
73.0	0.825	5.13	32.560	25.75
74.0	0.817	5.12	32.567	25.76
75.0	0.817	5.12	32.567	25.76
76.0	0.790	5.11	32.572	25.76
77.0	0.790	5.11	32.575	25.77
78.0	0.790	5.11	32.574	25.76
79.0	0.790	5.11	32.577	25.77
80.0	0.790	5.11	32.585	25.77
81.0	0.790	5.14	32.602	25.78
82.0	0.790	5.17	32.616	25.79
83.0	0.790	5.17	32.620	25.79
84.0	0.790	5.14	32.621	25.80
85.0	0.790	5.09	32.618	25.80
86.0	0.790	5.08	32.626	25.81
87.0	0.763	5.06	32.626	25.81
88.0	0.754	5.05	32.625	25.81
89.0	0.754	5.05	32.627	25.81
90.0	0.736	5.05	32.630	25.82
91.0	0.736	5.04	32.630	25.82
92.0	0.736	5.03	32.630	25.82
93.0	0.718	5.03	32.632	25.82
94.0	0.710	5.01	32.630	25.82
95.0	0.710	5.00	32.628	25.82
96.0	0.710	4.98	32.646	25.84
97.0	0.710	4.97	32.659	25.85
98.0	0.710	4.95	32.675	25.86
99.0	0.710	4.96	32.668	25.86
100.0	0.683	4.99	32.652	25.84
101.0	0.683	4.99	32.658	25.84
102.0	0.656	4.98	32.658	25.85
103.0	0.656	4.96	32.665	25.85

STATION A06 CAST # 3 UPWARD LATITUDE 43 31.5N LONGITUDE 69 27.2W DATE 01/06/81 TIME 1638

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
6.0	1.015	10.76	32.464	24.87
7.0	1.036	10.63	32.473	24.90
8.0	1.097	10.44	32.490	24.94
9.0	1.137	10.06	32.559	25.06
10.0	1.219	9.39	32.519	25.14
11.0	1.310	8.81	32.481	25.20
12.0	1.463	8.56	32.463	25.22
13.0	1.707	8.35	32.438	25.23
14.0	1.798	8.18	32.418	25.24
15.0	1.991	8.11	32.415	25.25
16.0	2.286	8.03	32.442	25.28
17.0	2.469	7.73	32.415	25.31
18.0	2.561	7.45	32.392	25.33
19.0	2.652	7.38	32.406	25.35
20.0	2.713	7.34	32.410	25.36
21.0	2.439	7.25	32.412	25.37
22.0	2.225	7.14	32.414	25.39
23.0	1.981	7.07	32.428	25.41
24.0	1.646	7.05	32.440	25.42
25.0	1.421	7.05	32.451	25.43
26.0	1.432	7.03	32.474	25.45
27.0	1.432	6.93	32.477	25.46
28.0	1.463	6.80	32.457	25.47
29.0	1.503	6.74	32.464	25.48
30.0	1.493	6.70	32.462	25.48
31.0	1.463	6.69	32.463	25.49
32.0	1.432	6.68	32.475	25.50
33.0	1.432	6.67	32.482	25.50
34.0	1.341	6.64	32.489	25.51
35.0	1.310	6.60	32.488	25.52
36.0	1.299	6.57	32.492	25.52
37.0	1.280	6.55	32.495	25.53
38.0	1.280	6.53	32.499	25.53
39.0	1.280	6.49	32.507	25.55
40.0	1.259	6.45	32.505	25.55
41.0	1.259	6.30	32.524	25.58
42.0	1.259	6.36	32.543	25.59
43.0	1.259	6.54	32.596	25.61
44.0	1.310	6.76	32.665	25.63
45.0	1.402	6.81	32.730	25.68
46.0	1.615	6.79	32.768	25.71
47.0	1.676	6.78	32.785	25.73
48.0	1.707	6.79	32.806	25.74
49.0	1.646	6.79	32.820	25.75
50.0	1.646	6.71	32.832	25.77
51.0	1.585	6.63	32.829	25.78
52.0	1.524	6.53	32.825	25.79
53.0	1.487	6.53	32.826	25.79
54.0	1.402	6.52	32.827	25.79
55.0	1.341	6.49	32.828	25.80
56.0	1.341	6.45	32.831	25.81
57.0	1.341	6.41	32.830	25.81
58.0	1.310	6.35	32.832	25.82
59.0	1.280	6.30	32.833	25.83
60.0	1.219	6.27	32.833	25.83
61.0	1.188	6.23	32.842	25.84
62.0	1.188	6.17	32.837	25.85
63.0	1.158	6.13	32.841	25.85
64.0	1.137	6.10	32.842	25.86
65.0	1.127	6.05	32.847	25.87
66.0	1.097	5.98	32.859	25.89
67.0	1.097	5.83	32.861	25.91
68.0	1.066	5.61	32.859	25.93
69.0	1.055	5.56	32.869	25.95
70.0	1.036	5.57	32.874	25.95
71.0	0.975	5.60	32.873	25.94
72.0	0.944	5.59	32.883	25.95
73.0	0.914	5.53	32.916	25.99
74.0	0.853	5.04	32.917	26.04
75.0	0.822	4.92	32.912	26.05
76.0	0.812	4.91	32.928	26.07
77.0	0.792	4.89	32.943	26.08
78.0	0.771	4.88	32.945	26.08
79.0	0.761	4.87	32.953	26.09
80.0	0.731	4.82	32.960	26.10
81.0	0.689	4.78	32.960	26.11
82.0	0.649	4.75	32.960	26.11
83.0	0.639	4.77	32.957	26.10
84.0	0.639	4.79	32.957	26.10
85.0	0.609			
86.0	0.609			
87.0	0.578			
88.0	0.567			
89.0	0.567			
90.0	0.567			
91.0	0.567			
92.0	0.548			
93.0	0.548			
94.0	0.517			
95.0	0.517			
96.0	0.517			
97.0	0.517			
98.0	0.487			
99.0	0.487			
100.0	0.487			
101.0	0.487			
102.0	0.487			
103.0	0.487			
104.0	0.487			

