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OCEANOGRAPHIC DATA COLLECTED FROM THE SIR JOHN FRANKLIN IN THE BEAUFORT SEA, SEPTEMBER 1989

by

R.W. Macdonald, E.C. Carmack, M.C. O'Brien,
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Institute of Ocean Sciences
Department of Fisheries and Oceans
Sidney, B.C.

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Canadian Data Report Of Hydrography and Ocean Sciences

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Les établissements des Sciences et levés océaniques dans les régions et à l'administration centrale ont cessé de publier leurs diverses séries de rapports en décembre 1981. Une liste complète de ces publications figure dans le volume 39, Index des publications 1982, du *Journal canadien des sciences halieutiques et aquatiques*. La série actuelle a commencé avec la publication du rapport numéro 1 en janvier 1982.

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Contents

Abstract

R.W. Macdonald, E.C. Carmack, M.C. O'Brien, F.A. McLaughlin, B.G. Minkley and K. Berger-North, 1990, Oceanographic Data Collected from the *Sir John Franklin* in the Beaufort Sea, September 1989. *Can. Data Rep. Hydrogr. Ocean Sci.:* **80**, 100 pp

A cruise to the Southern Beaufort Sea was carried out from the CCGS *Sir John Franklin* in August - September, 1989. Here we report the bottle data including salinity, temperature, nutrients (silicate, phosphate and nitrate), dissolved oxygen and chlorophyll a determinations, and the CTD data.

Key words: Arctic, Canada Basin, chlorophyll a, coastal zone, nutrients, oceanography, oxygen, salinity, temperature.

Résumé

R.W. Macdonald, E.C. Carmack, M.C. O'Brien, F.A. McLaughlin, B.G. Minkley and K. Berger-North, 1990, Oceanographic Data Collected from the *Sir John Franklin* in the Beaufort Sea, September 1989. *Can. Data Rep. Hydrogr. Ocean Sci.:* **80**, 100 pp

Une mission a été conduite dans la partie sud de la mer de Beaufort à bord du CCGS *Sir John Franklin* en août-septembre 1989. Dans le présent document, nous rapportons les données de salinité, température, nutriments (silicate, phosphate et nitrate), oxygène dissous et chlorophylle *a* qui ont été obtenues suite à cette mission, ainsi que les données CTP.

Mots-clés: Artique, Bassin Canada, chlorophylle *a*, zone côtières, nutriments, océanographie, oxygène, salinité, température.

Acknowledgements

We are very much indebted to the officers and men of the CCGS *Sir John Franklin* who assisted us in every way during the cruise and made it a pleasure to do the work. We especially note the skilled seamanship of Capt. D.S. McGarvie, the organizational effort of chief mate W. Coles, and the deck assistance of boatswain A. Miller and boatswain's mate A. Pittman. T. Juhasz did most of the ground work to prepare the ship for our cruise on very short lead time. We appreciate the efforts of Captain D. Johns (Coast Guard Northern) both for arranging this opportunity and for generously sharing costs; R. Wilson (IOS) acted as liaison between IOS and CCGS. P. Gamble designed and prepared the boxes which carried our gear; they certainly made a difference both in ease and in organization. We thank PCSP for their tolerance during our transfers to and from the ship, and the officers, men and hydrographers aboard the *John P. Tully* for tranporting much of our gear to and from the Beaufort Sea. S. Thomson assisted with advice on style, and with final text-editing. Charles Gobeil translated the abstract into French. This report forms part of the NOGAP B.6 series.

1 INTRODUCTION

The data reported here (IOS cruise 89-70) were collected from the Canadian Coast Guard Ship *Sir John Franklin* during a cruise to the Canadian Beaufort Sea from August 21 - Sept 5, 1989. For this cruise we had two broad objectives; a) Collect chemical and CTD data at a deep station in the Canada Basin, and b) Survey intensively the shelf break with the Mackenzie Canyon as a focus.

Data include:

- Conductivity-Temperature-Depth; using a Guildline CTD system.
- Water samples (hydrocasts at 6 shelf edge stations($\approx$200 m) and one deep station (3200 m)): salinity, temperature, dissolved oxygen, nutrients, (reactive silicate, phosphate, nitrate plus nitrite), and chlorophyll a.

Additional samples for tritium, C-14 and oxygen isotope composition were collected and several towed acoustic profiles (50 kH and 200 kH) were run; these data are not reported here, but will be entered into the electronic file when completed.

1.1 Stations

Station locations, shown in Figure 1, were determined from a transit Satellite Navigator by the ship's officers. The majority of positions are expected to be within 930 m of the true position, with a mean displacement of about 476 m [*Huggett and Mortimer*, 1971]. Our experience during this cruise in recovering moorings placed on the shelf with an independent Satellite Navigation system, leads us to believe that the above figures fairly reflect the precision of the navigation systems. The majority of stations were occupied near the shelf break. For most of these stations, as shown in Figure 2, the region was clear of ice during the cruise. For the A stations, which were at water depths of about 3200m, the ice cover was generally greater than 7/10.

2 METHODS

Sampling was carried out from the forward port side of the ship. Two winch pads were welded to the deck in St. John's, and these were used to mount IOS winches transferred from the *John P. Tully*. The ship's crane was used to suspend the block for either the CTD or hydrocasts. Both were done directly over the rail.

2.1 Guildline Conductivity-Temperature-Depth System

The Guildline model 8706 probe was equipped with a 1500 decibar pressure sensor. Data were logged via 2-conductor cable and slip rings to a deck unit (audio cassette). Simultaneously, data were recorded onto a Toshiba 3200 portable computer. Data were further processed and calibrated at IOS using procedures deicribed in Cuypers *et al.*, 1988.

2.1.1 Data Validation

At stations A01, B09, B10, C01, C01E, D03, D10, and E01, bottle samples were collected and analyzed for temperature and salinity as part of the chemical program (see subsequent sections and the chemical data tables). The bottle data were used to cross check the CTD measurements. We made the comparison on a point by point basis, selecting regions of the profiles where gradients

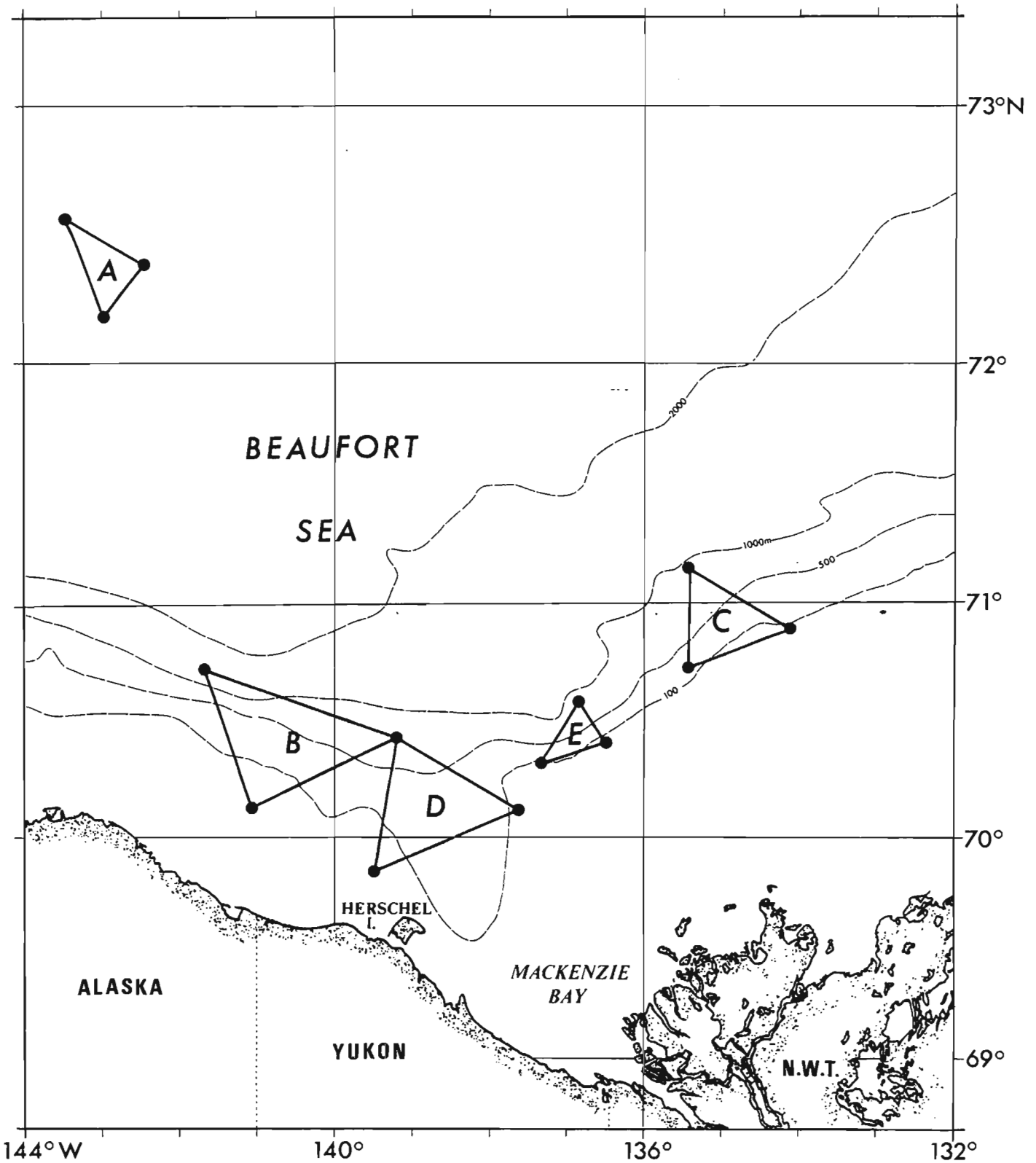

Figure 1: Station locations

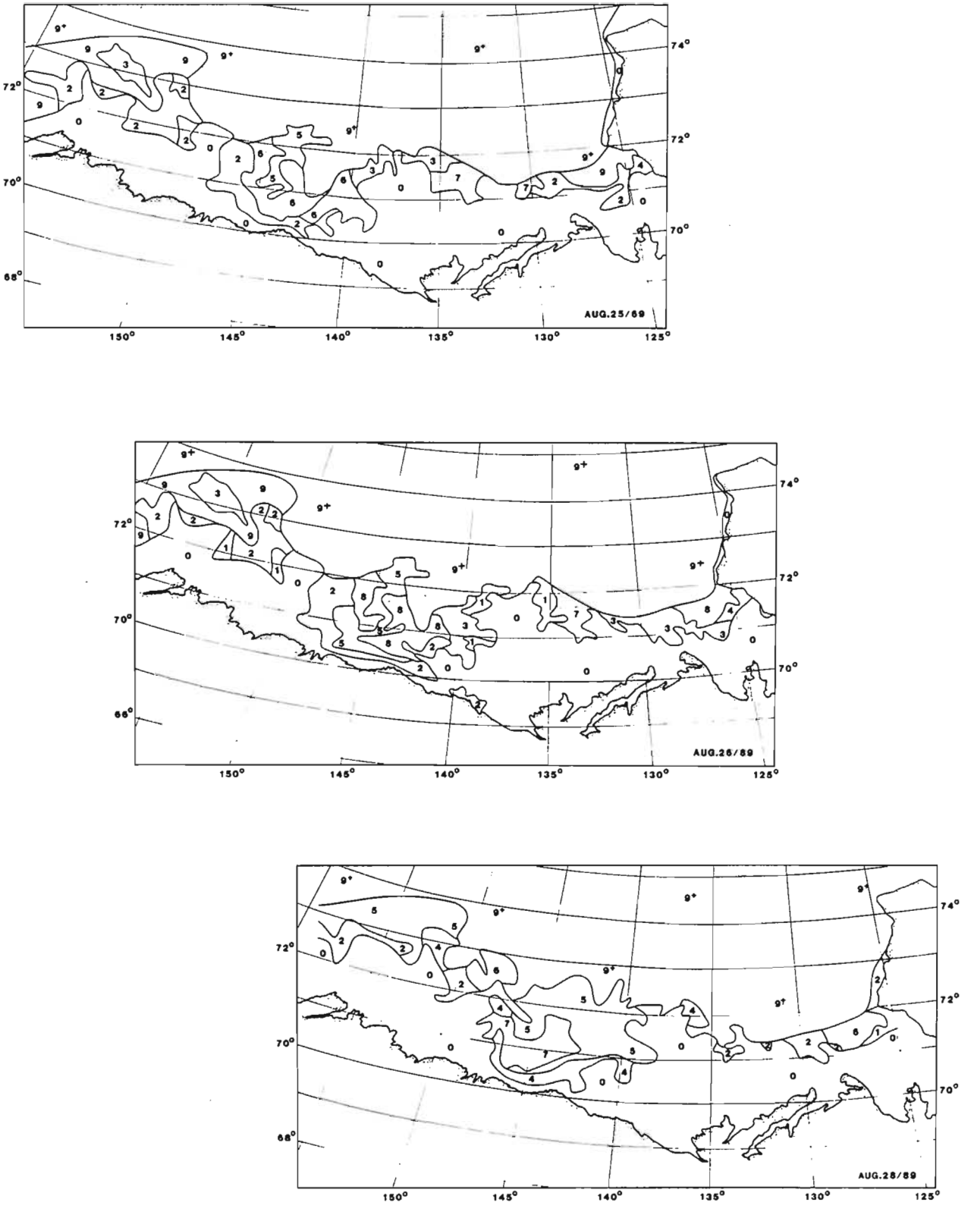

Figure 2: Distribution of ice coverage (in tens) during the cruise.

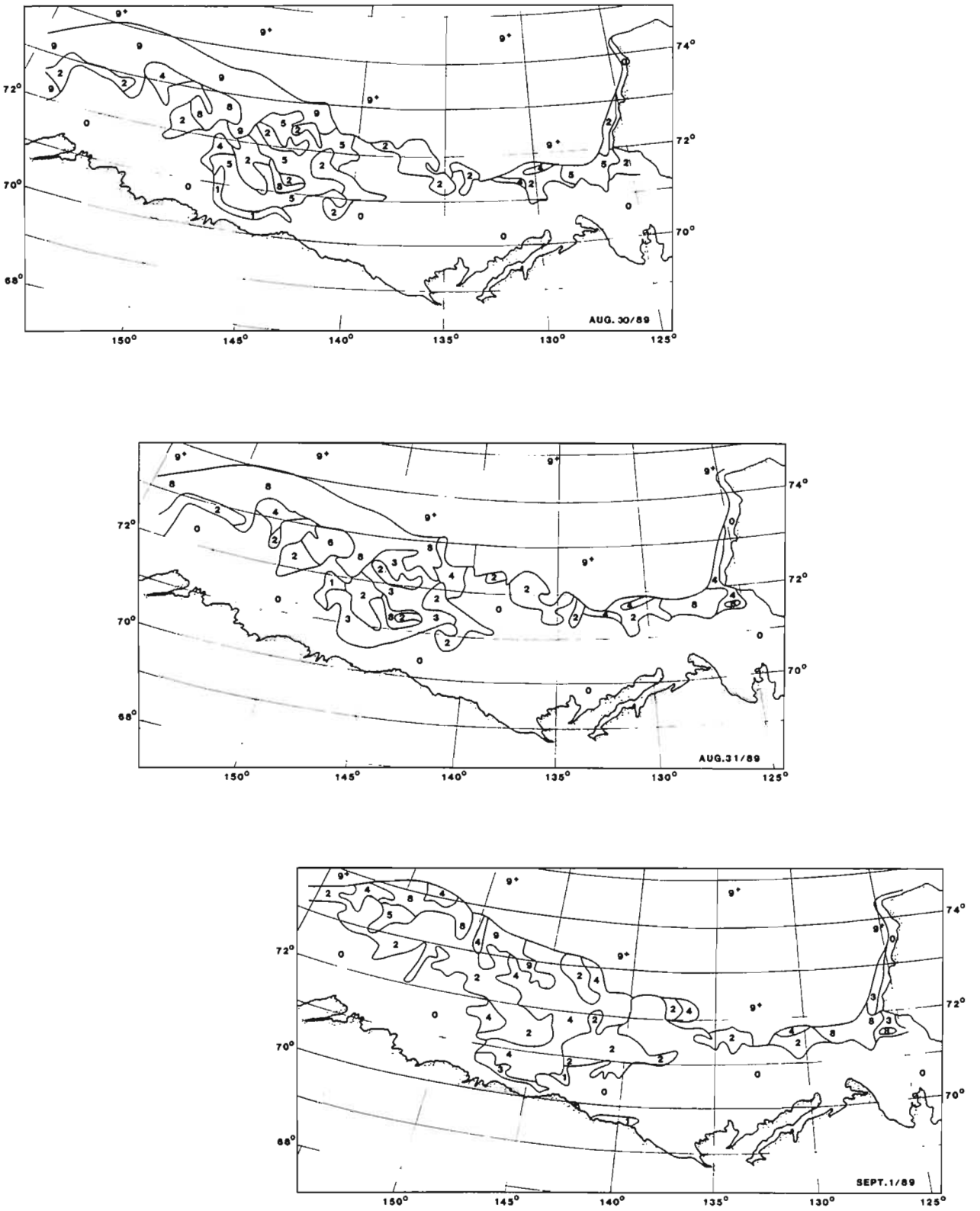

Figure 3: Distribution of ice coverage (in tens) during the cruise.

were small. It should be noted that the CTD casts and the bottle samples were **not** collected simultaneously, and that depth for the CTD was determined from the pressure sensor, while depth for the bottles was estimated by "wire out" (checked with unprotected thermometers where possible). Therefore, the differences in the intercomparison can be ascribed partly to environmental variance and partly to offset in depth between the two methods. With sufficient samples, however, we can examine with confidence the "average" offsets between bottle data and the CTD; we cannot measure salinity or temperature performance of the instrument while passing through strong gradients (e.g. poor temperature correction response, slow flushing).

To quantify the bottle - CTD intercomparison, the property differences $\Delta = X_{bottle} - X_{CTD}$ were calculated for each point (S and T) with the results reported in Table 1. There appears to be no significant offset in the Guildline CTD calibration in either temperature or salinity.

Table 1: Results of the Bottle and CTD Intercomparisons

	Salinity			Temperature		
	Δ	s	n	Δ	s	n
CTD - Bottle	-0.0050	0.019	22	0.0036	0.013	22

Units for salinity are in parts per thousand, and for temperature, Centigrade degrees; s refers to standard deviation, and n to the number of points at which Δ could be confidently calculated.

Error (noise) in the CTD measurement can be estimated by assuming the usual rule that variances add:

$$s_{\Delta}^2 = s_{bottle}^2 + s_{CTD}^2$$

Using the standard deviations calculated for the bottle data, we estimate for the Guildline CTD salinity measurements — s≈ 0.02 parts per thousand, and for temperature — s≈ 0.02 Centigrade degrees. The bottle cast and the CTD data were not collected at identical space/time coordinates, therefore this estimate of error also includes an environmental component and overestimates the instrumental error. From parts of the profiles where property gradients are low, it is apparent that the instrumental standard deviations are probably closer to 0.01, for both salinity and temperature. As noted, the above treatments do not include error which arises in steep property gradients where both sensor response and flushing times are long relative to environmental changes experienced by the instrument during its descent.

2.2 Water Chemistry

2.2.1 Field Sampling

Water samples were collected with either 5L or 1.7L Niskin bottles equipped with reversing protected and unprotected thermometers. Subsampling from the bottles followed the normal oceanographic procedure of first withdrawing dissolved oxygen (using latex tubing), followed by salinity, oxygen isotopes, and nutrients. Finally, the remaining water was transferred to a twice rinsed, 2L polybottle for chlorophyll a samples. Where Tritium samples were collected, they were taken directly after the dissolved oxygen sample.

Table 2: Estimates of error: basis of calculation and error models are given in the text.

measurement	units	precision (s_p)	Standard Reference Material
Salinity	psu	$\leq$0.01	IAPSO Seawater
Temperature	°C	0.024	NBS Calibration
Silicate	mmol m^{-3}	0.13	Sagami SiO_2
Nitrate	mmol m^{-3}	0.08	Sagami KNO_3
Phosphate	mmol m^{-3}	0.04	Sagami KH_2PO_4
Dissolved Oxygen	mmol m^{-3}	0.65	Sagami KIO_3
Chl *a*	mg m^{-3}	0.04	No SRM available

2.2.2 Laboratory Methods

Errors for the various methods reported here are expressed as precision and accuracy as summarized in Table 2. Pooled variance, s_p, is calculated as

$$s_p = \sqrt{\frac{\nu_1 s_1^2 + \cdots + \nu_i s_i^2}{\nu_1 + \cdots + \nu_i}}$$

where $\nu_i = n_i - 1$ degrees of freedom, and the n_i and s_i refer to the number of replicates and their standard deviation for the individual components used in the pooled standard deviation calculation.

Salinity Salinity samples were drawn into 200 mL salinity bottles after 3 rinses from 1.7 L or 5 L Niskin bottles. The samples were then capped tightly until determination.

The salinities were analyzed on a Guildline Autosal (Model 8400A, SN 42.501) instrument at the Institute of Ocean Sciences; data are reported in practical salinity units (psu) [see *Lewis and Perkin*, 1978]. During analyses the instrument was standardized against Standard Sea Water of Chlorinity 19.374 (K_{15} = 0.99991). The Standard Sea Water was obtained from Standard Seawater Service (lot p107, 11th Nov, 1987), Institute of Oceanography, Wormley, Godalming, Surrey, England.

Standard deviation of repeated measurements on the same sub- sample was less than 0.0005 psu. Precision of the sampling/analysis was evaluated from independent duplicate samples drawn occasionally from the Niskin bottles; we found the pooled standard deviation, $s_p = 0.005, \nu = 9$.