STATION A08 CAST # 4 UPWARD LATITUDE 43 27.9N LONGITUDE 69 23.8W DATE 01/06/81 TIME 2244

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
6.0	1.245	10.38	32.337	24.83
7.0	1.245	10.37	32.337	24.83
8.0	1.245	10.38	32.340	24.84
9.0	1.245	10.36	32.346	24.84
10.0	1.245	10.21	32.353	24.87
11.0	1.245	9.94	32.381	24.94
12.0	1.245	9.49	32.400	25.03
13.0	1.258	9.13	32.413	25.10
14.0	1.258	9.08	32.387	25.08
15.0	1.344	8.77	32.410	25.15
16.0	1.443	8.46	32.443	25.22
17.0	1.591	8.33	32.456	25.25
18.0	1.665	8.27	32.458	25.26
19.0	1.739	8.22	32.468	25.28
20.0	1.961	8.15	32.469	25.29
21.0	2.109	8.02	32.488	25.32
22.0	2.257	7.98	32.494	25.33
23.0	2.294	7.96	32.496	25.34
24.0	2.294	7.92	32.506	25.35
25.0	2.035	7.85	32.524	25.38
26.0	1.887	7.79	32.560	25.41
27.0	1.887	7.79	32.571	25.42
28.0	1.813	7.76	32.582	25.43
29.0	1.739	7.71	32.570	25.44
30.0	1.591	7.70	32.577	25.44
31.0	1.554	7.70	32.578	25.44
32.0	1.517	7.68	32.579	25.44
33.0	1.443	7.62	32.586	25.46
34.0	1.443	7.37	32.580	25.49
35.0	1.406	7.03	32.544	25.50
36.0	1.369	6.93	32.534	25.51
37.0	1.295	6.88	32.534	25.52
38.0	1.110	6.85	32.540	25.52
39.0	0.888	6.79	32.533	25.53
40.0	0.801	6.73	32.531	25.53
41.0	0.752	6.78	32.549	25.54
42.0	0.703	6.81	32.566	25.55
43.0	0.653	6.75	32.578	25.57
44.0	0.629	6.55	32.582	25.60
45.0	0.604	6.29	32.587	25.63
46.0	0.592	6.21	32.590	25.65
47.0	0.518	6.10	32.602	25.67
48.0	0.444	6.01	32.626	25.70
49.0	0.357	5.90	32.633	25.72
50.0	0.407	5.65	32.632	25.75
51.0	0.407	5.55	32.629	25.76
52.0	0.357	5.53	32.631	25.76
53.0	0.357	5.53	32.634	25.76
54.0	0.333	5.55	32.645	25.77
55.0		5.57	32.658	25.78
56.0		5.59	32.669	25.78
57.0		5.60	32.670	25.78
58.0		5.65	32.686	25.79
59.0		5.72	32.706	25.80
60.0		5.84	32.744	25.81
61.0		5.90	32.759	25.82
62.0		5.98	32.791	25.83
63.0		5.99	32.802	25.84
64.0		6.00	32.805	25.84