Temperature Temperature was measured with paired oceanographic restricted- range thermometers (low temperature) manufactured by Richter and Weise (Berlin), Yoshino Factory (Tokyo) or Gohla (Kiel). These were read twice to the nearest 0.01 C°; precision, based on agreement between pairs, was s_p=0.024 C° (for 145 pairs). Unprotected reversing thermometers were used to check depth as determined by the length of wire out.

Dissolved Oxygen Dissolved oxygen samples were 'pickled' immediately on deck and taken to the ship's laboratory for determination by the Micro- Winkler technique [*Carpenter*, 1965]. Analyses were carried out within 24 hours of collection. Calibration of the thio- sulphate solution was carried out with each titration set (daily) by using Sagami primary standard KIO_3. Precision of the method was routinely monitored with blind replicate samples drawn at a frequency of about 20% from the Niskin or Go-Flo bottles. For the data reported here we obtained the following results

on replicates: $s_p = 0.65$ mmol m^{-3}, $\nu = 44$ (1 replicate pair with a difference of 6 mmol m^{-3} (0.13 mL/L) was removed by Chauvenet's criterion).

Nutrients Samples for nutrient determination were collected into twice rinsed glass and polystyrene test tubes (2 glass and 2 polystyrene tubes per sample).

Nutrients (silicate and nitrate plus nitrite) were determined in the ship's lab. Instrument problems forced us to freeze and store the phosphate samples for later determination at IOS. Nutrient determinations were performed using Technicon Autoanalyzer II components. Reactive silicate and nitrate plus nitrite were determined according to Technicon Industrial Methods No. 186-72 W and 158-71 W respectively, and soluble orthophosphate was determined using a modified Technicon method [*Brynjolfson,* 1973]. Sagami standards were used to calibrate secondary standards which were prepared daily in 30.5$^o/_{oo}$ NaCl solutions.

Phosphate was determined in the laboratory at IOS on samples thawed and analyzed immediately.

Most of the nutrient samples were analyzed in duplicate, the average being reported. The precision of the determinations, based on these duplicates, was found to be: silicate, s_p= 0.13 mmol m^{-3}, ν = 146; phosphate s_p= 0.04 mmol m^{-3}, ν = 142; nitrate,s_p= 0.08 mmol m^{-3}, ν = 134.

Chlorophyll *a* Chlorophyll *a* samples were filtered in the ship's lab immediately upon sampling, taking care to restrict light. Water samples (1-3 L) were filtered through 24-mm diameter Whatman GF/C glass fiber filters. The inside of the filtration funnel was rinsed with about 10 mL filtered sea water and approximately 1 mL of 1% $MgCO_3$ solution was added to the samples just before filtration was complete. After filtration, the filters were folded in half, placed in filter paper folded into quarters, labelled, and stored frozen in a dark bottle containing silica- gel in a deep freezer. At IOS chlorophyll *a* was determined fluorometrically with a Turner Design fluorometer [*Strickland and Parsons*, 1972].

Blanks were estimated from deep samples (125 m and greater, where chlorophyll concentrations are low) to be 0.013 mg m^{-3} (s=0.005 mg m^{-3} n=16). Pooled standard deviation of replicates is estimated to be less than 0.04 mg m^{-3} (n=12) from previous field work [*Macdonald et al.*, 1988]. No duplicate chlorophylls were collected during the Franklin Cruise.

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4 APPENDIX 1; GUILDLINE CTD DATA; TABLES AND PLOTS

Units and abbreviations used in the computer listings which are included in the following appendix are summarized below.

Measurement	Abbreviation	Units
DEPTH	DEPTH	METRES (M)
TEMPERATURE	TEMP	DEGREES CENTIGRADE (DEG C)
SALINITY	SALN	PARTS PER THOUSAND (PPT)
DENSITY†	SIGT	KILOGRAM/METRE^3 (KG/M^3)
DEPARTURE FROM FREEZING	T-Tf	CENTIGRADE DEGREES (DEG C)
DYNAMIC HEIGHT ANOMALY	DYN HT	METRES (M)

† The quantity reported for density is actually γ(S,t,0) [UNESCO, 1987].

Station #	Reference #	Station #	Reference #
A01	89-70-015	C01H	89-70-013
A02	89-70-020	C01I	89-70-014
A03	89-70-021	C02	89-70-003
A3-2	89-70-022	C03	89-70-001
B01	89-70-023	C3A	89-70-002
B02	89-70-024	D01	89-70-043
B03	89-70-025	D02	89-70-044
B04	89-70-026	D03	89-70-046
B05	89-70-027	D04	89-70-047
B06	89-70-028	D05	89-70-048
B07	89-70-029	D06	89-70-049
B08	89-70-030	D07	89-70-050
B09	89-70-032	D08	89-70-051
B10	89-70-034	D09	89-70-052
B11	89-70-035	D10	89-70-054
B12	89-70-036	D11	89-70-055
B13	89-70-037	D12	89-70-056
B14	89-70-038	D13	89-70-060
B15	89-70-039	D14	89-70-061
B16	89-70-040	D15	89-70-062
B17	89-70-041	D16	89-70-063
B18	89-70-042	E01	89-70-058
C01	89-70-004	E02	89-70-064
C01A	89-70-006	E03	89-70-065
C01B	89-70-007	E04	89-70-066
C01C	89-70-008	E05	89-70-067
C01D	89-70-009	E07	89-70-069
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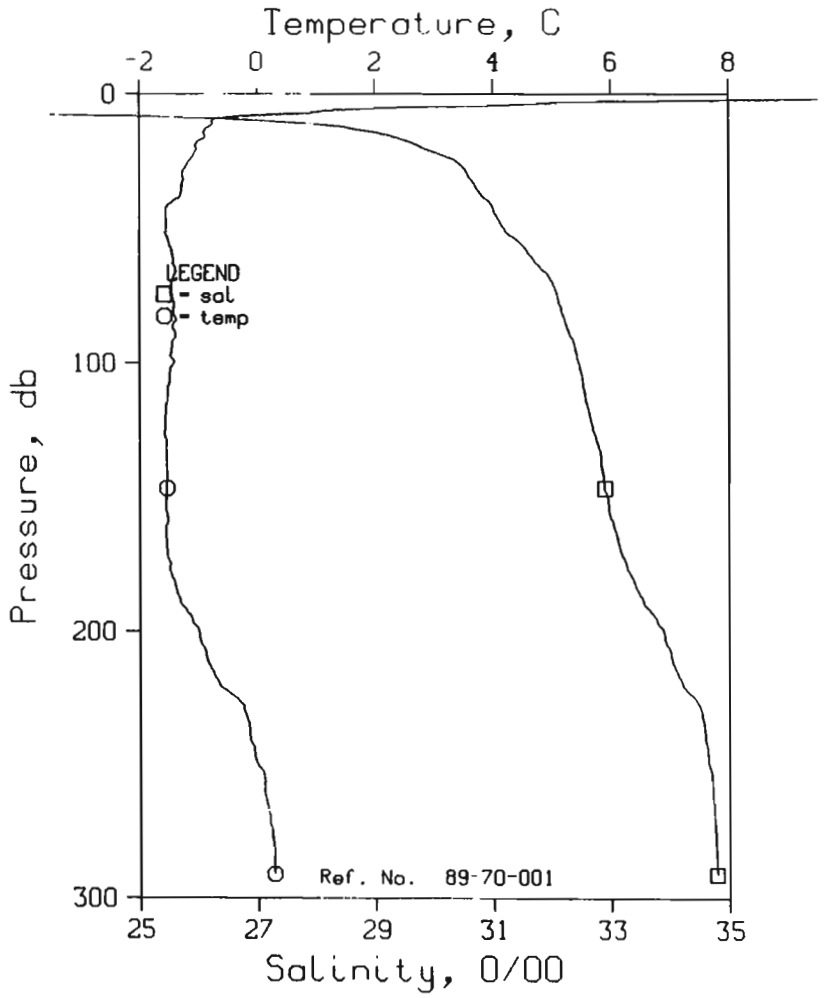
CO1G	89-70-012	E10	89-70-072



OCEAN PHYSICS DIVISION
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RESULTS OF STP CAST
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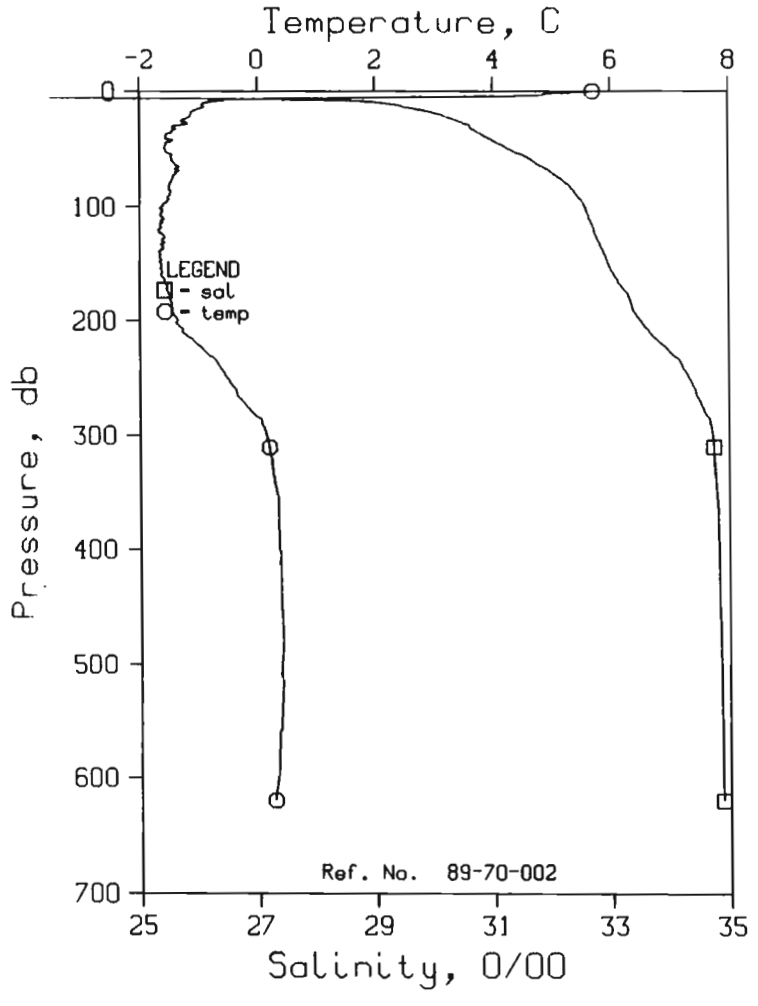
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.16	10.27	0	7.77	1965.0	0.00	0.00	1460.
10	-0.76	27.22	10	21.89	593.7	1.32	0.05	1435.
20	-1.02	29.84	20	24.01	391.0	1.77	0.12	1438.
30	-1.27	30.58	30	24.61	333.4	2.13	0.21	1438.
50	-1.56	31.19	50	25.11	285.5	2.74	0.46	1438.
75	-1.44	32.09	75	25.83	216.9	3.36	0.85	1440.
100	-1.42	32.46	99	26.13	188.6	3.86	1.30	1441.
125	-1.57	32.69	124	26.33	169.7	4.31	1.81	1441.
150	-1.55	32.94	149	26.52	151.0	4.71	2.36	1442.
175	-1.48	33.26	174	26.78	126.6	5.06	2.94	1443.
200	-0.99	33.89	198	27.27	80.0	5.32	3.44	1446.
225	-0.37	34.40	223	27.66	43.7	5.49	3.80	1450.
250	-0.01	34.65	248	27.84	26.7	5.57	3.99	1453.

DEEPEST MEASUREMENT:

291	0.28	34.78	288	27.94	18.0	5.66	4.24	1455.



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10	-0.91	29.14	10	23.44	445.3	0.98	0.04	1437.
20	-1.13	30.11	20	24.23	370.0	1.39	0.10	1438.
30	-1.43	30.62	30	24.64	330.3	1.74	0.19	1437.
50	-1.56	31.28	50	25.18	279.3	2.35	0.44	1438.
75	-1.42	32.13	75	25.86	214.1	2.96	0.82	1440.
100	-1.62	32.57	99	26.23	179.3	3.45	1.25	1440.
125	-1.60	32.74	124	26.37	165.9	3.88	1.75	1441.
150	-1.64	32.95	149	26.53	149.8	4.27	2.30	1441.
175	-1.51	33.24	174	26.77	127.4	4.62	2.87	1443.
200	-1.36	33.49	198	26.97	108.5	4.92	3.44	1444.
225	-0.93	33.95	223	27.32	75.0	5.15	3.94	1447.
250	-0.52	34.32	248	27.60	49.0	5.30	4.30	1450.
300	0.15	34.71	297	27.89	22.5	5.47	4.77	1454.
400	0.36	34.81	396	27.95	16.7	5.66	5.43	1457.
500	0.39	34.85	495	27.98	14.0	5.81	6.13	1459.
600	0.32	34.87	594	28.00	12.2	5.94	6.87	1460.

DEEPEST MEASUREMENT:

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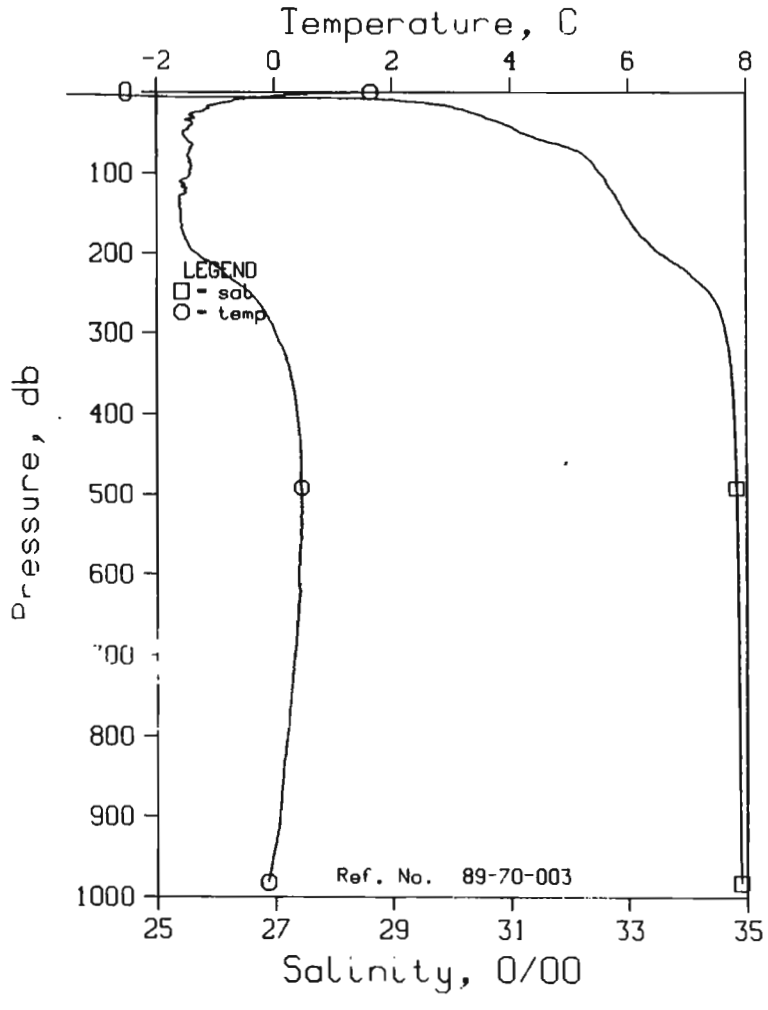

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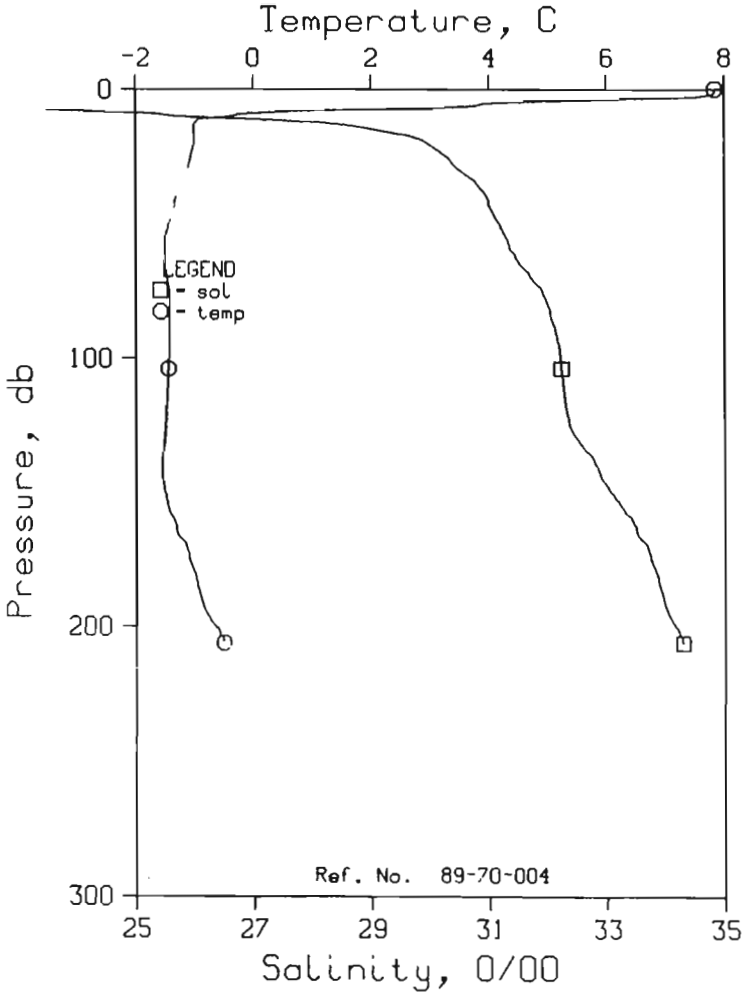
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	1.63	19.15	0	15.37	1222.3	0.00	0.00	1435.
10	-0.66	29.01	10	23.33	455.7	0.76	0.03	1438.
20	-1.10	30.08	20	24.20	372.7	1.16	0.09	1438.
30	-1.36	30.55	30	24.59	335.5	1.51	0.18	1437.
50	-1.56	31.19	50	25.11	285.8	2.13	0.43	1438.
75	-1.45	32.21	75	25.93	207.6	2.74	0.82	1440.
100	-1.43	32.52	99	26.18	183.7	3.23	1.25	1441.
125	-1.50	32.76	124	26.37	165.0	3.66	1.75	1441.
150	-1.61	32.94	149	26.53	150.3	4.06	2.30	1441.
175	-1.56	33.18	174	26.72	132.4	4.41	2.88	1442.
200	-1.33	33.53	198	26.99	106.0	4.71	3.45	1444.
225	-0.86	34.03	223	27.38	69.8	4.93	3.92	1448.
250	-0.41	34.38	248	27.65	44.6	5.07	4.26	1451.
300	0.01	34.65	297	27.84	26.7	5.24	4.73	1454.
400	0.38	34.79	396	27.93	18.5	5.45	5.48	1457.
500	0.46	34.83	495	27.96	15.8	5.62	6.26	1459.
600	0.41	34.85	594	27.98	14.0	5.77	7.09	1461.
800	0.21	34.88	791	28.01	10.9	6.02	8.85	1463.
1000	-0.10	34.90	988	28.05	7.0	6.20	10.45	1465.

DEEPEST MEASUREMENT:

982	-0.12	34.90	970	28.05	6.9	6.18	10.32	1465.

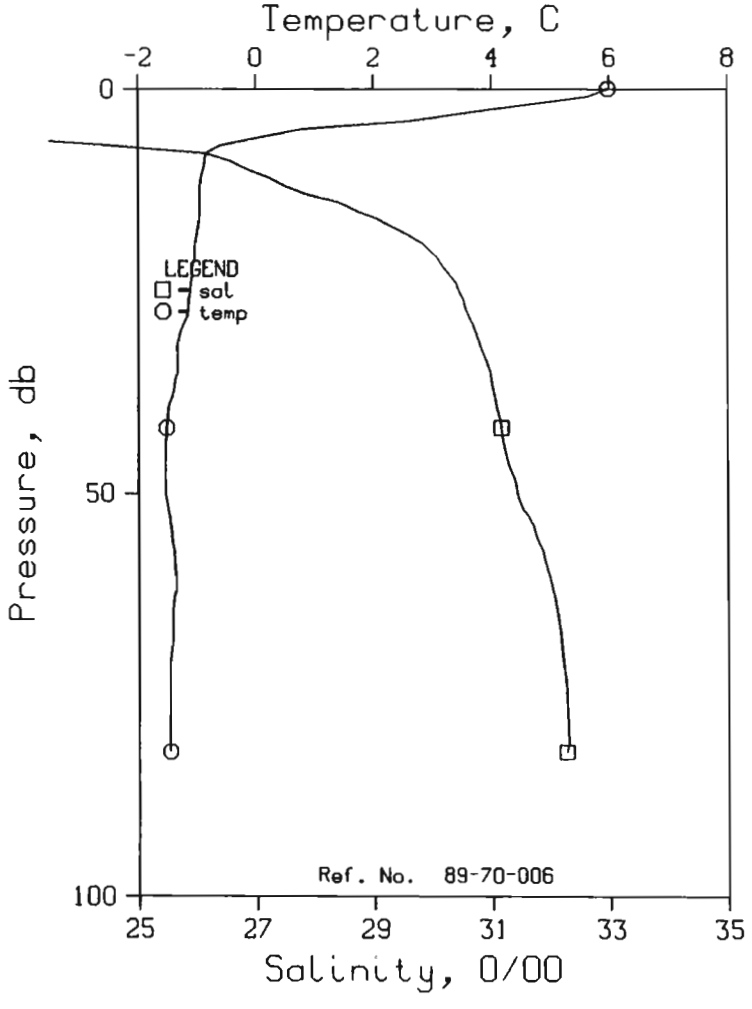


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 4 DATE 26/ 8/89
POSITION 70-57.9N, 134-28.4W GMT 22:14 STATION C01
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.83	12.63	0	9.85	1760.6	0.00	0.00	1454.
10	-0.41	25.70	10	20.66	711.2	1.32	0.06	1435.
20	-1.01	29.96	20	24.11	381.6	1.79	0.13	1438.
30	-1.12	30.51	30	24.55	339.0	2.15	0.22	1438.
50	-1.44	31.19	50	25.10	286.3	2.76	0.47	1438.
75	-1.42	31.92	75	25.69	230.3	3.42	0.88	1440.
100	-1.44	32.22	99	25.93	207.0	3.96	1.36	1440.
125	-1.49	32.36	124	26.06	195.2	4.47	1.94	1441.
150	-1.50	33.07	149	26.63	140.9	4.88	2.52	1442.
175	-1.08	33.76	174	27.17	89.8	5.16	2.98	1445.
200	-0.65	34.16	198	27.48	60.3	5.36	3.34	1448.