STATION A10 CAST # 5 UPWARD LATITUDE 43 22.6N LONGITUDE 69 22.7W DATE 02/06/81 TIME 0317

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
4.0	1.079	10.06	32.510	25.02
5.0	1.079	10.05	32.505	25.02
6.0	1.079	10.02	32.501	25.02
7.0	1.079	10.00	32.499	25.02
8.0	1.079	9.96	32.491	25.02
9.0	1.079	9.93	32.485	25.02
10.0	1.114	9.93	32.482	25.02
11.0	1.114	9.92	32.486	25.03
12.0	1.114	9.90	32.491	25.03
13.0	1.114	9.81	32.500	25.05
14.0	1.150	9.65	32.501	25.08
15.0	1.150	9.30	32.492	25.13
16.0	1.239	8.72	32.448	25.19
17.0	1.328	8.46	32.420	25.20
18.0	1.507	8.68	32.510	25.24
19.0	1.721	8.92	32.581	25.26
20.0	1.881	9.06	32.626	25.27
21.0	1.641	9.09	32.636	25.28
22.0	1.542	9.09	32.642	25.28
23.0	1.560	9.08	32.653	25.29
24.0	1.560	8.83	32.637	25.32
25.0	1.570	7.30	32.479	25.42
26.0	1.507	6.78	32.398	25.42
27.0	1.239	6.64	32.415	25.45
28.0	0.597	6.63	32.418	25.46
29.0	0.517	6.59	32.420	25.46
30.0	0.544	6.49	32.438	25.49
31.0	0.571	6.45	32.491	25.54
32.0	0.597	6.53	32.526	25.56
33.0	0.615	6.55	32.635	25.64
34.0	0.722	6.53	32.567	25.59
35.0	0.811	6.41	32.605	25.63
36.0	0.811	6.09	32.609	25.68
37.0	0.758	6.01	32.630	25.70
38.0	0.624	5.91	32.650	25.73
39.0	0.464	5.83	32.668	25.75
40.0	0.401	5.77	32.687	25.78
41.0	0.383	5.72	32.695	25.79
42.0	0.365	5.63	32.706	25.81
43.0	0.357	5.60	32.708	25.81
44.0	0.330	5.56	32.718	25.83
45.0	0.303	5.54	32.728	25.84
46.0	0.303	5.54	32.729	25.84
47.0	0.294	5.53	32.733	25.84
48.0	0.294	5.51	32.742	25.85
49.0	0.294	5.47	32.762	25.87
50.0	0.294	5.43	32.775	25.89
51.0	0.294	5.44	32.783	25.89
52.0	0.276	5.40	32.785	25.90
53.0	0.276	5.40	32.786	25.90
54.0	0.276	5.40	32.787	25.90
55.0	0.258	5.39	32.790	25.90
56.0	0.258	5.39	32.791	25.90
57.0	0.258	5.39	32.793	25.91
58.0	0.250	5.39	32.795	25.91
59.0	0.250	5.39	32.796	25.91
60.0	0.250	5.39	32.799	25.91
61.0	0.250	5.38	32.801	25.91
62.0	0.250	5.38	32.802	25.91
63.0	0.250	5.34	32.805	25.92
64.0	0.250	5.30	32.804	25.92
65.0	0.250	5.25	32.812	25.94
66.0	0.250	5.20	32.797	25.93
67.0	0.223	5.22	32.810	25.94
68.0	0.223	5.23	32.811	25.94
69.0	0.250	5.24	32.821	25.94
70.0	0.223	5.25	32.831	25.95
71.0	0.258	5.23	32.838	25.96
72.0	0.250	5.19	32.842	25.97
73.0	0.250	5.17	32.838	25.97
74.0	0.250	5.15	32.836	25.97
75.0	0.223	5.16	32.838	25.97
76.0	0.250	5.16	32.845	25.97
77.0	0.250	5.17	32.852	25.98
78.0	0.250	5.18	32.850	25.97
79.0	0.223	5.20	32.854	25.98
80.0	0.223	5.24	32.881	25.99
81.0	0.258	5.27	32.892	26.00
82.0	0.258	5.28	32.900	26.00
83.0	0.276	5.28	32.910	26.01
84.0	0.294	5.28	32.912	26.01
85.0	0.294	5.27	32.915	26.02
86.0	0.303	5.26	32.921	26.02
87.0		5.25	32.925	26.03
88.0	0.294	5.23	32.929	26.03
89.0	0.276	5.21	32.933	26.04
90.0	0.294	5.20	32.935	26.04
91.0	0.294	5.11	32.953	26.06
92.0	0.294	4.98	32.958	26.08
93.0	0.294	4.87	32.958	26.09
94.0	0.294	4.84	32.961	26.10
95.0	0.294	4.82	32.985	26.12
96.0	0.294	4.82	32.998	26.13
97.0	0.276	4.81	33.005	26.14
98.0	0.258	4.81	33.006	26.14
99.0	0.258	4.80	33.010	26.14
100.0	0.258	4.79	33.013	26.15
101.0	0.258	4.77	33.019	26.15
102.0	0.250	4.74	33.029	26.17
103.0		4.67	33.034	26.18
104.0		4.62	33.039	26.19
105.0		4.79	32.976	26.12

STATION A51 CAST # 6 UPWARD LATITUDE 43 33.4N LONGITUDE 69 29.9W DATE 02/06/81 TIME 1305

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
5.0	0.796	10.48	32.296	24.78
6.0	0.796	10.43	32.296	24.79
7.0	0.796	10.45	32.294	24.79
8.0	0.829	10.43	32.296	24.79
9.0	0.851	10.42	32.297	24.79
10.0	0.863	10.41	32.298	24.80
11.0	0.931	10.41	32.299	24.80
12.0	0.942	10.40	32.300	24.80
13.0	0.942	10.39	32.301	24.80
14.0	0.964	10.36	32.304	24.81
15.0	0.986	10.32	32.313	24.82
16.0	1.032	10.14	32.322	24.86
17.0	1.099	9.75	32.353	24.95
18.0	1.211	9.26	32.359	25.03
19.0	1.302	8.93	32.375	25.10
20.0	1.403	8.65	32.364	25.13
21.0	1.538	8.19	32.350	25.19
22.0	1.751	7.79	32.369	25.26
23.0	1.909	7.44	32.432	25.36
24.0	1.876	7.28	32.440	25.39
25.0	1.302	7.22	32.453	25.41
26.0	1.268	7.15	32.464	25.42
27.0	1.268	7.04	32.464	25.44
28.0	1.302	6.87	32.452	25.45
29.0	1.302	6.76	32.452	25.47
30.0	1.268	6.67	32.452	25.48
31.0	1.268	6.62	32.451	25.48
32.0	1.268	6.57	32.448	25.49
33.0	1.268	6.53	32.449	25.50
34.0	1.211	6.37	32.469	25.53
35.0	1.167	6.23	32.478	25.56
36.0	1.099	6.21	32.481	25.56
37.0	0.942	6.18	32.489	25.57
38.0	0.931	6.07	32.510	25.60
39.0	0.897	5.97	32.523	25.62
40.0	0.829	5.94	32.527	25.63
41.0	0.728	5.93	32.536	25.64
42.0	0.716	5.93	32.548	25.65
43.0	0.694	5.93	32.552	25.65
44.0	0.672	5.94	32.557	25.65
45.0	0.661	5.95	32.560	25.66
46.0	0.581	5.94	32.564	25.66
47.0	0.581	5.94	32.565	25.66
48.0	0.581	5.99	32.568	25.66
49.0	0.537	5.89	32.593	25.69
50.0	0.492	5.84	32.610	25.71
51.0	0.458	5.82	32.620	25.72
52.0	0.402	5.80	32.622	25.72
53.0	0.391	5.78	32.622	25.72
54.0	0.357	5.77	32.624	25.73
55.0	0.323	5.77	32.626	25.73
56.0	0.323	5.77	32.634	25.74
57.0	0.311	5.77	32.648	25.75
58.0	0.289	5.77	32.652	25.75
59.0	0.289	5.78	32.655	25.75
60.0	0.311	5.78	32.659	25.75
61.0	0.289	5.77	32.663	25.76
62.0	0.311	5.76	32.663	25.76
63.0	0.289	5.76	32.666	25.76
64.0	0.289	5.75	32.668	25.76
65.0	0.289	5.75	32.670	25.77
66.0	0.289	5.74	32.673	25.77
67.0	0.289	5.74	32.675	25.77
68.0	0.289	5.73	32.679	25.78
69.0	0.289	5.72	32.684	25.78
70.0	0.289	5.70	32.689	25.79
71.0	0.289	5.69	32.692	25.79
72.0	0.289	5.68	32.697	25.80
73.0	0.289	5.62	32.709	25.81
74.0	0.289	5.58	32.716	25.82
75.0	0.289	5.56	32.720	25.83
76.0	0.289	5.55	32.723	25.83
77.0	0.289	5.53	32.727	25.84
78.0	0.289	5.49	32.735	25.85
79.0	0.267	5.44	32.738	25.86
80.0	0.289	5.40	32.748	25.87
81.0	0.323	5.40	32.757	25.88
82.0	0.357	5.41	32.768	25.88
83.0	0.357	5.46	32.790	25.90
84.0	0.357	5.48	32.801	25.90
85.0	0.357	5.54	32.815	25.90
86.0	0.391	5.56	32.830	25.91
87.0	0.391	5.54	32.846	25.93
88.0	0.402	5.47	32.860	25.95
89.0	0.391	5.44	32.867	25.96
90.0	0.357	5.43	32.876	25.97
91.0	0.357	5.42	32.889	25.98
92.0	0.323	5.39	32.902	25.99
93.0	0.323	5.36	32.909	26.00
94.0	0.323	5.32	32.911	26.01
95.0	0.323	5.31	32.915	26.01
96.0	0.311	5.28	32.922	26.02
97.0	0.289	5.19	32.927	26.03
98.0	0.311	5.14	32.930	26.04
99.0	0.289	5.09	32.950	26.06
100.0	0.311	5.07	32.965	26.08
101.0	0.289	5.07	32.932	26.05
102.0	0.289	5.07	32.930	26.05
103.0	0.289			