DEEPEST MEASUREMENT:

206	-0.51	34.29	204	27.58	51.5	5.39	3.41	1449.

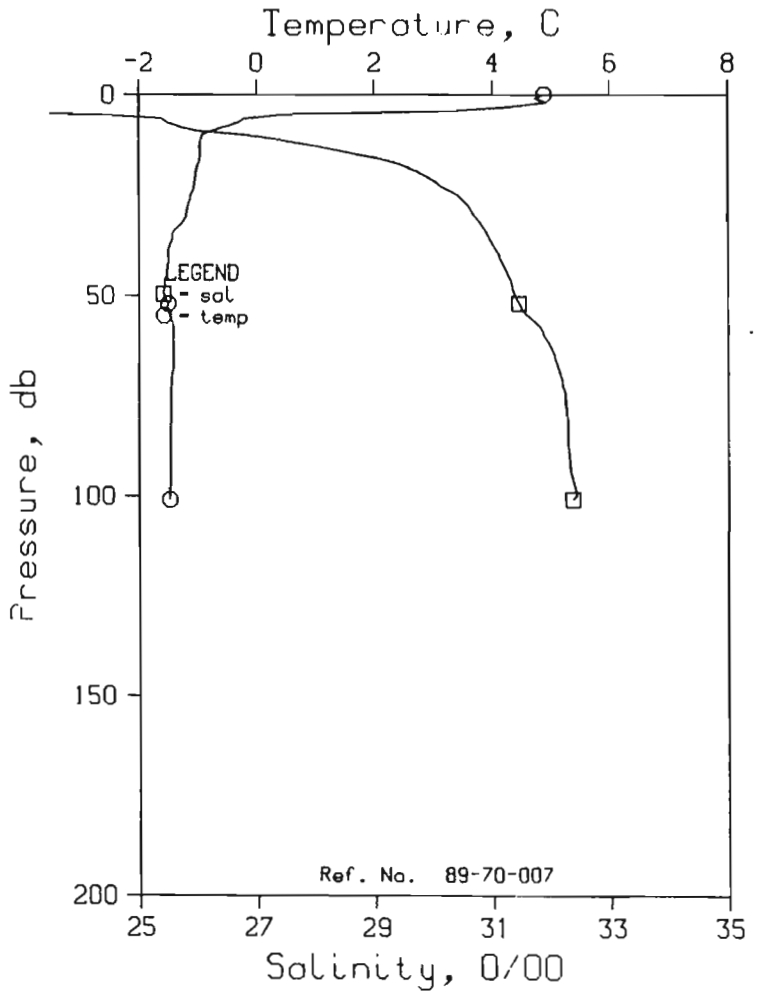


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 5 DATE 27/ 8/89
POSITION 70-54.4N, 134- 9.1W GMT 16:26 STATION C01A
RESULTS OF SIP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.97	14.95	0	11.82	1567.1	0.00	0.00	1449.
10	-0.89	26.87	10	21.61	620.1	1.09	0.05	1434.
20	-1.04	29.97	20	24.11	381.2	1.57	0.12	1438.
30	-1.29	30.73	30	24.73	321.9	1.92	0.21	1438.
50	-1.53	31.43	50	25.30	267.2	2.51	0.44	1438.
75	-1.46	32.26	75	25.97	204.0	3.07	0.80	1440.

DEEPEST MEASUREMENT:

82	-1.46	32.25	81	25.97	204.2	3.21	0.91	1440.

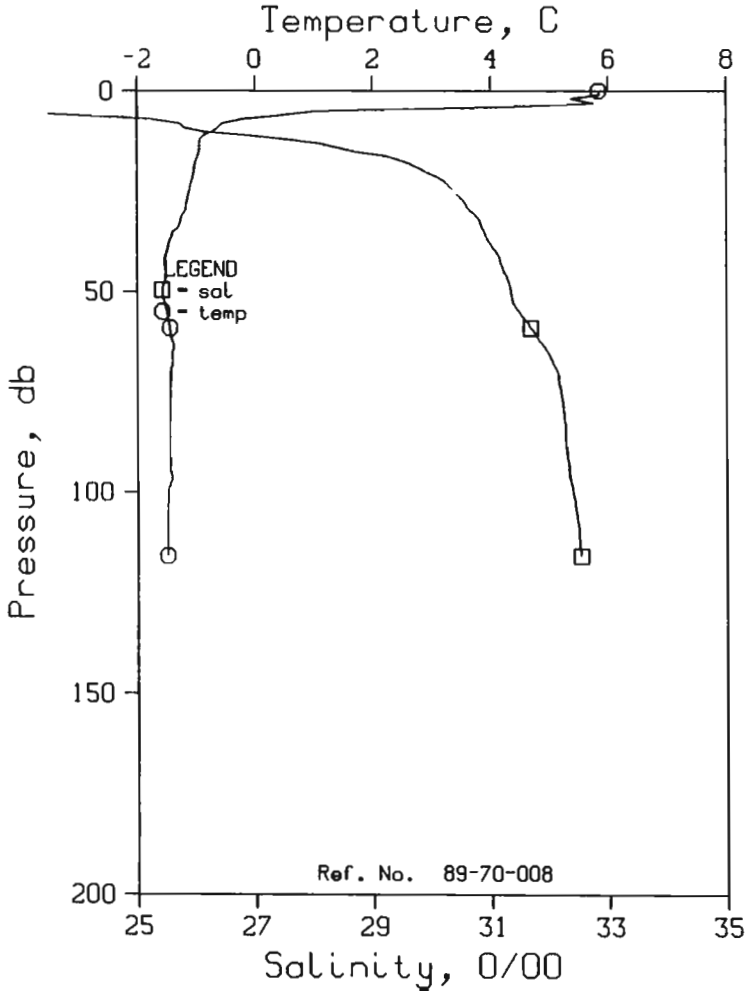


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 7 DATE 27/ 8/89
POSITION 70-55.5N, 134-12.8W GMT 17: 9 STATION C01B
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.88	16.94	0	13.47	1407.0	0.00	0.00	1447.
10	-0.91	26.77	10	21.53	628.1	1.00	0.04	1434.
20	-1.03	29.84	20	24.00	391.3	1.49	0.11	1438.
30	-1.20	30.68	30	24.69	325.7	1.84	0.20	1438.
50	-1.57	31.39	50	25.27	270.3	2.43	0.44	1438.
75	-1.46	32.24	75	25.95	205.2	3.01	0.80	1440.
100	-1.48	32.42	99	26.10	190.9	3.51	1.25	1440.

DEEPEST MEASUREMENT:

101	-1.48	32.37	100	26.06	195.3	3.53	1.27	1440.

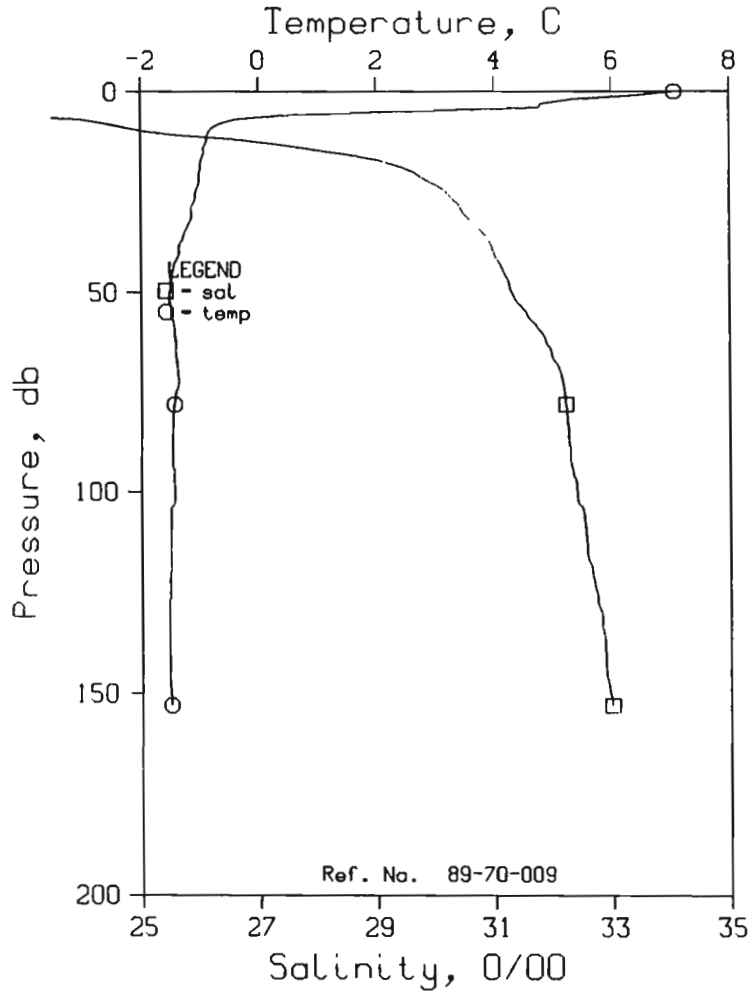


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 8 DATE 27/ 8/89
POSITION 70-55.7N, 134-15.1W GMT 17:29 STATION C01C
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.83	15.44	0	12.22	1528.3	0.00	0.00	1449.
10	-0.72	26.15	10	21.03	676.1	1.09	0.05	1434.
20	-1.04	29.91	20	24.06	386.0	1.58	0.12	1438.
30	-1.20	30.68	30	24.69	326.0	1.92	0.21	1438.
50	-1.57	31.34	50	25.23	274.0	2.52	0.45	1438.
75	-1.45	32.19	75	25.92	208.8	3.11	0.82	1440.
100	-1.48	32.39	99	26.08	193.2	3.62	1.27	1440.

DEEPEST MEASUREMENT:

116	-1.50	32.53	115	26.19	182.9	3.92	1.60	1441.

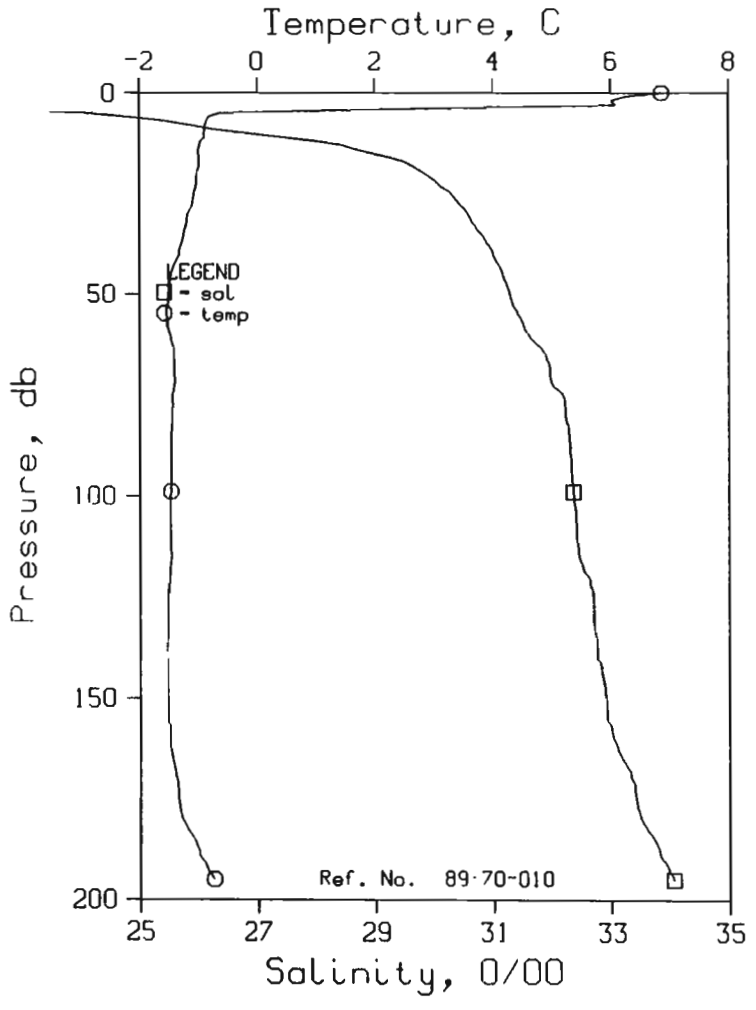


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 9 DATE 27/ 8/89
POSITION 70-56.9N, 134-21.0W GMT 18:31 STATION C01D
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.06	13.89	0	10.90	1657.0	0.00	0.00	1452.
10	-0.84	25.11	10	20.19	756.0	1.17	0.05	1432.
20	-1.01	29.65	20	23.85	406.1	1.71	0.13	1437.
30	-1.14	30.47	30	24.52	342.0	2.08	0.22	1438.
50	-1.51	31.30	50	25.19	277.8	2.69	0.47	1438.
75	-1.41	32.20	75	25.92	208.7	3.28	0.84	1440.
100	-1.44	32.40	99	26.08	193.0	3.78	1.29	1441.
125	-1.51	32.73	124	26.35	166.9	4.23	1.80	1441.
150	-1.51	32.96	149	26.53	149.7	4.63	2.36	1442.

DEEPEST MEASUREMENT:

153	-1.50	32.99	152	26.56	147.1	4.67	2.42	1442.

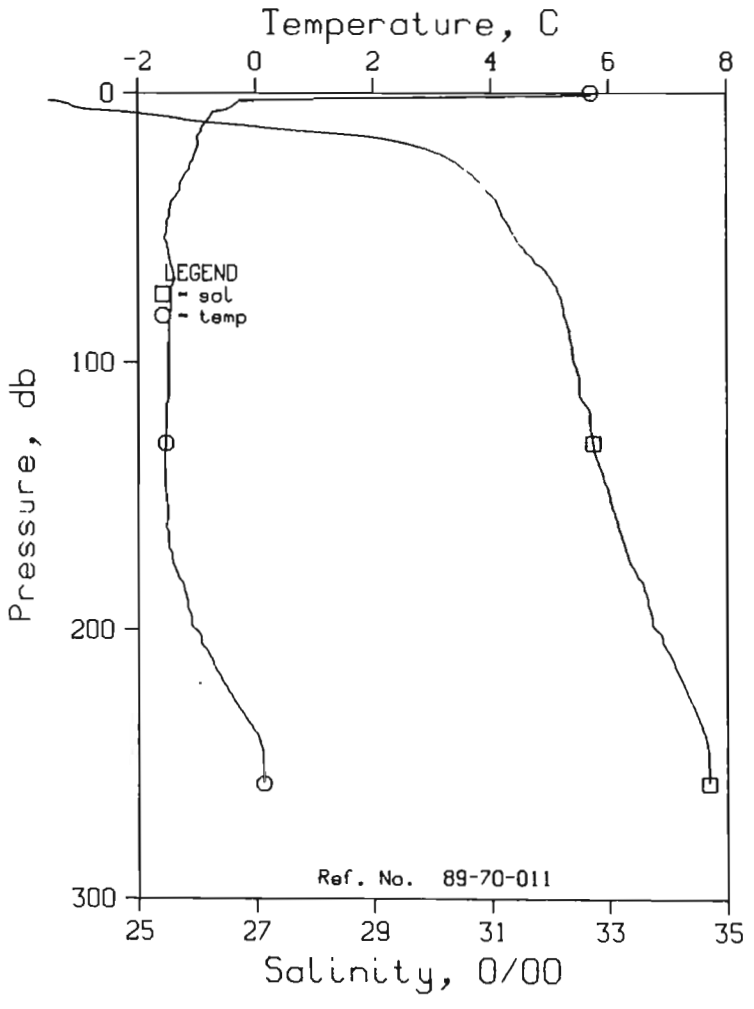


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 10 DATE 27/ 8/89
POSITION 70-58.0N, 134-29.4W GMT 18:52 STATION C01E
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.86	14.24	0	11.20	1628.5	0.00	0.00	1452.
10	-0.90	26.84	10	21.58	622.8	1.07	0.04	1434.
20	-1.01	29.86	20	24.02	389.4	1.54	0.11	1438.
30	-1.18	30.58	30	24.61	333.6	1.90	0.20	1438.
50	-1.51	31.28	50	25.18	278.8	2.50	0.45	1438.
75	-1.44	32.18	75	25.91	209.6	3.12	0.84	1440.
100	-1.48	32.37	99	26.06	195.4	3.62	1.28	1440.
125	-1.52	32.69	124	26.32	170.1	4.09	1.82	1441.
150	-1.53	32.90	149	26.49	153.5	4.50	2.39	1442.
175	-1.35	33.41	174	26.90	115.4	4.84	2.95	1444.

DEEPEST MEASUREMENT:

195	-0.74	34.06	193	27.40	68.2	5.02	3.29	1448.

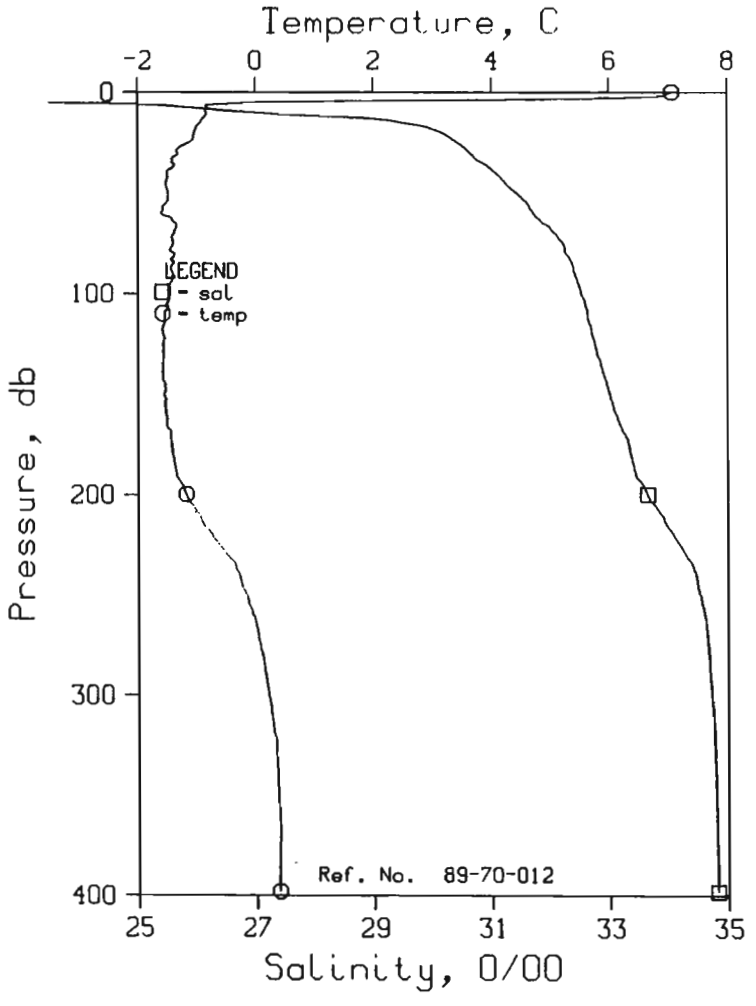


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 11 DATE 27/ 8/89
POSITION 70-59.3N, 134-31.4W GMT 19:12 STATION C01F
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA 0	POT. EN	SOUND
0	5.69	15.74	0	12.46	1504.6	0.00	0.00	1449.
10	-0.81	25.83	10	20.77	700.4	0.94	0.04	1433.
20	-0.99	29.78	20	23.96	395.5	1.46	0.12	1438.
30	-1.19	30.67	30	24.68	327.2	1.82	0.21	1438.
50	-1.51	31.32	50	25.21	276.3	2.42	0.45	1438.
75	-1.44	32.17	75	25.89	211.0	3.02	0.83	1440.
100	-1.48	32.40	99	26.09	192.3	3.53	1.28	1440.
125	-1.52	32.69	124	26.32	170.5	3.98	1.79	1441.
150	-1.51	33.02	149	26.58	145.0	4.38	2.35	1442.
175	-1.41	33.36	174	26.86	118.7	4.71	2.90	1443.
200	-1.03	33.79	198	27.20	87.2	4.96	3.37	1446.
225	-0.39	34.36	223	27.63	46.5	5.12	3.72	1450.
250	0.12	34.68	248	27.86	24.8	5.20	3.92	1454.

DEEPEST MEASUREMENT:

257	0.13	34.69	255	27.87	24.4	5.22	3.96	1454.