STATION A52 CAST # 7 UPWARD LATITUDE 43 34.7N LONGITUDE 69 29.7W DATE 02/06/81 TIME 2017

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
7.0	0.619	9.65	32.065	24.74
8.0	0.619	9.64	32.064	24.74
9.0	0.649	9.64	32.067	24.75
10.0	0.619	9.60	32.089	24.77
11.0	0.649	9.46	32.144	24.83
12.0	0.678	9.10	32.190	24.93
13.0	0.698	9.01	32.192	24.94
14.0	0.857	8.78	32.184	24.97
15.0	1.006	8.73	32.183	24.98
16.0	1.035	8.66	32.201	25.00
17.0	1.065	8.45	32.204	25.04
18.0	1.035	8.38	32.199	25.04
19.0	1.035	8.33	32.208	25.06
20.0	1.015	8.23	32.219	25.08
21.0	0.976	8.13	32.234	25.11
22.0	0.946	7.92	32.284	25.18
23.0		7.57	32.266	25.21
24.0	0.976	7.45	32.289	25.25
25.0	1.015	7.43	32.296	25.25
26.0	0.976	7.41	32.301	25.26
27.0	0.857	7.40	32.304	25.27
28.0	0.827	7.36	32.353	25.31
29.0	0.817	7.24	32.406	25.37
30.0	0.817	7.15	32.411	25.38
31.0	0.857	7.07	32.429	25.41
32.0	0.896	6.96	32.437	25.43
33.0	0.887	6.90	32.452	25.45
34.0	0.817	6.79	32.451	25.46
35.0	0.777	6.65	32.451	25.48
36.0	0.768	6.52	32.446	25.49
37.0	0.768	6.46	32.442	25.50
38.0	0.738	6.45	32.446	25.50
39.0	0.708	6.35	32.455	25.52
40.0	0.708	6.28	32.446	25.52
41.0	0.738	6.26	32.451	25.53
42.0	0.738	6.24	32.449	25.53
43.0	0.708	6.25	32.452	25.53
44.0	0.708	6.22	32.457	25.54
45.0	0.708	6.14	32.459	25.55
46.0	0.698	6.08	32.456	25.56
47.0	0.678	6.05	32.458	25.56
48.0	0.678	6.05	32.462	25.57
49.0	0.678	6.03	32.467	25.57
50.0	0.678	5.96	32.475	25.59
51.0	0.649	5.91	32.477	25.59
52.0	0.619	5.95	32.516	25.62
53.0	0.579	5.96	32.550	25.65
54.0	0.539	5.90	32.580	25.68
55.0	0.530	5.82	32.597	25.70
56.0	0.470	5.76	32.604	25.71
57.0	0.470	5.70	32.614	25.73
58.0	0.460	5.66	32.616	25.73
59.0	0.440	5.63	32.620	25.74
60.0	0.440	5.61	32.625	25.75
61.0	0.440	5.59	32.628	25.75
62.0	0.420	5.57	32.633	25.76
63.0	0.411	5.58	32.632	25.76
64.0	0.411	5.56	32.635	25.76
65.0	0.411	5.55	32.637	25.76
66.0	0.411	5.53	32.640	25.77
67.0	0.411	5.52	32.643	25.77
68.0	0.381	5.50	32.646	25.78
69.0	0.411	5.49	32.650	25.78
70.0	0.411	5.45	32.658	25.79
71.0	0.381	5.40	32.667	25.80
72.0	0.381	5.40	32.670	25.81
73.0	0.341	5.39	32.668	25.81
74.0	0.351	5.38	32.674	25.81
75.0	0.341	5.34	32.684	25.83
76.0	0.341	5.31	32.692	25.83
77.0	0.341	5.27	32.699	25.84
78.0	0.321	5.25	32.709	25.86
79.0	0.301	5.21	32.717	25.87
80.0	0.292	5.18	32.727	25.88
81.0	0.301	5.14	32.741	25.89
82.0	0.292	5.10	32.753	25.91
83.0	0.292	5.08	32.757	25.91
84.0	0.262	5.08	32.758	25.91
85.0	0.262	5.07	32.764	25.92
86.0	0.262	5.06	32.764	25.92
87.0	0.262	5.06	32.767	25.92
88.0	0.262	5.05	32.769	25.93
89.0	0.262	5.05	32.780	25.93
90.0	0.262	5.08	32.809	25.95
91.0	0.262	5.08	32.831	25.97
92.0	0.262	5.07	32.834	25.97
93.0	0.262	5.07	32.828	25.97
94.0	0.262	5.04	32.835	25.98
95.0	0.262	4.93	32.858	26.01
96.0	0.262	4.82	32.862	26.02
97.0	0.262	4.81	32.870	26.03
98.0	0.232	4.82	32.872	26.03
99.0	0.232	4.81	32.879	26.04
100.0	0.232	4.81	32.879	26.04
101.0	0.232	4.81	32.878	26.04
102.0	0.232	4.80	32.872	26.03
103.0	0.222	4.83	32.859	26.02
104.0	0.232	4.80	32.871	26.03
105.0	0.222			