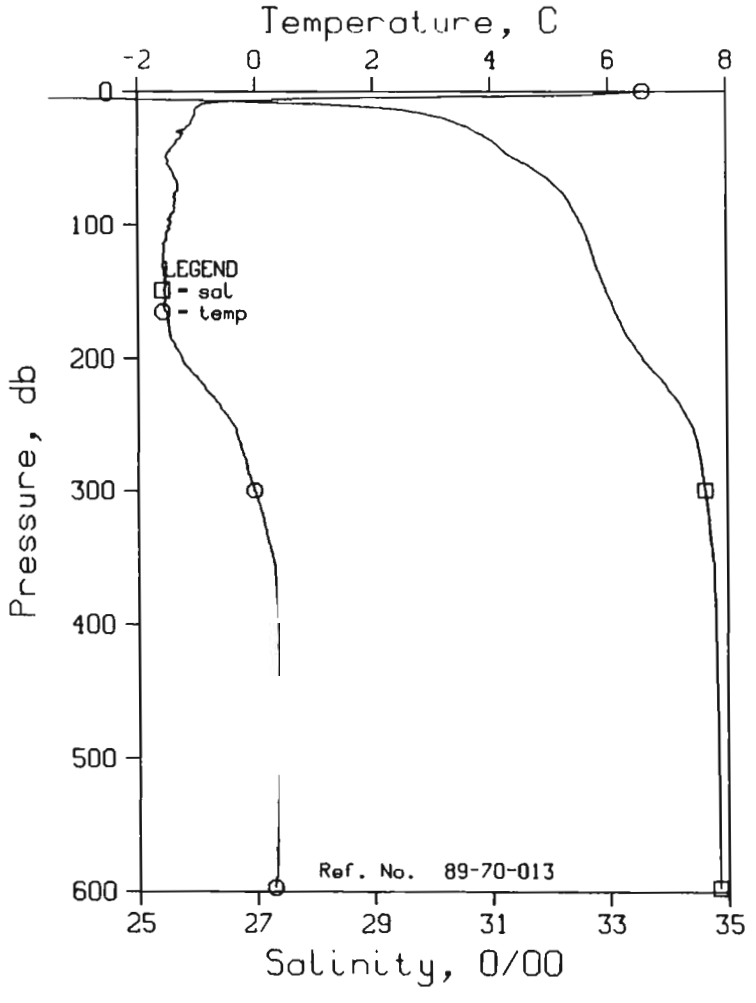


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 12 DATE 27/ 8/89
POSITION 70- 1.9N, 134-42.8W GMT 20: 4 STATION C01G
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.06	14.08	0	11.05	1642.5	0.00	0.00	1452.
10	-0.83	27.08	10	21.78	604.0	1.09	0.04	1435.
20	-1.04	30.15	20	24.26	367.1	1.53	0.11	1438.
30	-1.33	30.63	30	24.65	329.6	1.88	0.20	1437.
50	-1.48	31.42	50	25.29	268.7	2.47	0.44	1438.
75	-1.40	32.21	75	25.93	207.7	3.07	0.81	1440.
100	-1.47	32.52	99	26.18	183.2	3.55	1.24	1441.
125	-1.57	32.76	124	26.37	165.0	3.99	1.74	1441.
150	-1.55	33.00	149	26.57	146.0	4.38	2.28	1442.
175	-1.43	33.33	174	26.83	121.5	4.71	2.84	1443.
200	-1.19	33.65	198	27.09	97.5	4.99	3.37	1445.
225	-0.62	34.19	223	27.50	58.3	5.19	3.79	1449.
250	-0.16	34.53	248	27.76	34.7	5.30	4.05	1452.
300	0.21	34.72	297	27.89	22.3	5.43	4.42	1455.
400	0.39	34.82	396	27.96	16.1	5.62	5.09	1457.

DEEPEST MEASUREMENT:

398	0.39	34.82	394	27.96	16.1	5.62	5.08	1457.

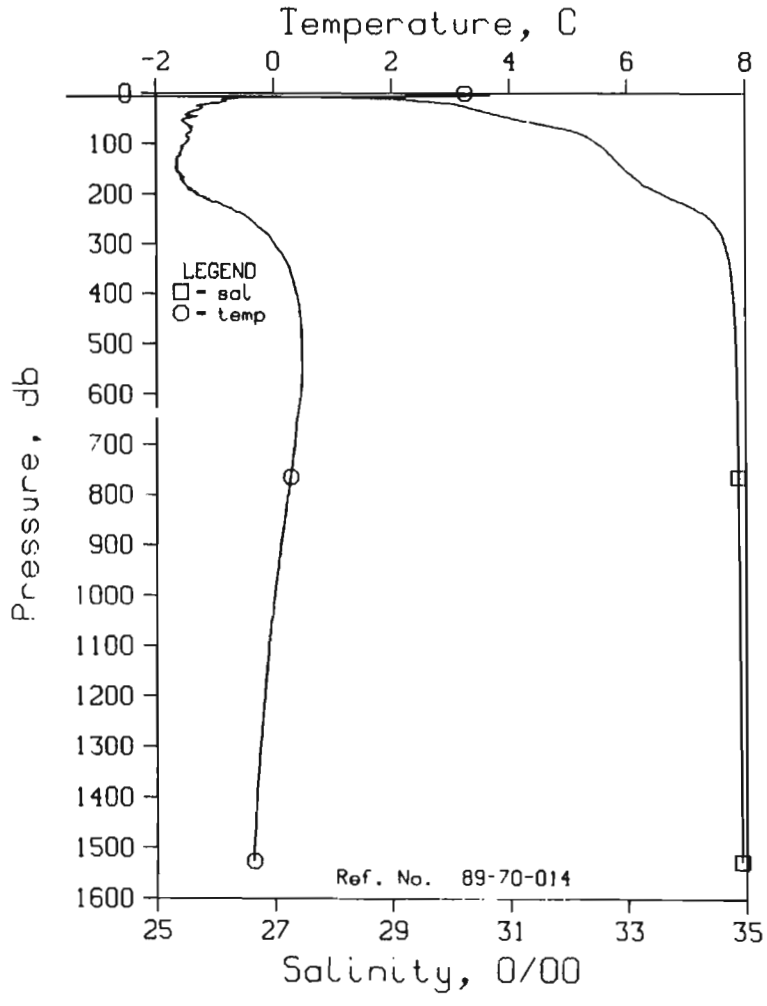


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 13 DATE 27/ 8/89
POSITION 71- 4.8N, 134-59.6W GMT 21: 1 STATION C01H
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.58	14.59	0	11.49	1599.6	0.00	0.00	1451.
10	-0.91	28.38	10	22.83	503.7	1.02	0.04	1436.
20	-1.05	30.21	20	24.30	362.9	1.43	0.10	1438.
30	-1.33	30.73	30	24.73	321.6	1.77	0.19	1438.
50	-1.50	31.41	50	25.28	269.2	2.36	0.43	1438.
75	-1.34	32.20	75	25.92	208.3	2.95	0.80	1440.
100	-1.45	32.54	99	26.20	181.8	3.43	1.23	1441.
125	-1.56	32.74	124	26.36	165.9	3.86	1.72	1441.
150	-1.53	32.96	149	26.54	149.4	4.26	2.27	1442.
175	-1.47	33.22	174	26.74	129.7	4.61	2.85	1443.
200	-1.24	33.57	198	27.03	103.0	4.90	3.41	1445.
225	-0.82	34.02	223	27.37	70.7	5.12	3.87	1448.
250	-0.38	34.39	248	27.65	44.4	5.26	4.21	1451.
300	-0.02	34.62	297	27.82	28.3	5.43	4.69	1454.
400	0.37	34.80	396	27.94	17.6	5.64	5.44	1457.
500	0.39	34.84	495	27.97	14.8	5.80	6.17	1459.
600	0.30	34.86	594	27.99	12.8	5.94	6.94	1460.

DEEPEST MEASUREMENT:

597	0.30	34.86	591	27.99	12.8	5.94	6.92	1460.

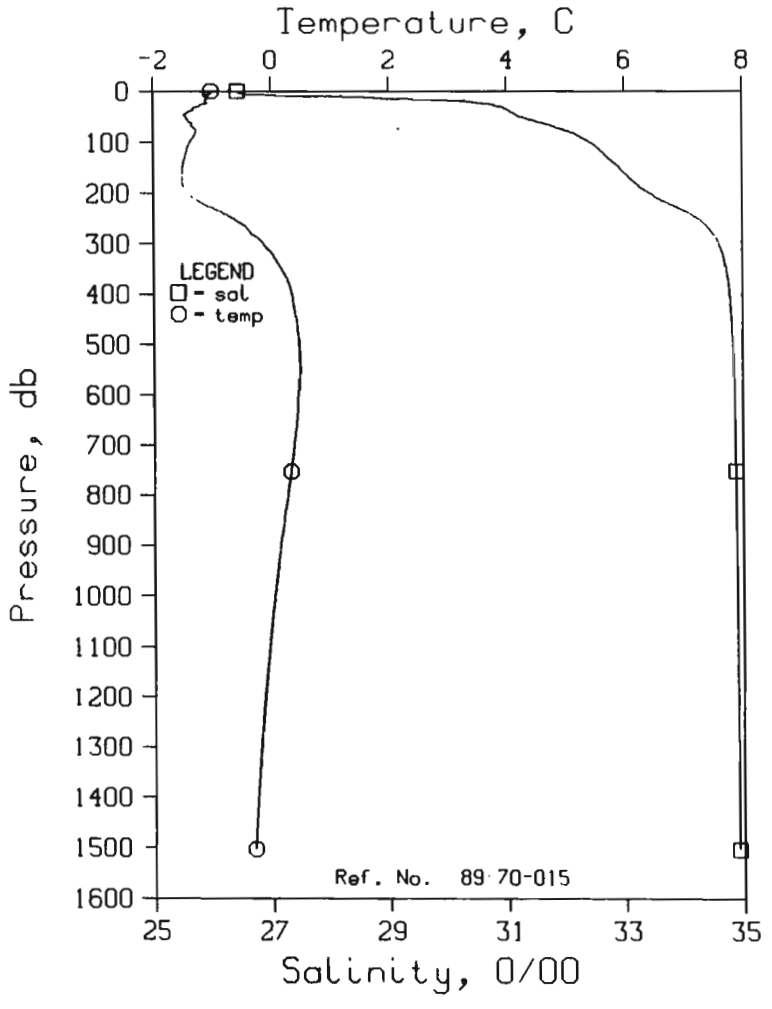


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 14 DATE 27/ 8/89
POSITION 71-20.2N, 136- 8.2W GMT 23:46 STATION C011
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.25	17.90	0	14.32	1324.4	0.00	0.00	1441.
10	-0.66	28.70	10	23.08	479.4	1.00	0.04	1438.
20	-1.01	29.95	20	24.10	382.5	1.42	0.10	1438.
30	-1.23	30.36	30	24.43	350.6	1.78	0.20	1438.
50	-1.53	31.04	50	24.99	297.2	2.43	0.46	1437.
75	-1.40	32.08	75	25.83	217.4	3.07	0.86	1440.
100	-1.50	32.49	99	26.16	185.4	3.56	1.30	1440.
125	-1.62	32.74	124	26.36	166.3	4.00	1.80	1441.
150	-1.66	32.94	149	26.53	150.3	4.40	2.35	1441.
175	-1.54	33.20	174	26.74	130.4	4.75	2.93	1442.
200	-1.31	33.59	198	27.04	101.3	5.04	3.49	1445.
225	-0.81	34.06	223	27.40	67.7	5.25	3.94	1448.
250	-0.41	34.40	248	27.66	43.2	5.39	4.27	1451.
300	0.00	34.64	297	27.84	27.1	5.55	4.73	1454.
400	0.38	34.78	396	27.93	19.0	5.77	5.51	1457.
500	0.48	34.83	495	27.96	16.1	5.94	6.29	1459.
600	0.45	34.85	594	27.98	14.5	6.10	7.15	1461.
800	0.23	34.87	791	28.01	11.4	6.36	8.98	1463.
1000	0.00	34.88	988	28.03	8.7	6.56	10.80	1466.
1200	-0.16	34.90	1185	28.05	6.3	6.70	12.45	1468.
1500	-0.35	34.92	1480	28.08	2.8	6.84	14.28	1472.

DEEPEST MEASUREMENT:

1527	-0.35	34.92	1507	28.08	2.7	6.85	14.39	1473.

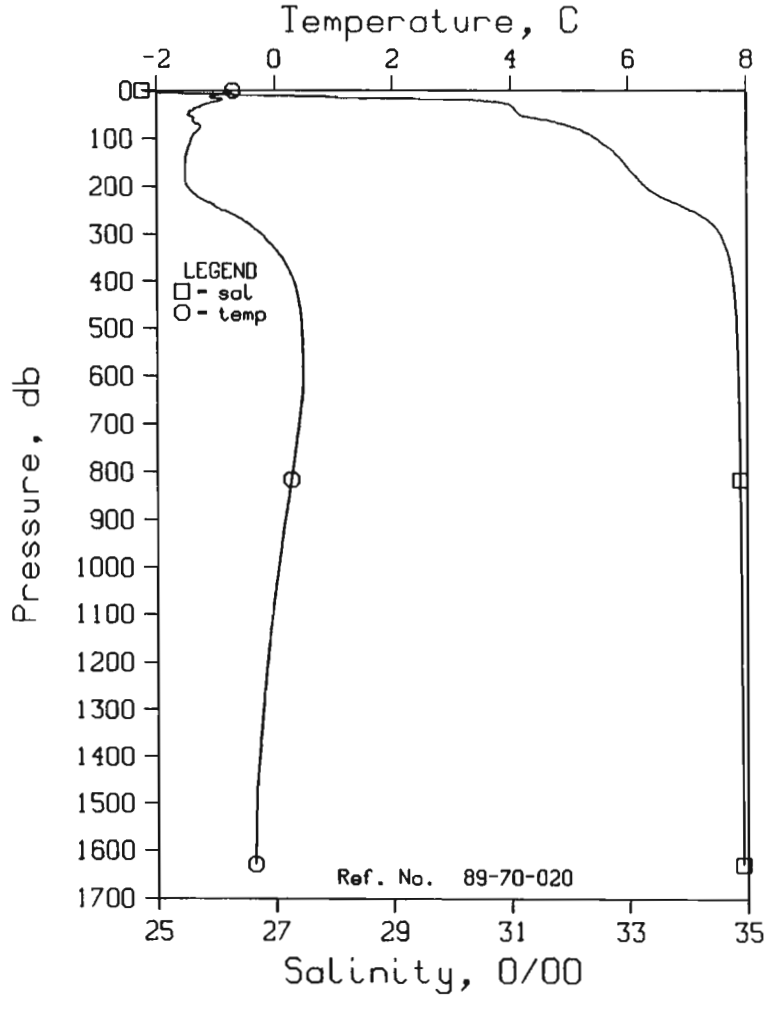


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 15 DATE 28/ 8/89
POSITION 72-33.5N, 143-24.9W GMT 14:21 STATION A01
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	-1.01	26.43	0	21.26	653.9	0.00	0.00	1433.
10	-1.13	27.39	10	22.03	580.2	0.63	0.03	1434.
20	-1.12	30.25	20	24.34	359.3	1.09	0.10	1438.
30	-1.25	30.91	30	24.87	308.4	1.41	0.18	1438.
50	-1.45	31.23	50	25.14	282.7	2.00	0.42	1438.
75	-1.27	31.97	74	25.73	226.7	2.64	0.82	1440.
100	-1.38	32.42	99	26.09	191.8	3.16	1.28	1441.
125	-1.45	32.67	124	26.31	171.5	3.61	1.80	1441.
150	-1.50	32.92	149	26.51	152.4	4.01	2.36	1442.
175	-1.51	33.13	174	26.67	136.4	4.37	2.96	1443.
200	-1.40	33.42	198	26.91	114.3	4.69	3.56	1444.
225	-1.10	33.83	223	27.23	83.9	4.94	4.10	1446.
250	-0.64	34.23	248	27.54	55.2	5.11	4.51	1449.
300	-0.14	34.60	297	27.81	29.9	5.31	5.07	1453.
400	0.35	34.78	396	27.93	19.0	5.54	5.87	1457.
500	0.47	34.83	495	27.96	15.8	5.71	6.66	1459.
600	0.46	34.86	594	27.99	14.0	5.86	7.49	1461.
800	0.27	34.88	791	28.01	11.0	6.11	9.26	1464.
1000	0.05	34.89	988	28.04	8.5	6.31	11.05	1466.
1200	-0.13	34.90	1185	28.05	6.4	6.46	12.70	1468.
1500	-0.30	34.91	1480	28.07	3.7	6.60	14.72	1473.

DEEPEST MEASUREMENT:

1503	-0.30	34.92	1483	28.07	3.6	6.60	14.74	1473.

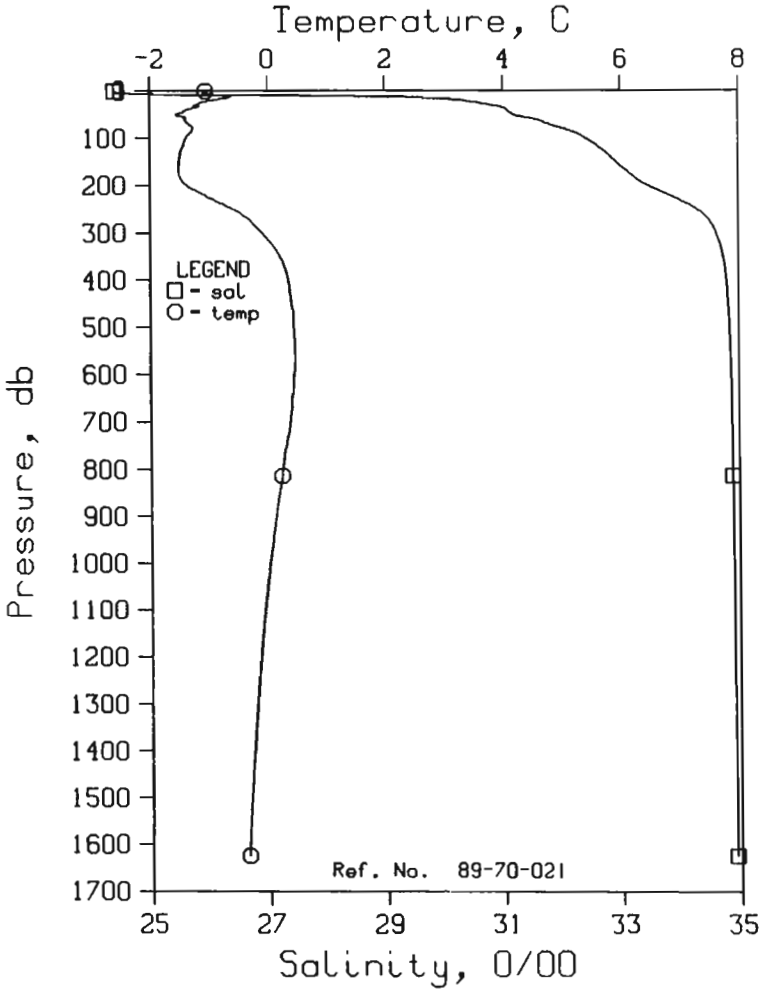


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 20 DATE 29/ 8/89
POSITION 72-22.4N, 142-26.8W GMT 15:28 STATION A02
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	-0.71	24.75	0	19.90	784.4	0.00	0.00	1432.
10	-0.97	26.52	10	21.33	647.4	0.73	0.04	1433.
20	-0.89	30.31	20	24.38	355.5	1.23	0.11	1439.
30	-1.22	30.99	30	24.94	301.9	1.55	0.19	1439.
50	-1.47	31.16	50	25.08	288.8	2.14	0.43	1438.
75	-1.25	32.04	75	25.79	220.8	2.77	0.83	1441.
100	-1.41	32.46	99	26.13	188.7	3.28	1.28	1441.
125	-1.48	32.73	124	26.35	167.4	3.72	1.79	1441.
150	-1.52	32.92	149	26.51	152.1	4.12	2.34	1442.
175	-1.52	33.09	174	26.64	139.1	4.49	2.95	1442.
200	-1.48	33.29	198	26.80	124.1	4.82	3.57	1443.
225	-1.26	33.60	223	27.05	100.3	5.10	4.19	1445.
250	-0.86	34.07	248	27.42	66.3	5.31	4.69	1448.
300	-0.22	34.55	297	27.78	32.7	5.54	5.32	1453.
400	0.33	34.77	396	27.92	19.5	5.78	6.18	1457.
500	0.46	34.83	495	27.96	16.1	5.96	6.98	1459.
600	0.48	34.85	594	27.98	14.2	6.11	7.82	1461.
800	0.29	34.88	791	28.01	11.3	6.36	9.63	1464.
1000	0.05	34.89	988	28.04	8.5	6.56	11.42	1466.
1200	-0.14	34.90	1185	28.06	6.0	6.70	13.04	1468.
1500	-0.33	34.92	1480	28.08	3.1	6.84	14.89	1472.

DEEPEST MEASUREMENT:

1629	-0.34	34.92	1607	28.08	2.6	6.88	15.48	1475.