STATION A53 CAST # 8 UPWARD LATITUDE 43 34.1N LONGITUDE 69 29.2W DATE 03/06/01 TIME 0250

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (O/OO)	SIGMA T
6.0	0.885	9.98	32.253	24.83
7.0	0.907	9.98	32.252	24.83
8.0	0.907	9.98	32.255	24.84
9.0	0.885	10.00	32.264	24.84
10.0	0.929	9.98	32.334	24.90
11.0	0.941	9.54	32.398	25.02
12.0	1.064	9.13	32.416	25.10
13.0	1.334	9.02	32.413	25.11
14.0	1.582	8.97	32.417	25.12
15.0	1.829	8.91	32.433	25.15
16.0	1.886	8.79	32.428	25.16
17.0	1.964	8.65	32.444	25.19
18.0	2.055	8.48	32.453	25.23
19.0	2.144	8.26	32.456	25.26
20.0	2.257	8.06	32.460	25.29
21.0	2.325	7.84	32.467	25.33
22.0	2.325	7.70	32.466	25.35
23.0	2.257	7.66	32.470	25.36
24.0	2.089	7.43	32.482	25.40
25.0	1.954	7.20	32.481	25.43
26.0	1.829	7.06	32.473	25.44
27.0	1.694	6.96	32.469	25.45
28.0	1.515	6.91	32.467	25.46
29.0	1.380	6.87	32.468	25.47
30.0	1.334	6.85	32.466	25.47
31.0	1.289	6.81	32.467	25.47
32.0	1.289	6.79	32.467	25.48
33.0	1.279	6.77	32.460	25.48
34.0	1.289	6.74	32.468	25.48
35.0	1.245	6.70	32.472	25.49
36.0	1.245	6.66	32.476	25.50
37.0	1.211	6.58	32.481	25.51
38.0	1.211	6.43	32.477	25.53
39.0	1.177	6.26	32.477	25.55
40.0	1.154	6.08	32.475	25.57
41.0	1.064	5.95	32.477	25.59
42.0	1.020	5.92	32.484	25.60
43.0	1.042	5.89	32.493	25.61
44.0	0.907	5.88	32.499	25.62
45.0	0.794	5.87	32.508	25.63
46.0	0.750	5.86	32.514	25.63
47.0	0.705	5.85	32.520	25.64
48.0	0.659	5.85	32.530	25.64
49.0	0.659	5.86	32.535	25.65
50.0	0.637	5.87	32.541	25.65
51.0	0.637	5.89	32.551	25.66
52.0	0.637	5.89	32.590	25.69
53.0	0.604	5.90	32.619	25.71
54.0	0.615	5.90	32.633	25.72
55.0	0.570	5.88	32.643	25.73
56.0	0.524	5.87	32.648	25.73
57.0	0.524	5.84	32.660	25.75
58.0	0.524	5.84	32.665	25.75
59.0	0.502	5.81	32.668	25.76
60.0	0.502	5.79	32.671	25.76
61.0	0.469	5.76	32.676	25.77
62.0	0.469	5.75	32.679	25.77
63.0	0.469	5.72	32.686	25.78
64.0	0.389	5.66	32.697	25.80
65.0	0.389	5.62	32.702	25.81
66.0	0.367	5.61	32.711	25.82
67.0	0.367	5.60	32.714	25.82
68.0	0.345	5.59	32.715	25.82
69.0	0.345	5.59	32.717	25.82
70.0	0.345	5.58	32.717	25.82
71.0	0.345	5.55	32.719	25.83
72.0	0.345	5.54	32.722	25.83
73.0	0.334	5.53	32.731	25.84
74.0	0.334	5.50	32.742	25.85
75.0	0.334	5.46	32.749	25.86
76.0	0.300	5.44	32.762	25.88
77.0	0.300	5.43	32.772	25.88
78.0	0.300	5.43	32.788	25.90
79.0	0.367	5.42	32.792	25.90
80.0	0.367	5.41	32.796	25.91
81.0	0.334	5.40	32.798	25.91
82.0	0.334	5.39	32.799	25.91
83.0	0.334	5.39	32.801	25.91
84.0	0.334	5.37	32.807	25.92
85.0	0.334	5.34	32.814	25.93
86.0	0.300	5.29	32.824	25.94
87.0	0.300	5.24	32.831	25.95
88.0	0.300	5.19	32.834	25.96
89.0	0.300	5.13	32.837	25.97
90.0	0.300	5.11	32.842	25.98
91.0	0.300	5.09	32.845	25.98
92.0	0.300	5.07	32.844	25.98
93.0	0.266	5.05	32.848	25.99
94.0	0.254	5.01	32.849	25.99
95.0	0.232	4.99	32.853	26.00
96.0	0.232	4.99	32.863	26.01
97.0	0.232	4.94	32.893	26.04
98.0	0.232	4.77	32.908	26.07
99.0	0.232	4.74	32.909	26.07
100.0	0.232	4.74	32.909	26.07
101.0	0.232	4.74	32.910	26.07
102.0	0.232	4.73	32.912	26.07
103.0	0.232	4.73	32.915	26.08
104.0	0.232	4.72	32.916	26.08
105.0		4.71	32.917	26.08
106.0		4.71	32.919	26.08