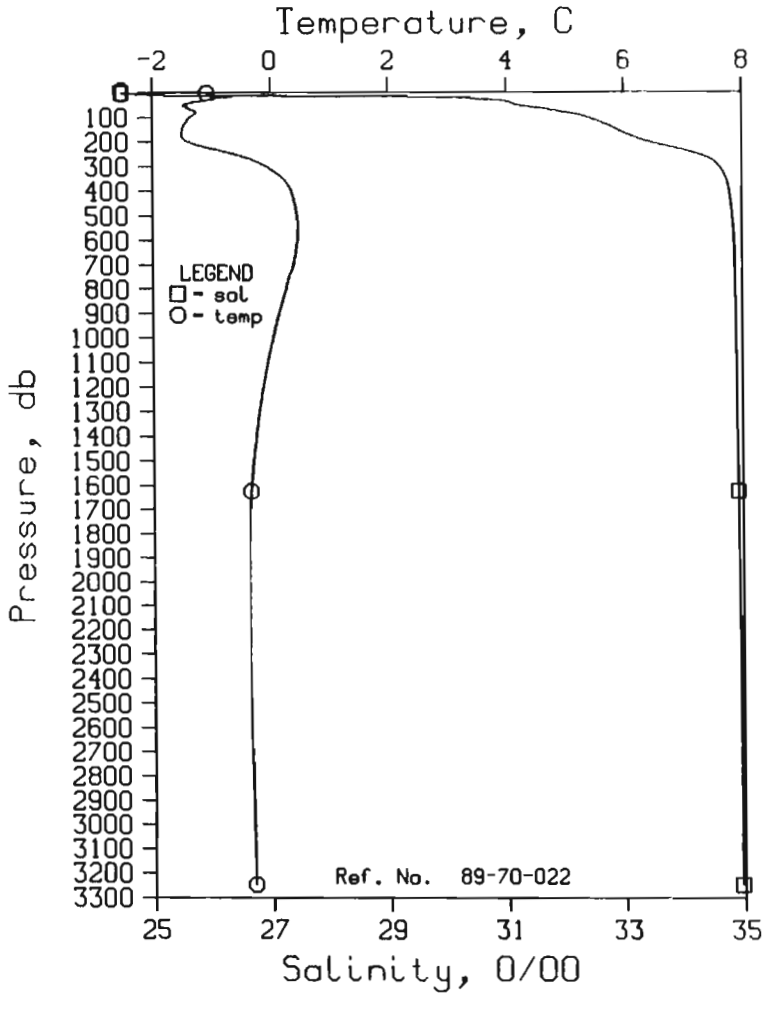


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 21 DATE 29/ 8/89
POSITION 72-11.1N, 143- 5.2W GMT 17:46 STATION A03
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	-1.05	24.39	0	19.62	811.9	0.00	0.00	1430.
10	-0.78	26.95	10	21.68	614.0	0.78	0.04	1435.
20	-0.86	30.27	20	24.35	358.4	1.20	0.10	1439.
30	-1.22	30.81	30	24.79	316.2	1.54	0.19	1438.
50	-1.55	31.18	50	25.10	286.5	2.13	0.43	1438.
75	-1.29	31.89	75	25.67	232.3	2.77	0.83	1440.
100	-1.37	32.39	99	26.08	193.4	3.30	1.30	1441.
125	-1.46	32.70	124	26.32	169.9	3.75	1.81	1441.
150	-1.50	32.93	149	26.51	152.0	4.15	2.38	1442.
175	-1.50	33.16	174	26.70	133.6	4.51	2.97	1443.
200	-1.37	33.46	198	26.94	111.2	4.82	3.55	1444.
225	-1.02	33.91	223	27.29	77.9	5.05	4.06	1447.
250	-0.58	34.30	248	27.59	50.2	5.21	4.44	1450.
300	-0.09	34.61	297	27.82	28.8	5.40	4.95	1453.
400	0.35	34.79	396	27.94	18.3	5.62	5.74	1457.
500	0.44	34.84	495	27.97	15.3	5.79	6.50	1459.
600	0.44	34.86	594	27.99	13.6	5.93	7.31	1461.
800	0.25	34.88	791	28.02	10.8	6.18	9.04	1463.
1000	0.02	34.89	988	28.04	8.1	6.36	10.75	1466.
1200	-0.14	34.90	1185	28.06	6.0	6.51	12.33	1468.
1500	-0.31	34.92	1480	28.08	3.4	6.65	14.24	1473.

DEEPEST MEASUREMENT:

1625	-0.36	34.92	1603	28.08	2.4	6.68	14.81	1474.

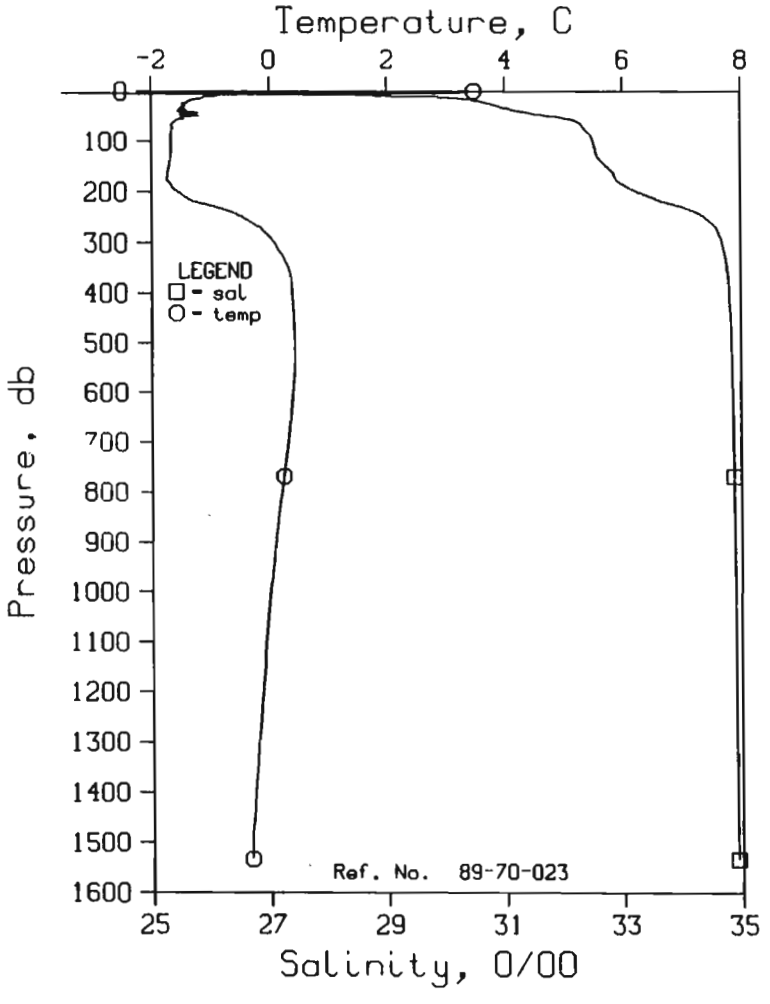


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 22 DATE 29/ 8/89
POSITION 72-11.1N, 143- 5.3W GMT 18:40 STATION A3-2
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	-1.07	24.48	0	19.68	805.5	0.00	0.00	1430.
10	-0.98	24.96	10	20.07	768.0	0.79	0.04	1431.
20	-0.75	29.90	20	24.05	386.8	1.37	0.12	1439.
30	-0.98	30.72	30	24.71	323.7	1.72	0.21	1439.
50	-1.47	31.16	50	25.08	288.2	2.32	0.45	1438.
75	-1.26	31.86	75	25.65	234.6	2.97	0.87	1440.
100	-1.36	32.37	99	26.06	195.5	3.50	1.34	1441.
125	-1.44	32.66	124	26.29	173.0	3.96	1.86	1441.
150	-1.49	32.88	149	26.47	155.4	4.37	2.43	1442.
175	-1.50	33.12	174	26.67	137.1	4.74	3.04	1443.
200	-1.39	33.42	198	26.91	114.0	5.05	3.64	1444.
225	-1.05	33.85	223	27.25	82.3	5.30	4.18	1447.
250	-0.62	34.25	248	27.55	53.8	5.47	4.58	1450.
300	-0.07	34.62	297	27.82	28.6	5.66	5.11	1453.
400	0.36	34.78	396	27.93	18.5	5.88	5.89	1457.
500	0.45	34.84	495	27.97	15.3	6.05	6.65	1459.
600	0.46	34.86	594	27.99	13.9	6.19	7.47	1461.
800	0.27	34.88	791	28.02	10.9	6.44	9.22	1463.
1000	0.04	34.89	988	28.04	8.5	6.63	10.99	1466.
1200	-0.13	34.90	1185	28.05	6.6	6.78	12.66	1468.
1500	-0.30	34.91	1480	28.07	3.8	6.94	14.76	1473.
2000	-0.40	34.93	1971	28.09	1.1	7.05	16.71	1481.
2500	-0.37	34.94	2461	28.10	-0.1	7.07	17.02	1489.
3000	-0.32	34.95	2950	28.10	-0.3	7.05	16.61	1498.

DEEPEST MEASUREMENT:

3247	-0.30	34.95	3191	28.10	-0.4	7.04	16.37	1502.

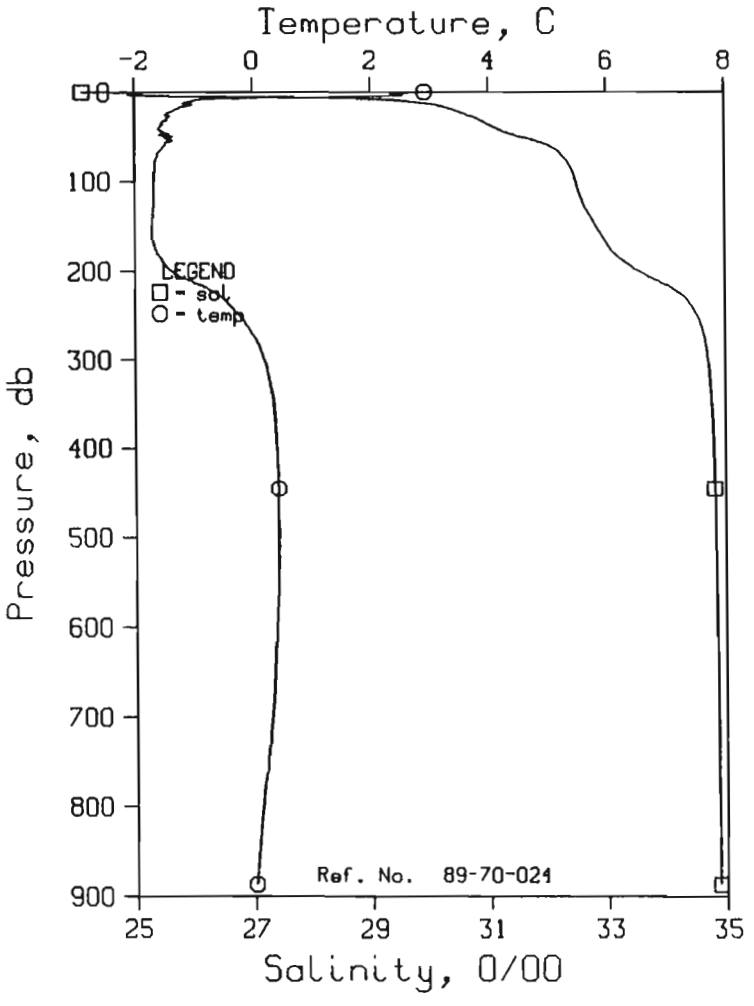


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 23 DATE 30/ 8/89
POSITION 70-44.1N, 141-40.8W GMT 14: 4 STATION B01
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.48	22.57	0	18.01	967.0	0.00	0.00	1448.
10	-0.94	29.23	10	23.52	438.1	0.71	0.03	1437.
20	-1.35	30.55	20	24.58	336.1	1.08	0.09	1437.
30	-1.47	30.91	30	24.88	308.0	1.40	0.17	1437.
50	-1.45	31.78	50	25.59	240.6	1.96	0.39	1439.
75	-1.65	32.35	74	26.05	196.3	2.48	0.72	1439.
100	-1.67	32.50	99	26.17	184.7	2.96	1.14	1440.
125	-1.67	32.55	124	26.21	180.2	3.41	1.67	1440.
150	-1.70	32.73	149	26.36	166.5	3.85	2.27	1441.
175	-1.73	32.88	174	26.48	154.4	4.25	2.93	1441.
200	-1.55	33.24	198	26.77	127.2	4.60	3.61	1443.
225	-1.06	33.87	223	27.26	81.3	4.87	4.18	1447.
250	-0.44	34.39	248	27.65	44.1	5.02	4.53	1451.
300	0.09	34.68	297	27.87	24.5	5.17	4.97	1454.
400	0.39	34.80	396	27.95	17.4	5.37	5.67	1457.
500	0.43	34.84	495	27.97	14.9	5.53	6.41	1459.
600	0.39	34.86	594	27.99	13.4	5.67	7.20	1461.
800	0.20	34.88	791	28.02	10.7	5.91	8.90	1463.
1000	0.00	34.89	988	28.04	8.2	6.10	10.61	1466.
1200	-0.13	34.90	1185	28.05	6.4	6.25	12.23	1468.
1500	-0.32	34.92	1480	28.08	3.3	6.39	14.23	1473.

DEEPEST MEASUREMENT:

1533	-0.32	34.92	1513	28.08	3.2	6.41	14.40	1473.

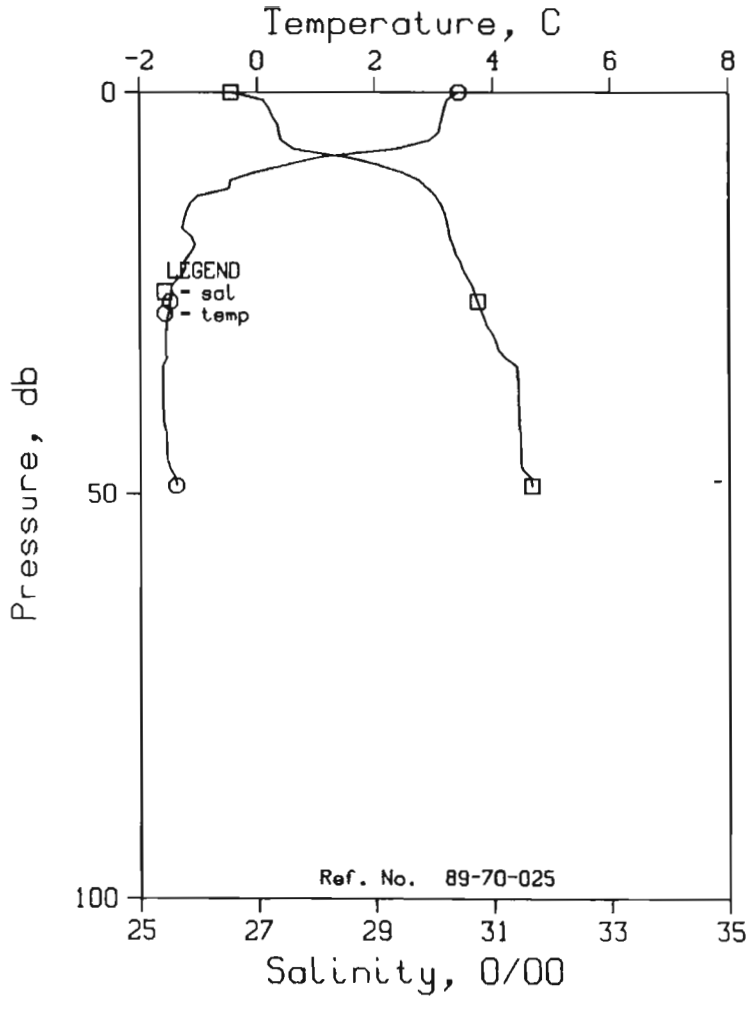


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 24 DATE 30/ 8/89
POSITION 70-41.1N, 141-37.8W GMT 15:12 STATION B02
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	2.92	24.11	0	19.26	846.5	0.00	0.00	1448.
10	-1.02	29.59	10	23.80	410.6	0.64	0.03	1437.
20	-1.32	30.44	20	24.50	344.0	1.01	0.08	1437.
30	-1.45	30.82	30	24.81	314.7	1.34	0.17	1437.
50	-1.37	31.55	50	25.39	258.8	1.92	0.40	1439.
75	-1.64	32.30	74	26.01	200.0	2.47	0.75	1439.
100	-1.67	32.49	99	26.16	185.4	2.95	1.18	1440.
125	-1.68	32.61	124	26.26	176.0	3.40	1.69	1440.
150	-1.71	32.82	149	26.43	159.7	3.82	2.28	1441.
175	-1.66	33.06	174	26.63	140.9	4.20	2.90	1442.
200	-1.36	33.55	198	27.01	104.2	4.51	3.49	1444.
225	-0.61	34.24	223	27.55	54.2	4.70	3.91	1449.
250	-0.21	34.54	248	27.76	34.0	4.81	4.17	1452.
300	0.19	34.71	297	27.88	23.0	4.94	4.54	1455.
400	0.39	34.80	396	27.94	17.6	5.14	5.24	1457.
500	0.42	34.83	495	27.97	15.4	5.31	5.99	1459.
600	0.38	34.85	594	27.98	14.0	5.45	6.82	1461.
800	0.13	34.87	791	28.02	10.4	5.70	8.57	1463.

DEEPEST MEASUREMENT:

887	0.02	34.88	877	28.03	9.0	5.79	9.29	1464.



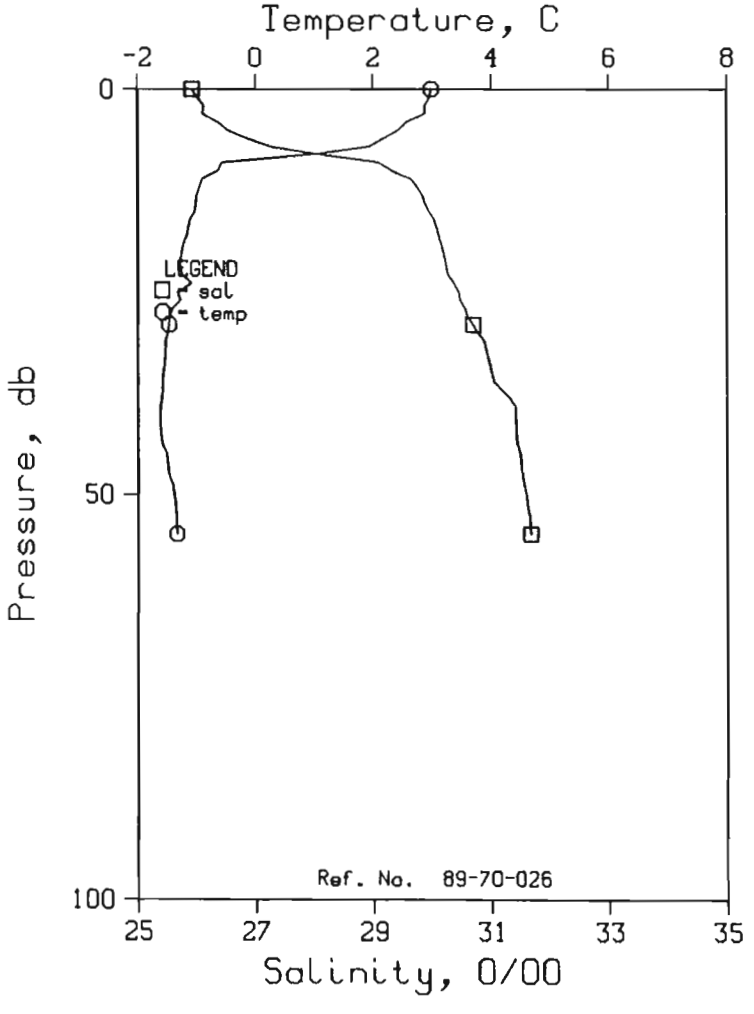
OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 25 DATE 30/ 8/89
POSITION 70-16.0N, 141-11.4W GMT 20:39 STATION B03
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.42	26.55	0	21.16	663.3	0.00	0.00	1453.
10	-0.06	29.48	10	23.69	421.8	0.57	0.03	1442.
20	-1.13	30.36	20	24.43	351.0	0.94	0.08	1438.
30	-1.57	30.99	30	24.94	301.7	1.27	0.17	1437.
50	-1.38	31.66	50	25.48	250.3	1.82	0.39	1439.

DEEPEST MEASUREMENT:

49	-1.38	31.65	49	25.48	251.0	1.80	0.37	1439.