STATION A54 CAST # 9 UPWARD LATITUDE 43 34.6N LONGITUDE 69 30.4W DATE 03/06/81 TIME 0727

DEPTH (M)	CHLOROPHYLL (UG/L)	TEMPERATURE (DEG C)	SALINITY (0/00)	SIGMA T
5.0	0.648	9.58	32.129	24.80
6.0	0.673	9.56	32.134	24.81
7.0	0.762	9.52	32.125	24.81
8.0	0.824	9.50	32.126	24.81
9.0	0.875	9.53	32.148	24.83
10.0	0.975	9.59	32.242	24.89
11.0	1.026	9.65	32.309	24.93
12.0	1.277	9.22	32.341	25.03
13.0	1.630	9.11	32.350	25.05
14.0	1.932	8.90	32.374	25.10
15.0	2.272	8.65	32.401	25.16
16.0	2.636	8.27	32.440	25.25
17.0	2.800	8.09	32.438	25.27
18.0	2.787	7.76	32.440	25.32
19.0	2.536	7.74	32.446	25.33
20.0	2.158	7.71	32.450	25.34
21.0	2.121	7.68	32.458	25.35
22.0	2.121	7.66	32.465	25.36
23.0	1.982	7.58	32.470	25.37
24.0	1.781	7.39	32.467	25.39
25.0	1.579	7.25	32.467	25.41
26.0	1.378	7.21	32.482	25.43
27.0	1.328	7.04	32.492	25.46
28.0	1.252	6.90	32.490	25.48
29.0	1.126	6.86	32.491	25.49
30.0	1.076	6.66	32.483	25.50
31.0	0.975	6.60	32.481	25.51
32.0	0.925	6.41	32.476	25.53
33.0	0.875	6.31	32.469	25.54
34.0	0.824	6.29	32.470	25.54
35.0	0.824	6.28	32.467	25.54
36.0	0.824	6.27	32.469	25.54
37.0	0.824	6.26	32.469	25.54
38.0	0.824	6.25	32.469	25.55
39.0	0.824	6.21	32.481	25.56
40.0	0.824	6.04	32.467	25.57
41.0	0.774	6.03	32.467	25.57
42.0	0.762	6.00	32.470	25.58
43.0	0.762	5.98	32.473	25.58
44.0	0.724	5.96	32.474	25.59
45.0	0.724	5.94	32.477	25.59
46.0	0.686	5.93	32.479	25.59
47.0	0.724	5.92	32.479	25.59
48.0	0.673	5.90	32.485	25.60
49.0	0.673	5.88	32.493	25.61
50.0	0.623	5.86	32.500	25.63
51.0	0.611	5.84	32.532	25.65
52.0	0.522	5.83	32.555	25.67
53.0	0.522	5.82	32.572	25.68
54.0	0.522	5.83	32.591	25.69
55.0	0.522	5.84	32.602	25.70
56.0	0.522	5.84	32.618	25.71
57.0	0.522	5.84	32.635	25.73
58.0	0.497	5.83	32.648	25.74
59.0	0.497	5.80	32.656	25.75
60.0	0.497	5.78	32.664	25.76
61.0	0.497	5.76	32.682	25.77
62.0	0.460	5.71	32.698	25.79
63.0	0.422	5.69	32.702	25.80
64.0	0.422	5.67	32.706	25.80
65.0	0.384	5.54	32.722	25.83
66.0	0.384	5.35	32.731	25.86
67.0	0.321	5.28	32.737	25.87
68.0	0.321	5.24	32.740	25.88
69.0	0.309	5.23	32.741	25.88
70.0	0.309	5.23	32.743	25.88
71.0	0.321	5.23	32.742	25.88
72.0	0.309	5.23	32.744	25.89
73.0	0.309	5.22	32.746	25.89
74.0	0.321	5.22	32.746	25.89
75.0	0.309	5.21	32.749	25.89
76.0	0.271	5.21	32.750	25.89
77.0	0.271	5.20	32.751	25.89
78.0	0.271	5.20	32.753	25.90
79.0	0.271	5.18	32.754	25.90
80.0	0.271	5.17	32.756	25.90
81.0	0.271	5.12	32.771	25.92
82.0	0.271	5.12	32.772	25.92
83.0	0.271	5.12	32.772	25.92
84.0	0.233	5.11	32.783	25.93
85.0	0.271	5.09	32.809	25.95
86.0	0.233	5.08	32.820	25.96
87.0	0.220	5.08	32.824	25.97
88.0	0.233	5.06	32.830	25.97
89.0	0.195	5.03	32.833	25.98
90.0	0.195	5.01	32.842	25.99
91.0	0.195	5.01	32.847	25.99
92.0	0.195	5.01	32.852	26.00
93.0	0.195	4.96	32.875	26.02
94.0	0.195	4.92	32.878	26.03
95.0	0.195	4.91	32.883	26.03
96.0	0.195	4.91	32.885	26.03
97.0	0.195	4.91	32.886	26.03
98.0	0.195	4.92	32.889	26.03
99.0	0.195	4.92	32.889	26.03
100.0	0.195	4.86	32.903	26.05
101.0	0.195	4.83	32.915	26.07
102.0	0.195	4.79	32.925	26.08
103.0	0.195	4.79	32.932	26.08
104.0		4.78	32.934	26.09
105.0		4.77	32.935	26.09
106.0		4.78	32.933	26.08
107.0		4.77	32.943	26.09
108.0		4.76	32.947	26.10
109.0		4.76	32.951	26.10
110.0		4.76	32.948	26.10