PRES	DEPTH	TEMP	SAL	PRES	DEPTH	TEMP	SAL
0.		3.418	26.553	25.		-1.465	30.693
1.		3.225	27.102	26.		-1.488	30.736
2.		3.172	27.208	27.		-1.503	30.795
3.		3.141	27.256	28.		-1.535	30.852
4.		3.107	27.346	29.		-1.547	30.896
5.		3.083	27.365	30.		-1.570	30.987
6.		2.914	27.412	31.		-1.572	31.051
7.		2.352	27.620	32.		-1.568	31.091
8.		1.086	28.479	33.		-1.550	31.207
9.		0.534	29.031	34.		-1.611	31.398
10.		-0.058	29.476	35.		-1.612	31.410
11.		-0.451	29.749	36.		-1.612	31.419
12.		-0.480	29.904	37.		-1.611	31.425
13.		-1.029	30.032	38.		-1.609	31.427
14.		-1.146	30.109	39.		-1.606	31.429
15.		-1.213	30.175	40.		-1.604	31.432
16.		-1.247	30.216	41.		-1.597	31.435
17.		-1.278	30.249	42.		-1.570	31.440
18.		-1.122	30.266	43.		-1.545	31.458
19.		-1.062	30.321	44.		-1.542	31.465
20.		-1.135	30.359	45.		-1.540	31.467
21.		-1.240	30.435	46.		-1.529	31.469
22.		-1.227	30.486	47.		-1.475	31.493
23.		-1.318	30.561	48.		-1.392	31.640
24.		-1.458	30.645	49.		-1.385	31.649

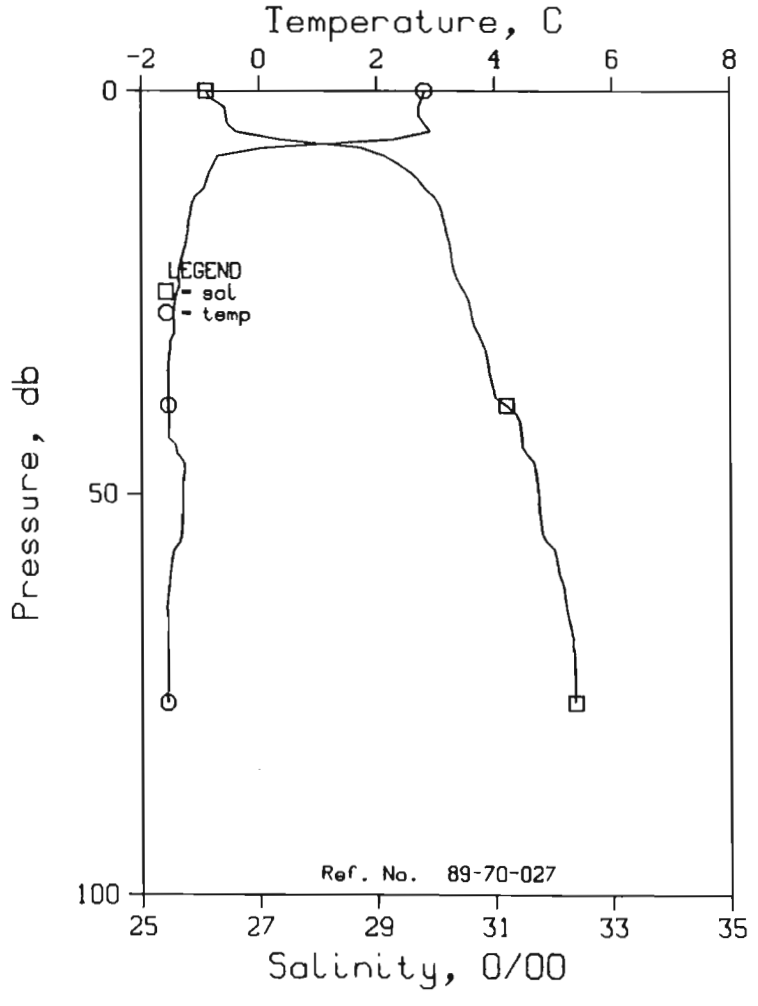


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 26 DATE 30/ 8/89
POSITION 70-18.7N, 141-14.4W GMT 21: 5 STATION B04
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	2.99	25.93	0	20.70	707.8	0.00	0.00	1450.
10	-0.63	29.32	10	23.58	431.8	0.62	0.03	1439.
20	-1.24	30.19	20	24.30	363.6	1.01	0.09	1437.
30	-1.49	30.78	30	24.77	317.9	1.35	0.17	1437.
50	-1.38	31.59	50	25.43	255.5	1.91	0.40	1439.

DEEPEST MEASUREMENT:

55	-1.33	31.68	55	25.50	248.8	2.03	0.47	1439.

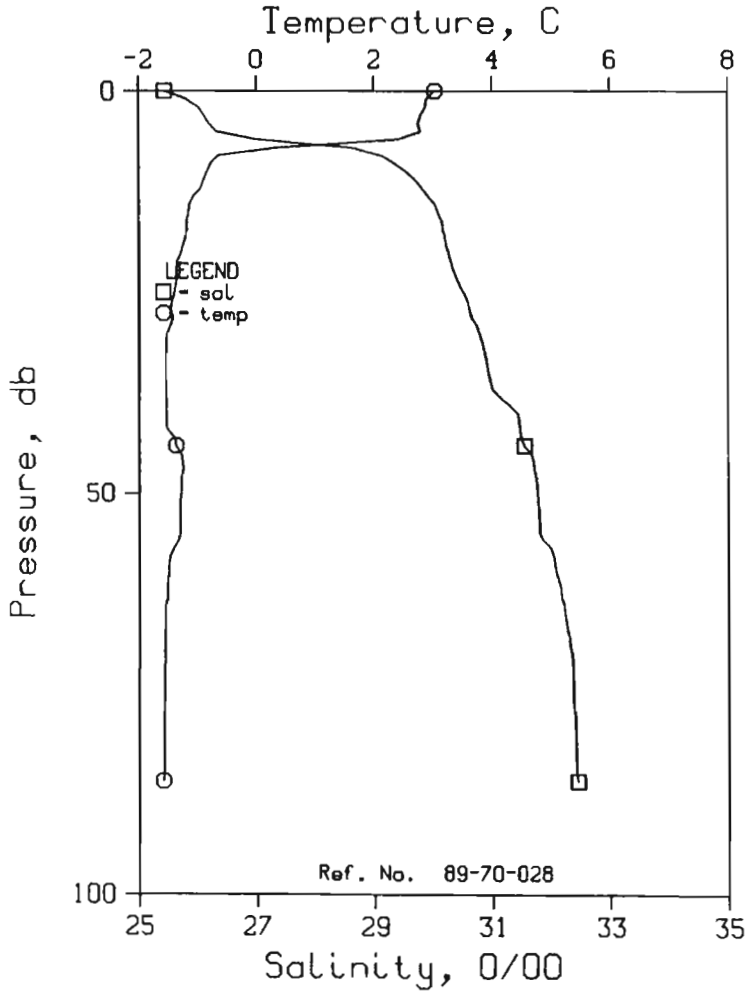


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 27 DATE 30/ 8/89
POSITION 70-20.3N, 141-16.0W GMT 21:38 STATION B05
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	2.81	26.10	0	20.85	693.3	0.00	0.00	1450.
10	-0.84	29.58	10	23.79	411.5	0.58	0.03	1438.
20	-1.29	30.27	20	24.36	357.6	0.96	0.08	1437.
30	-1.45	30.73	30	24.73	322.1	1.30	0.17	1437.
50.	-1.29	31.75	50	25.55	243.6	1.86	0.40	1440.
75	-1.56	32.36	74	26.06	195.7	2.40	0.73	1440.

DEEPEST MEASUREMENT:

76	-1.56	32.36	75	26.06	195.6	2.42	0.75	1440.

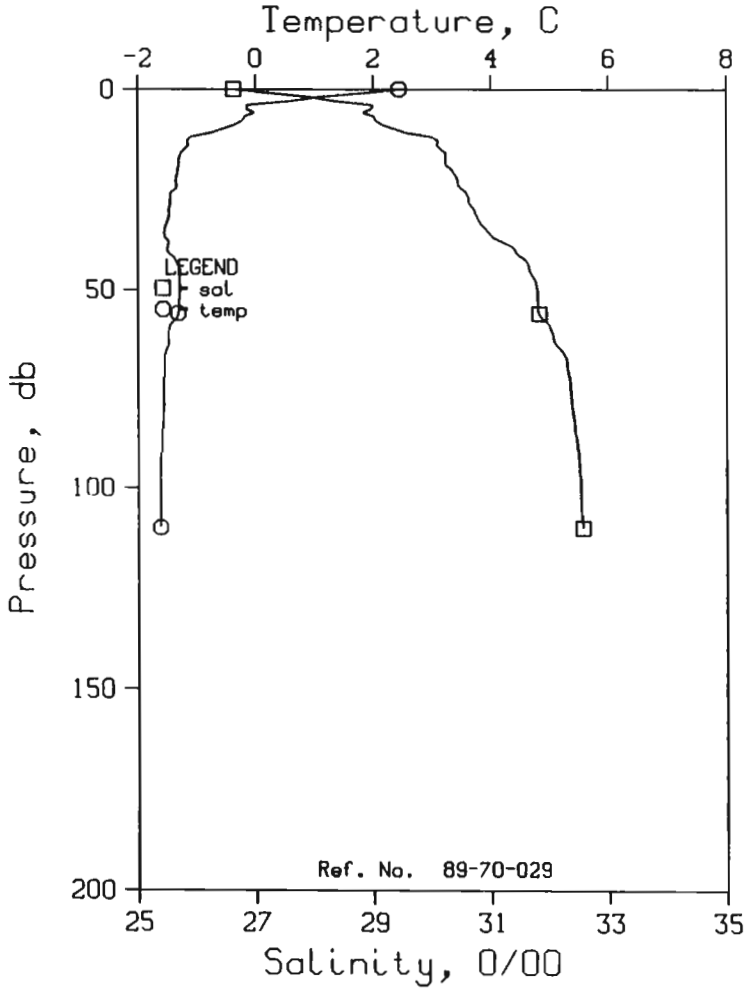


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 28 DATE 30/ 8/89
POSITION 70-20.5N, 141-16.2W GMT 21:56 STATION B06
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.03	25.45	0	20.31	744.9	0.00	0.00	1450.
10	-0.84	29.54	10	23.76	414.5	0.60	0.03	1438.
20	-1.28	30.26	20	24.35	358.3	0.98	0.08	1437.
30	-1.52	30.78	30	24.78	317.4	1.32	0.17	1437.
50	-1.29	31.76	50	25.56	242.6	1.87	0.39	1440.
75	-1.57	32.37	74	26.06	195.2	2.41	0.73	1440.

DEEPEST MEASUREMENT:

86	-1.59	32.44	85	26.12	189.3	2.62	0.91	1440.

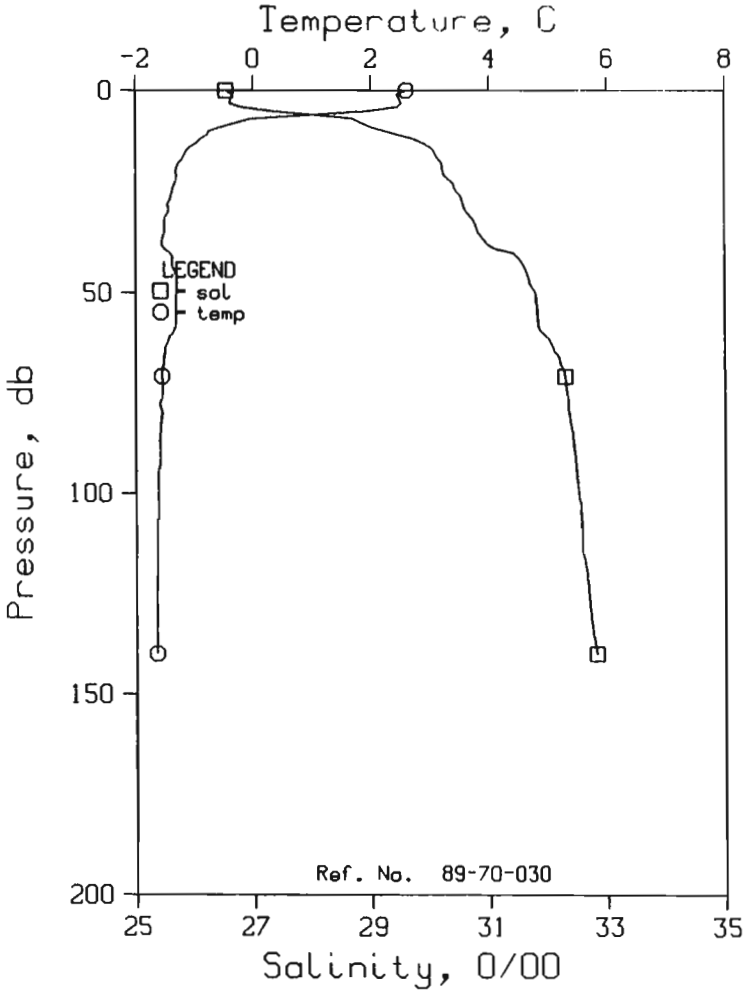


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 29 DATE 30/ 8/89
POSITION 70-20.8N, 141-16.6W GMT 22: 8 STATION B07
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	2.44	26.63	0	21.29	650.9	0.00	0.00	1449.
10	-0.56	29.36	10	23.61	428.8	0.49	0.02	1439.
20	-1.32	30.33	20	24.41	352.6	0.87	0.08	1437.
30	-1.48	30.72	30	24.73	322.4	1.21	0.17	1437.
50	-1.29	31.78	50	25.58	241.2	1.76	0.39	1440.
75	-1.57	32.35	74	26.05	196.6	2.31	0.73	1440.
100	-1.63	32.52	99	26.19	183.1	2.78	1.15	1440.

DEEPEST MEASUREMENT:

110	-1.62	32.55	109	26.21	180.7	2.96	1.35	1440.

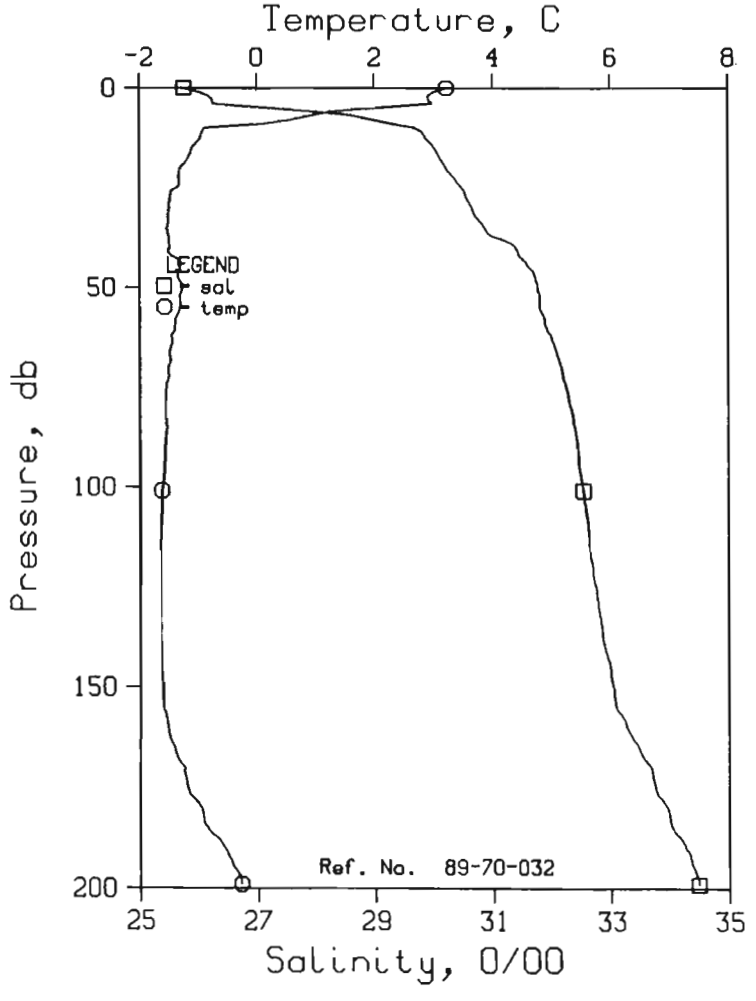


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 30 DATE 30/ 8/89
POSITION 70-21.0N, 141-17.0W GMT 22:21 STATION B08
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	2.60	26.55	0	21.21	658.4	0.00	0.00	1449.
10	-0.75	29.23	10	23.51	438.9	0.57	0.03	1438.
20	-1.31	30.22	20	24.32	361.3	0.95	0.08	1437.
30	-1.44	30.63	30	24.65	329.6	1.29	0.17	1437.
50	-1.30	31.78	50	25.58	241.1	1.86	0.40	1440.
75	-1.54	32.32	74	26.02	198.9	2.41	0.75	1440.
100	-1.61	32.52	99	26.18	183.5	2.89	1.17	1440.
125	-1.65	32.69	124	26.32	170.1	3.33	1.68	1440.

DEEPEST MEASUREMENT:

140	-1.65	32.82	139	26.43	160.1	3.58	2.01	1441.

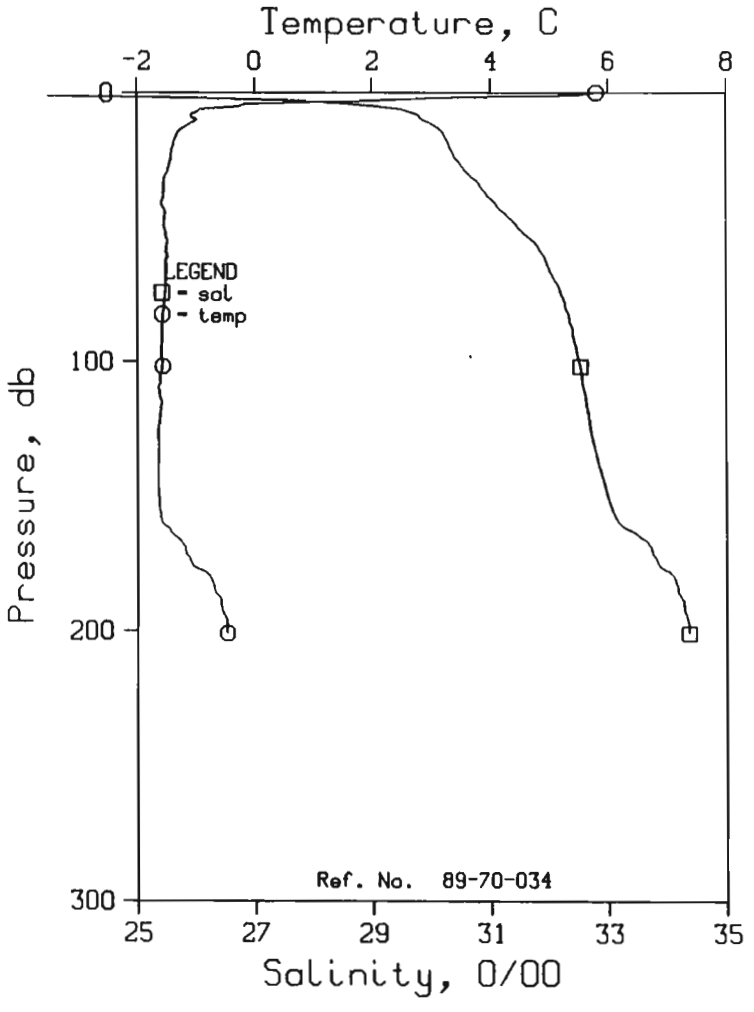


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 32 DATE 30/ 8/89
POSITION 70-22.0N, 141-19.0W GMT 23:44 STATION B09
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.22	25.76	0	20.55	722.2	0.00	0.00	1451.
10	-0.88	29.67	10	23.87	404.7	0.59	0.03	1438.
20	-1.30	30.21	20	24.31	362.2	0.97	0.08	1437.
30	-1.49	30.65	30	24.67	327.9	1.31	0.17	1437.
50	-1.27	31.77	50	25.57	242.1	1.87	0.40	1440.
75	-1.55	32.25	74	25.96	204.3	2.43	0.75	1439.
100	-1.61	32.52	99	26.19	182.9	2.91	1.18	1440.
125	-1.65	32.74	124	26.36	166.2	3.35	1.68	1440.
150	-1.61	33.04	149	26.60	143.2	3.74	2.22	1442.
175	-1.19	33.74	174	27.16	90.4	4.03	2.71	1445.
200	-0.28	34.49	198	27.73	37.0	4.19	3.00	1451.

DEEPEST MEASUREMENT:

199	-0.28	34.49	197	27.73	37.6	4.19	2.99	1451.

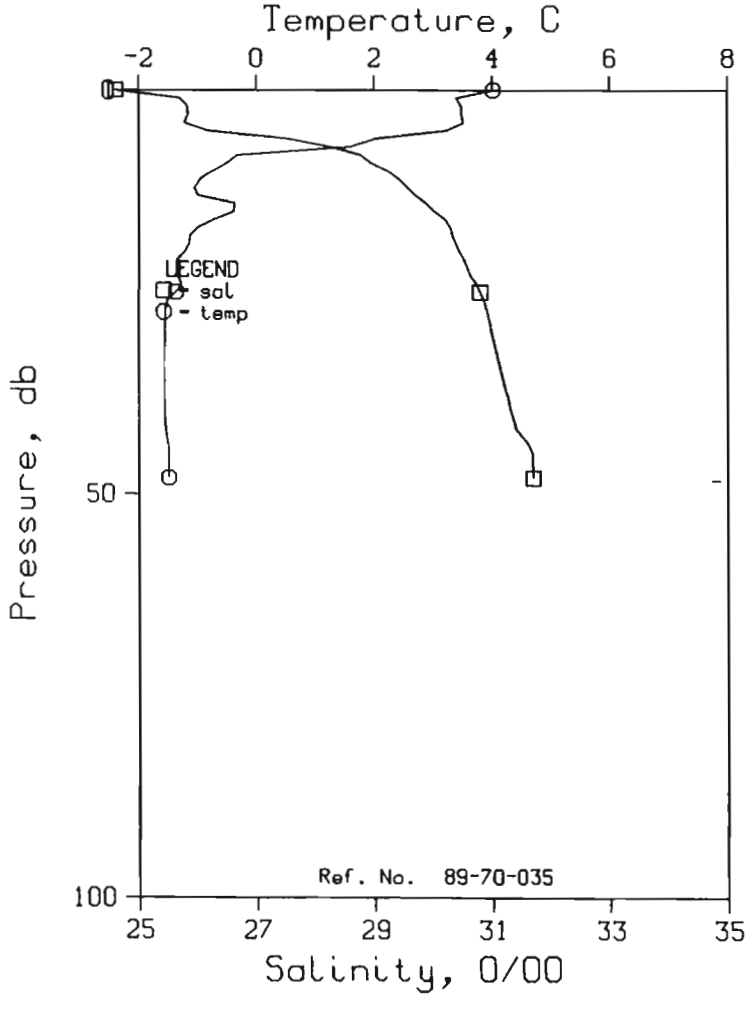


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 34 DATE 31/ 8/89
POSITION 70-15.9N, 140-17.2W GMT 14:20 STATION B10
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.79	22.26	0	17.58	1007.9	0.00	0.00	1458.
10	-0.97	29.84	10	24.00	391.6	0.55	0.02	1438.
20	-1.39	30.31	20	24.39	354.5	0.92	0.08	1437.
30	-1.50	30.61	30	24.64	330.9	1.26	0.17	1437.
50	-1.54	31.45	50	25.32	266.1	1.86	0.41	1438.
75	-1.53	32.19	74	25.92	208.9	2.44	0.77	1439.
100	-1.57	32.50	99	26.17	184.9	2.92	1.20	1440.
125	-1.65	32.69	124	26.32	170.0	3.37	1.71	1440.
150	-1.63	32.98	149	26.56	147.3	3.76	2.27	1441.
175	-1.08	33.84	174	27.24	83.3	4.06	2.75	1446.
200	-0.47	34.36	198	27.63	46.5	4.20	3.02	1450.

DEEPEST MEASUREMENT:

201	-0.47	34.35	199	27.63	46.6	4.21	3.03	1450.



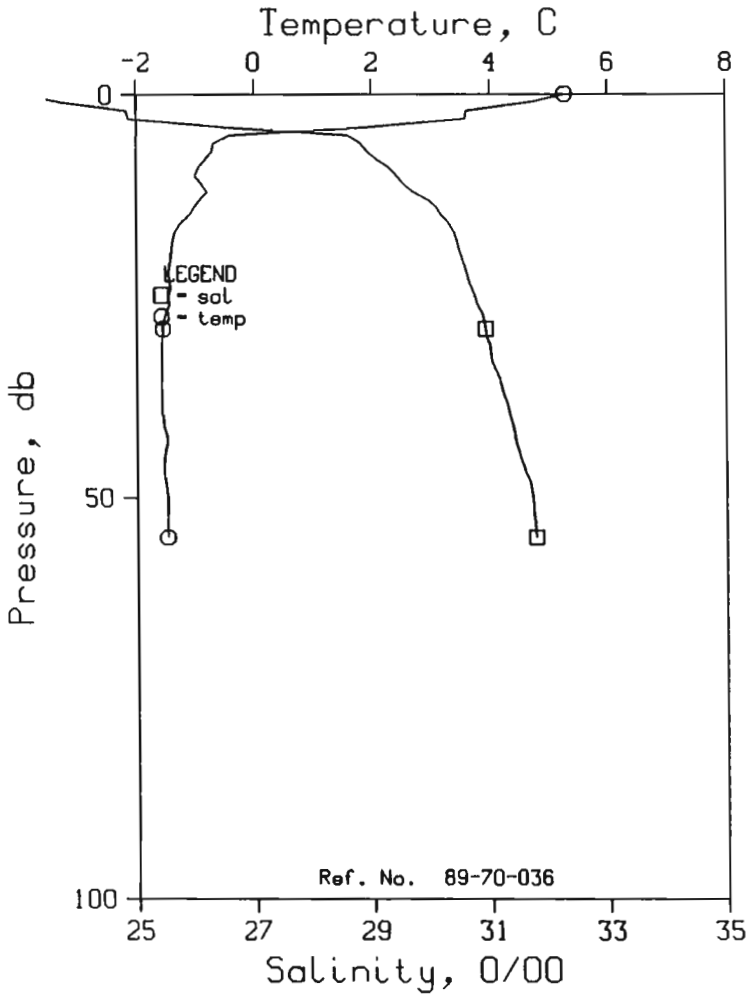
OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 35 DATE 31/ 8/89
POSITION 70-13.0N, 140-32.6W GMT 17:28 STATION B11
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.02	24.61	0	19.58	815.6	0.00	0.00	1453.
10	-0.74	29.24	10	23.52	437.7	0.62	0.03	1438.
20	-1.22	30.46	20	24.51	343.2	1.01	0.09	1438.
30	-1.57	30.99	30	24.95	301.3	1.33	0.17	1437.
50	-1.49	31.71	50	25.53	246.1	1.87	0.38	1439.

DEEPEST MEASUREMENT:

48	-1.49	31.70	48	25.52	247.1	1.82	0.36	1439.

PRES	DEPTH	TEMP	SAL	PRES	DEPTH	TEMP	SAL
0.		4.018	24.606	25.		-1.371	30.799
1.		3.393	25.679	26.		-1.515	30.863
2.		3.481	25.832	27.		-1.547	30.901
3.		3.489	25.835	28.		-1.552	30.937
4.		3.523	25.775	29.		-1.558	30.964
5.		3.233	26.186	30.		-1.566	30.992
6.		2.020	27.540	31.		-1.572	31.024
7.		1.586	28.256	32.		-1.580	31.059
8.		-0.310	28.768	33.		-1.589	31.091
9.		-0.485	28.946	34.		-1.590	31.126
10.		-0.741	29.243	35.		-1.585	31.151
11.		-0.955	29.422	36.		-1.581	31.187
12.		-1.055	29.561	37.		-1.575	31.224
13.		-0.998	29.707	38.		-1.579	31.267
14.		-0.372	29.873	39.		-1.563	31.303
15.		-0.380	30.023	40.		-1.563	31.335
16.		-0.706	30.204	41.		-1.562	31.380
17.		-0.997	30.293	42.		-1.546	31.412
18.		-1.123	30.334	43.		-1.520	31.534
19.		-1.133	30.387	44.		-1.503	31.627
20.		-1.221	30.457	45.		-1.496	31.684
21.		-1.350	30.529	46.		-1.495	31.688
22.		-1.364	30.586	47.		-1.493	31.691
23.		-1.334	30.645	48.		-1.493	31.697
24.		-1.273	30.739				

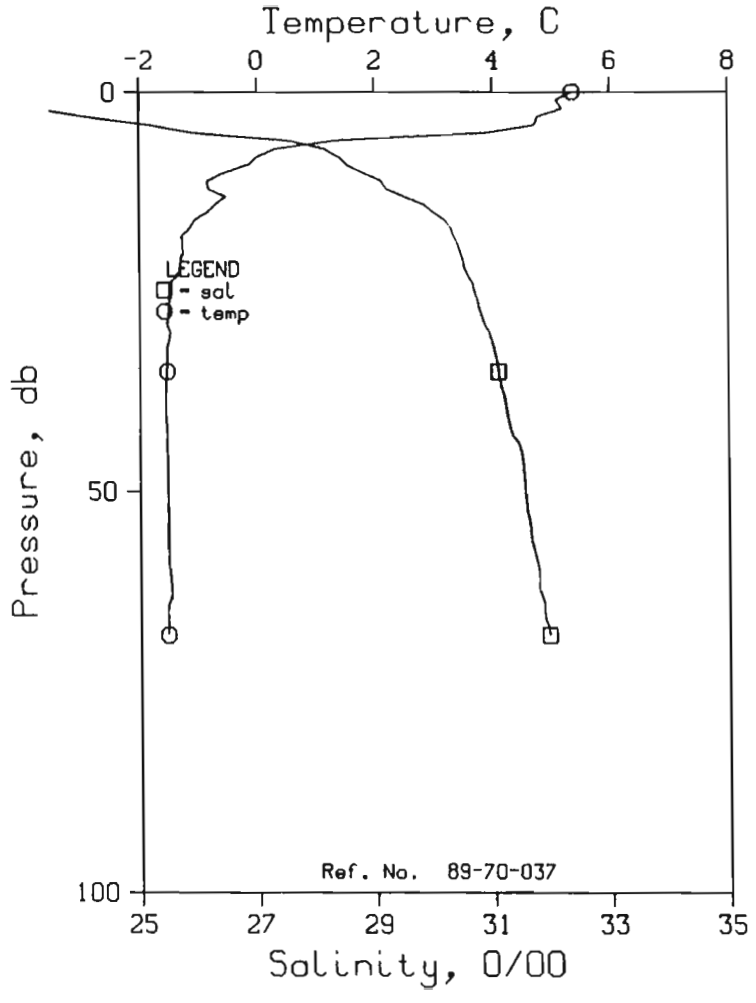


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 36 DATE 31/ 8/89
POSITION 70-13.6N, 140-22.4W GMT 17:36 STATION B12
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.27	23.19	0	18.36	933.2	0.00	0.00	1457.
10	-1.01	29.42	10	23.67	423.5	0.61	0.03	1437.
20	-1.41	30.52	20	24.56	338.1	0.98	0.08	1437.
30	-1.56	30.95	30	24.91	304.6	1.30	0.16	1437.
50	-1.48	31.72	50	25.53	245.5	1.85	0.38	1439.

DEEPEST MEASUREMENT:

55	-1.48	31.77	55	25.58	241.4	1.97	0.45	1439.

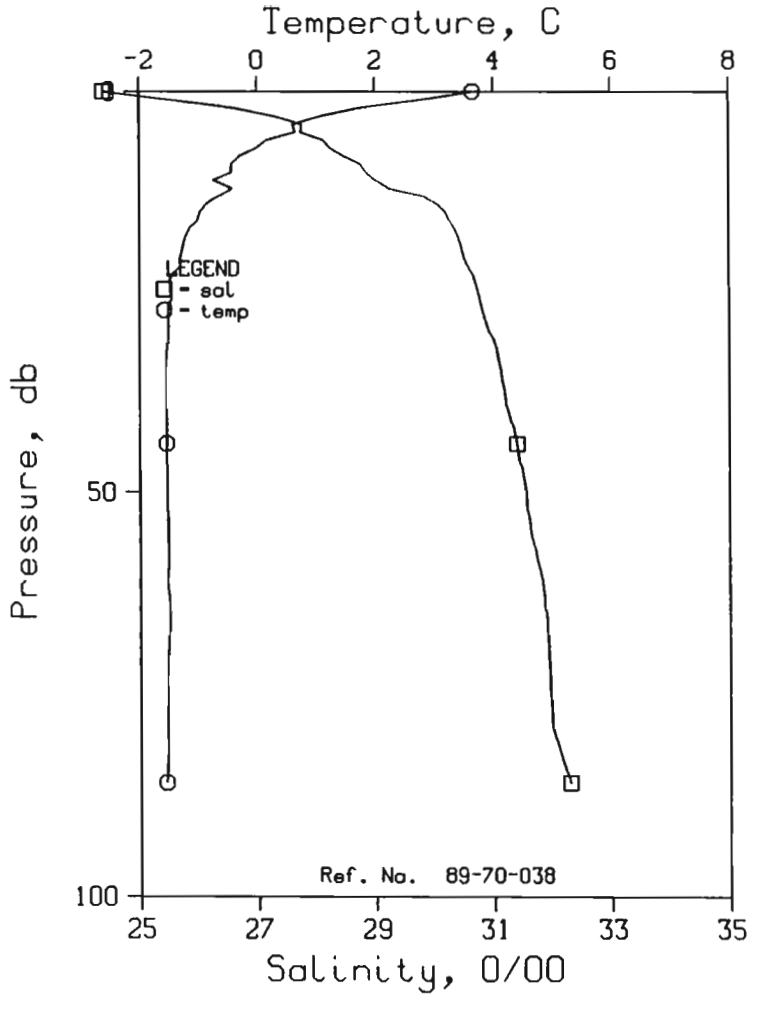


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 37 DATE 31/ 8/89
POSITION 70-15.2N, 140-19.7W GMT 18:30 STATION B13
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.36	22.78	0	18.02	965.3	0.00	0.00	1456.
10	-0.58	28.82	10	23.18	470.5	0.70	0.03	1438.
20	-1.26	30.46	20	24.51	343.2	1.09	0.09	1437.
30	-1.48	30.93	30	24.90	306.1	1.42	0.17	1437.
50	-1.53	31.55	50	25.40	258.6	1.98	0.40	1438.

DEEPEST MEASUREMENT:

68	-1.53	31.94	68	25.71	228.3	2.42	0.66	1439.

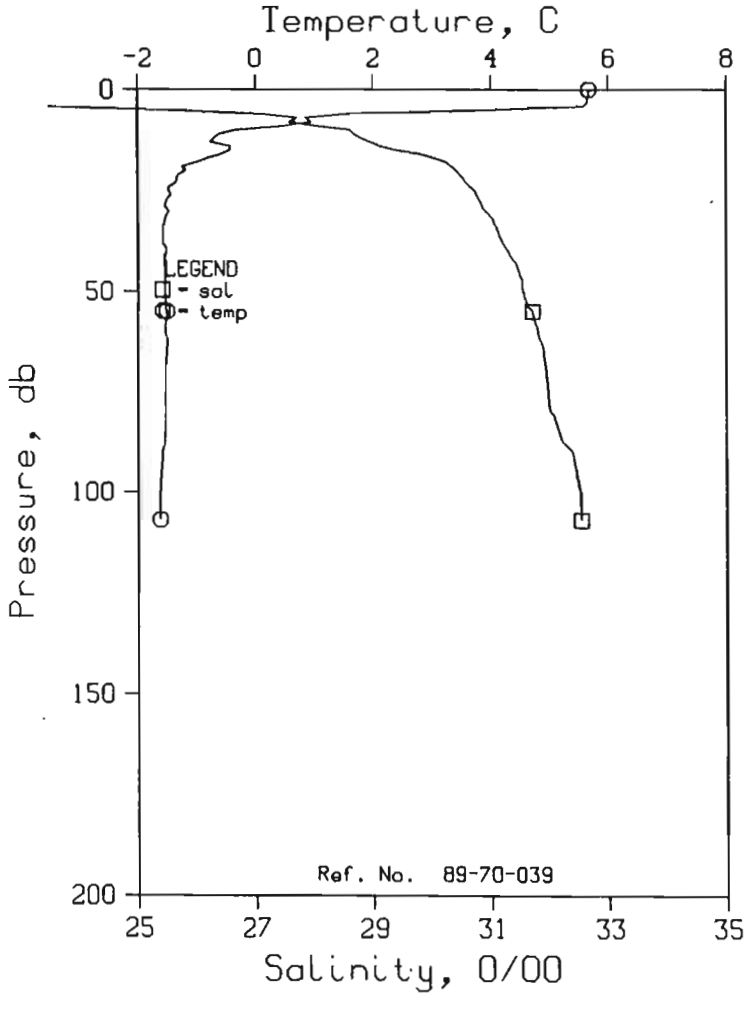


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 38 DATE 31/ 8/89
POSITION 70 '5.4N, 140-19.1W GMT 19:17 STATION B14
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.66	24.39	0	19.43	829.8	0.00	0.00	1451.
10	-0.44	28.85	10	23.19	468.7	0.58	0.03	1439.
20	-1.28	30.48	20	24.53	341.3	0.96	0.08	1437.
30	-1.51	30.92	30	24.89	306.9	1.28	0.17	1437.
50	-1.53	31.56	50	25.40	257.9	1.84	0.39	1438.
75	-1.54	31.97	74	25.73	226.2	2.44	0.77	1439.

DEEPEST MEASUREMENT:

86	-1.56	32.29	85	26.00	201.0	2.67	0.96	1440.

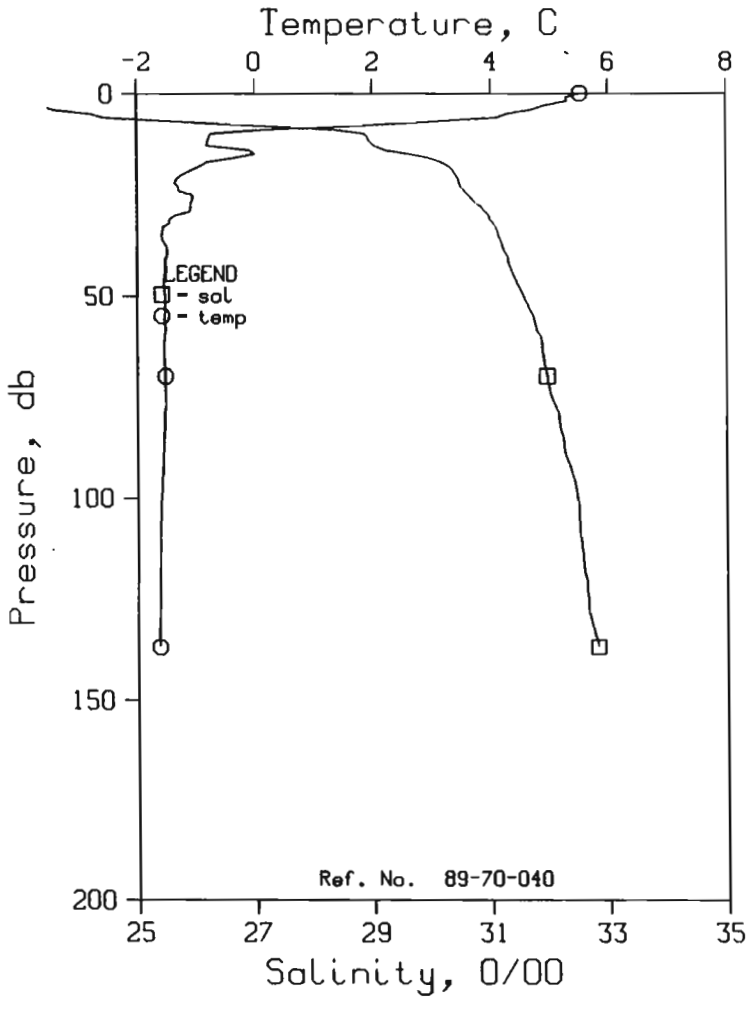


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 39 DATE 31/ 8/89
POSITION 70-15.6N, 140-18.4W GMT 19:31 STATION B15
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.66	22.33	0	17.64	1002.1	0.00	0.00	1457.
10	-0.33	28.60	10	22.99	488.1	0.78	0.03	1439.
20	-1.19	30.41	20	24.47	346.7	1.20	0.10	1438.
30	-1.47	30.92	30	24.88	307.4	1.52	0.18	1437.
50	-1.53	31.55	50	25.40	258.4	2.08	0.40	1438.
75	-1.53	31.97	75	25.74	225.8	2.67	0.78	1439.
100	-1.62	32.51	99	26.18	183.5	3.18	1.23	1440.

DEEPEST MEASUREMENT:

107	-1.62	32.53	106	26.20	181.9	3.31	1.37	1440.

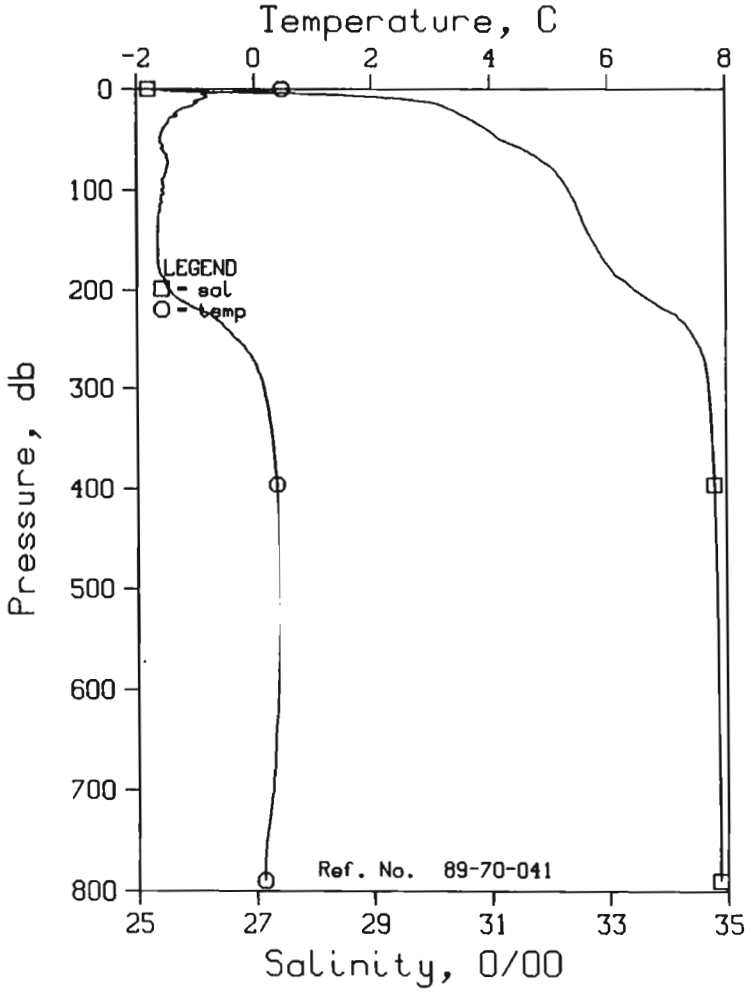


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 40 DATE 31/ 8/89
POSITION 70-15.4N, 140-17.7W GMT 19:51 STATION B16
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.52	22.43	0	17.74	993.0	0.00	0.00	1457.
10	-0.74	28.87	10	23.22	466.7	0.80	0.04	1438.
20	-1.22	30.41	20	24.47	346.6	1.21	0.10	1438.
30	-1.35	30.97	30	24.92	303.5	1.54	0.18	1438.
50	-1.52	31.56	50	25.41	257.5	2.10	0.41	1438.
75	-1.52	32.03	75	25.79	221.2	2.69	0.78	1439.
100	-1.60	32.46	99	26.14	187.6	3.20	1.23	1440.
125	-1.63	32.64	124	26.28	173.8	3.65	1.75	1440.

DEEPEST MEASUREMENT:

137.	-1.63	32.81	136	26.42	160.9	3.85	2.02	1441.