Sta.	Date	Zooplankton size (μ)	Depth (m)	ETS ($ml O_2/m^3/h$)	GDH ($\mu moles\ NH_4^+/m^3/h$)	Protein (mg/m^3)
02	06/01/81 0400 hrs	> 300	2-12	6.85	7.33	23.3
			12-22	4.67	5.37	19.0
			22-32	3.65	7.33	13.6
			32-42	4.38	7.23	15.4
			42-52	4.80	10.27	12.2
			52-60	1.81	2.33	7.0
06	06/01/81 1630 hrs	> 300	3-23	18.43	9.07	42.6
			23-43	4.80	8.17	18.6
			43-63	2.76	1.32	11.8
			63-83	1.43	0.84	7.6
			83-100	1.77	0.43	13.4
		153-300	3-23	0.128	0.159	2.05
			23-43	0.106	0.144	1.21
			43-63	0.038	0.106	0.76
			63-83	0.016	0	0.91
			83-100	0.037	0	1.21
10	06/02/81 0320 hrs	> 300	3-13	27.93	3.00	116.2
			13-23	31.07	8.89	105.5
			23-33	12.66	1.27	41.7
			33-43	3.98	2.04	19.4
			43-63	1.04	1.85	7.2
			63-83	1.41	0.90	6.7
			83-100	1.30	0.39	7.0
05-1	06/02/81 1315 hrs	> 300	3-13	6.12	6.85	33.2
			13-23	33.55	7.89	140.6
			23-33	17.13	5.79	90.6
			33-43	4.55	6.40	23.9
			43-63	1.95	4.36	9.4
			63-83	1.70	3.26	9.5
			83-100	0.70	0.57	8.6

Sta.	Date	Zooplankton size (μ)	Depth (m)	ETS_3 ($m/O_2/m^3/h$)	GDH_+ (μmoles NH_4^+ $/m^3/h$)	Protein (mg/m^3)
05-2	06/02/81 2030 hrs	> 300	3-13	22.44	10.19	62.9
			13-23	12.25	7.24	39.2
			23-33	2.98	10.40	18.0
			33-43	2.45	8.53	11.7
			43-53	1.60	10.82	10.5
			53-63	2.41	4.87	9.1
			63-83	1.26	3.02	6.1
			83-100	1.29	0.99	5.6
05-2	06/02/81 2030 hrs	153-300	3-13	0.436	0	2.99
			13-23	0.329	0	2.38
			23-33	0.746	0	4.94
			33-43	0.729	0.150	3.00
			43-53	0.397	0.210	2.25
			53-63	0.410	1.243	2.84
			63-83	0.203	0.925	1.34
			83-100	0.203	0.373	1.34
05-3	06/03/81 0300 hrs	> 300	3-13	73.40	2.77	126.5
			13-23	61.46	7.40	76.7
			23-33	9.94	7.78	40.7
			33-43	9.54	-	34.9
			43-53	4.74	8.19	21.6
			53-63	2.64	4.08	13.8
			63-83	2.46	2.21	10.8
			83-100	2.07	0.81	10.4
05-4	06/03/81 0730 hrs	> 300	3-13	15.72	14.63	61.5
			12-23	13.78	8.01	49.0
			23-33	4.23	9.56	22.0
			33-43	4.33	7.60	22.6
			43-53	3.75	5.48	16.8
			53-63	1.52	2.65	10.1
			63-83	1.30	3.68	8.8
			83-100	1.12	0.85	5.4