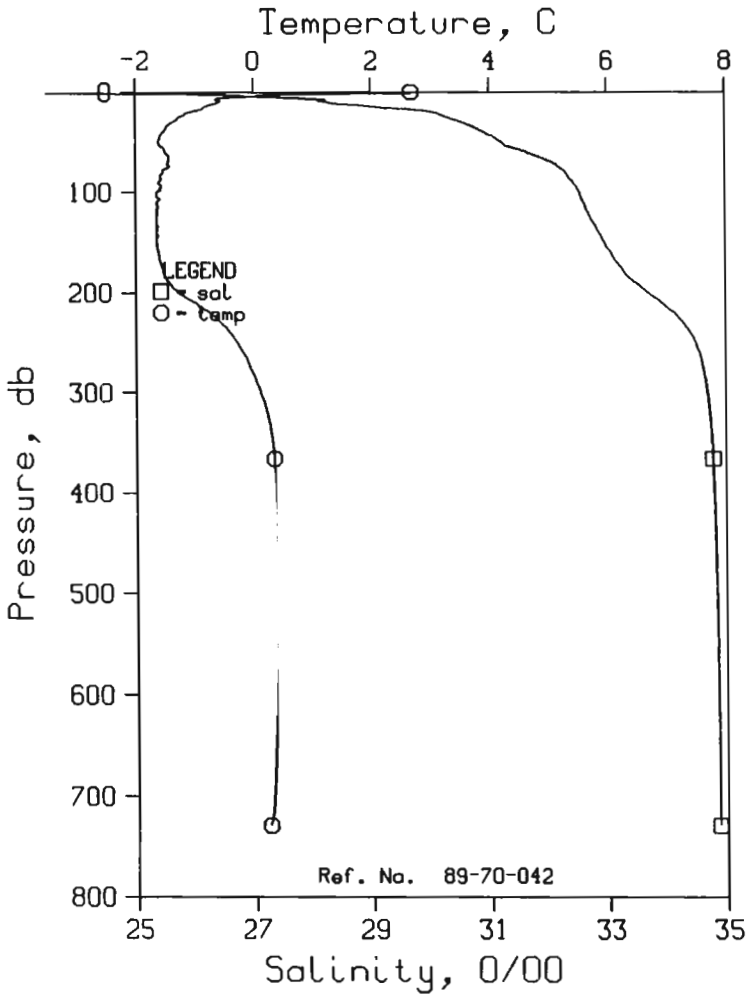


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 41 DATE 31/ 8/89
POSITION 70-34.7N, 140-25.7W GMT 21:50 STATION B17
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	0.47	25.20	0	20.24	751.7	0.00	0.00	1438.
10	-0.85	29.49	10	23.72	418.9	0.56	0.03	1438.
20	-1.23	30.32	20	24.40	353.7	0.94	0.08	1437.
30	-1.44	30.67	30	24.69	325.9	1.28	0.17	1437.
50	-1.59	31.17	50	25.09	287.4	1.89	0.42	1437.
75	-1.47	32.00	74	25.76	223.9	2.52	0.81	1440.
100	-1.57	32.34	99	26.04	197.3	3.04	1.28	1440.
125	-1.62	32.54	124	26.20	181.2	3.51	1.82	1440.
150	-1.64	32.74	149	26.37	165.4	3.95	2.43	1441.
175	-1.63	33.00	174	26.58	145.5	4.34	3.07	1442.
200	-1.45	33.46	198	26.94	110.6	4.66	3.68	1444.
225	-0.73	34.15	223	27.48	60.7	4.88	4.15	1448.
250	-0.29	34.48	248	27.72	37.6	5.00	4.44	1451.
300	0.16	34.70	297	27.88	23.4	5.14	4.84	1455.
400	0.37	34.79	396	27.94	17.9	5.35	5.56	1457.
500	0.42	34.83	495	27.97	15.4	5.51	6.32	1459.
600	0.38	34.85	594	27.98	13.9	5.66	7.13	1461.
800	0.14	34.87	791	28.01	10.7	5.91	8.85	1463.

DEEPEST MEASUREMENT:

790	0.14	34.87	781	28.01	10.7	5.89	8.77	1463.

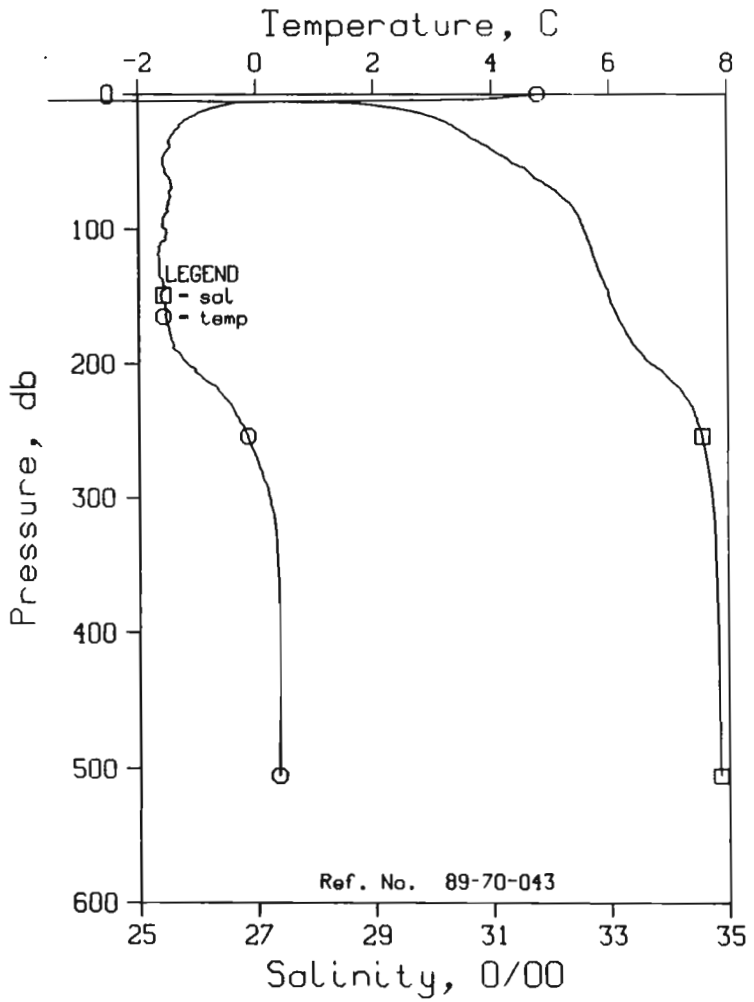


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 42 DATE 1/ 9/89
POSITION 70-26.2N, 139-12.2W GMT 0:19 STATION B18
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	2.68	22.14	0	17.71	995.4	0.00	0.00	1444.
10	-0.59	28.24	10	22.71	515.4	0.64	0.03	1437.
20	-1.04	30.03	20	24.16	376.5	1.09	0.10	1438.
30	-1.36	30.54	30	24.58	336.6	1.45	0.19	1437.
50	-1.61	31.19	50	25.11	285.5	2.06	0.44	1437.
75	-1.42	32.19	75	25.91	209.5	2.68	0.82	1440.
100	-1.64	32.53	99	26.20	182.1	3.16	1.25	1440.
125	-1.65	32.71	124	26.34	168.2	3.60	1.75	1440.
150	-1.64	32.95	149	26.53	149.7	4.00	2.31	1441.
175	-1.55	33.24	174	26.76	128.0	4.35	2.88	1443.
200	-1.26	33.70	198	27.13	93.5	4.63	3.42	1445.
225	-0.64	34.21	223	27.52	57.1	4.81	3.82	1449.
250	-0.28	34.49	248	27.73	37.1	4.93	4.09	1451.
300	0.11	34.68	297	27.87	24.6	5.08	4.50	1454.
400	0.37	34.79	396	27.94	18.2	5.28	5.23	1457.
500	0.42	34.83	495	27.97	15.6	5.45	5.99	1459.
600	0.38	34.85	594	27.98	13.9	5.60	6.82	1461.

DEEPEST MEASUREMENT:

729	0.25	34.87	721	28.01	11.7	5.76	7.92	1462.

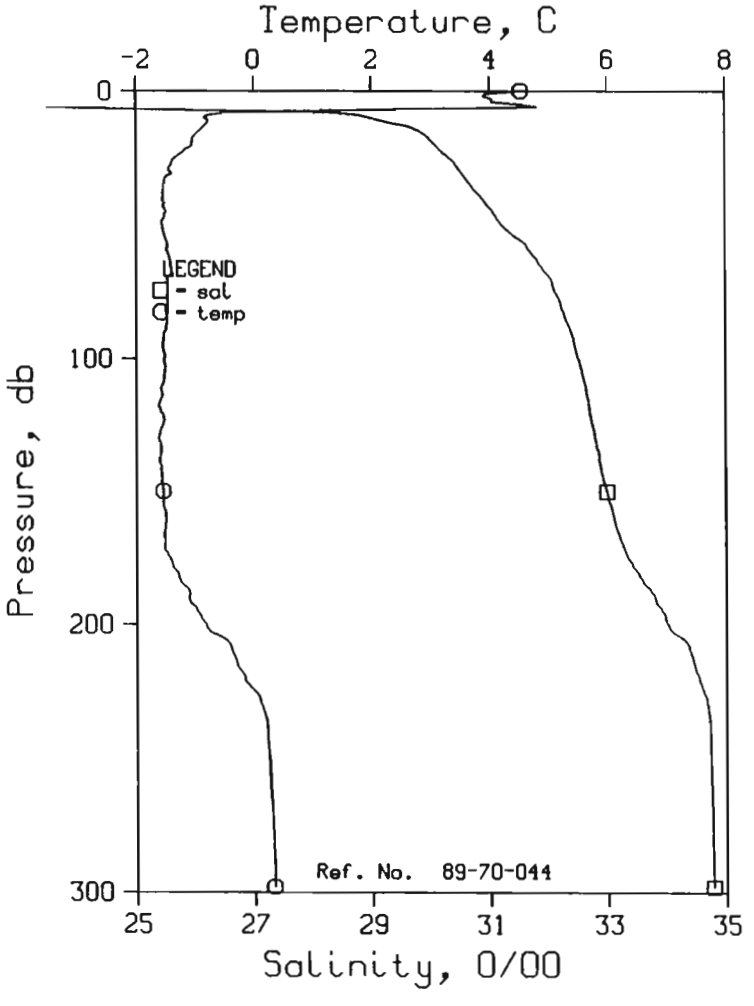


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 43 DATE 1/ 9/89
POSITION 70-17.1N, 139-16.8W GMT 1:39 STATION 001
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.78	21.15	0	16.79	1084.1	0.00	0.00	1452.
10	-0.76	29.37	10	23.62	427.7	0.75	0.03	1438.
20	-1.22	30.21	20	24.31	362.5	1.14	0.09	1437.
30	-1.43	30.59	30	24.62	332.3	1.48	0.18	1437.
50	-1.59	31.34	50	25.23	274.5	2.09	0.42	1438.
75	-1.45	32.18	75	25.91	209.9	2.68	0.80	1440.
100	-1.53	32.56	99	26.22	180.1	3.16	1.22	1440.
125	-1.64	32.77	124	26.39	163.5	3.59	1.71	1441.
150	-1.62	32.99	149	26.57	146.4	3.98	2.25	1441.
175	-1.48	33.25	174	26.78	126.8	4.32	2.82	1443.
200	-1.17	33.70	198	27.13	93.6	4.60	3.35	1445.
225	-0.55	34.28	223	27.57	52.1	4.78	3.73	1449.
250	-0.20	34.53	248	27.76	34.6	4.88	3.98	1452.
300	0.22	34.73	297	27.89	22.1	5.02	4.36	1455.
400	0.39	34.82	396	27.96	16.1	5.20	5.01	1457.
500	0.37	34.85	495	27.99	13.7	5.35	5.69	1459.

DEEPEST MEASUREMENT:

505	0.37	34.85	500	27.99	13.5	5.36	5.73	1459.

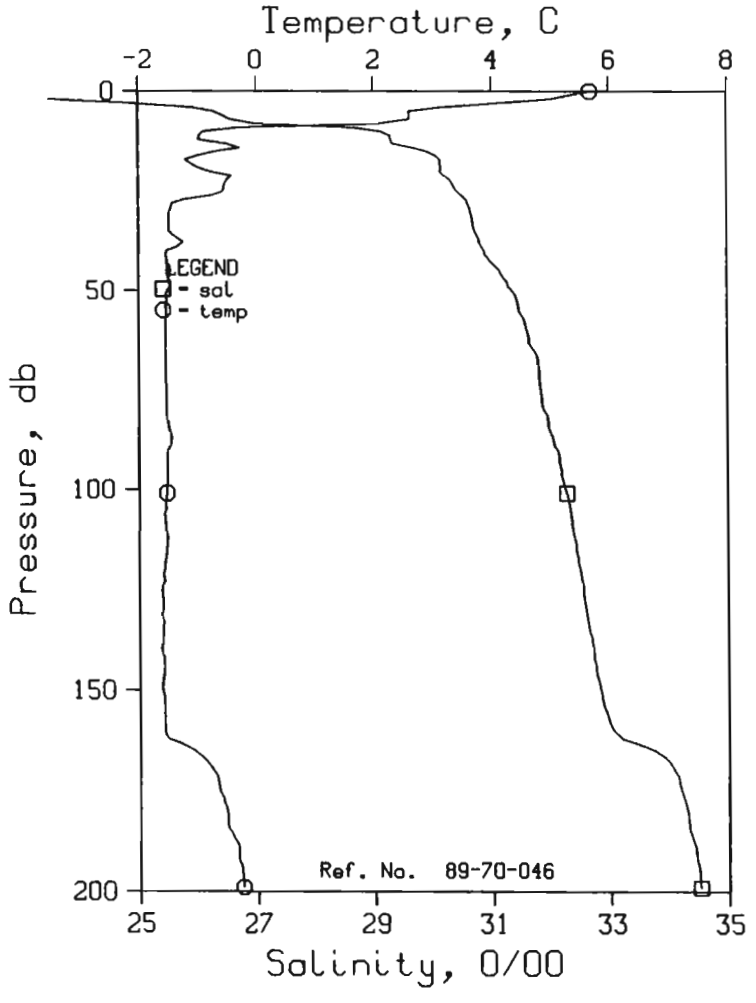


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 44 DATE 1/ 9/89
POSITION 70-12.2N, 139-19.2W GMT 2:25 STATION 002
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.53	22.13	0	17.59	1007.5	0.00	0.00	1452.
10	-0.84	28.96	10	23.29	459.6	0.82	0.04	1437.
20	-1.03	30.07	20	24.19	373.3	1.22	0.10	1438.
30	-1.44	30.50	30	24.55	339.3	1.58	0.19	1437.
50	-1.56	31.20	50	25.12	285.0	2.20	0.44	1438.
75	-1.46	32.12	75	25.85	214.8	2.81	0.82	1440.
100	-1.53	32.51	99	26.17	184.3	3.30	1.26	1440.
125	-1.55	32.74	124	26.36	166.0	3.74	1.76	1441.
150	-1.55	32.99	149	26.56	147.3	4.13	2.31	1442.
175	-1.42	33.35	174	26.85	119.4	4.47	2.86	1443.
200	-0.82	34.02	198	27.38	70.3	4.70	3.31	1447.
225	0.00	34.62	223	27.82	29.2	4.81	3.55	1452.
250	0.25	34.73	248	27.90	21.7	4.87	3.69	1454.
300	0.33	34.78	297	27.93	18.9	4.97	3.97	1455.

DEEPEST MEASUREMENT:

298	0.33	34.78	295	27.93	19.0	4.97	3.96	1455.

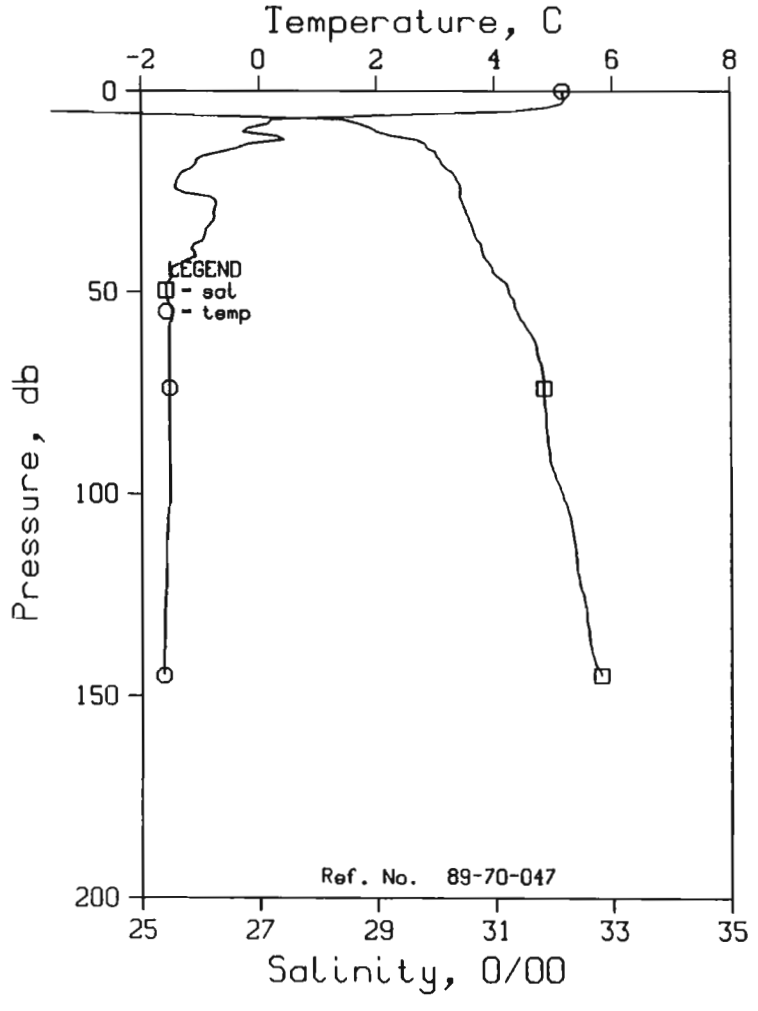


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 46 DATE 1/ 9/89
POSITION 70- 8.3N, 139-21.8W GMT 14:22 STATION D03
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.67	22.26	0	17.59	1006.9	0.00	0.00	1457.
10	-0.90	29.13	10	23.43	446.3	0.72	0.03	1437.
20	-0.75	30.13	20	24.23	369.8	1.12	0.09	1439.
30	-1.47	30.64	30	24.66	328.3	1.47	0.18	1437.
50	-1.51	31.34	50	25.23	274.3	2.08	0.43	1438.
75	-1.52	31.83	75	25.62	236.7	2.71	0.83	1439.
100	-1.52	32.25	99	25.96	204.4	3.26	1.31	1440.
125	-1.61	32.54	124	26.20	181.1	3.74	1.86	1440.
150	-1.61	32.83	149	26.44	159.0	4.17	2.46	1441.
175	-0.64	34.19	174	27.50	58.4	4.45	2.92	1448.
200	-0.25	34.51	198	27.75	35.7	4.56	3.14	1451.

DEEPEST MEASUREMENT:

199	-0.25	34.51	197	27.74	35.9	4.56	3.13	1451.

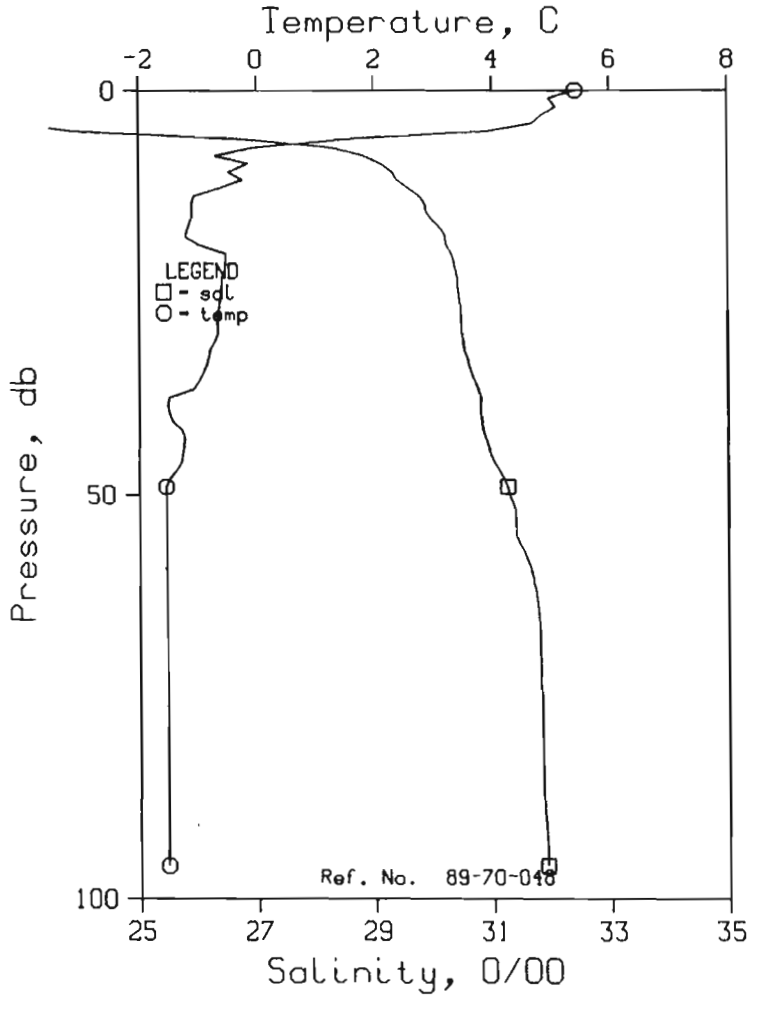


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 47 DATE 1/ 9/89
POSITION 70- 8.5N, 139-22.8W GMT 16:19 STATION D04
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.15	22.34	0	17.70	996.5	0.00	0.00	1455.
10	-0.27	29.01	10	23.32	457.0	0.77	0.03	1440.
20	-1.31	30.29	20	24.37	356.1	1.16	0.09	1437.
30	-0.76	30.52	30	24.55	339.6	1.51	0.18	1440.
50	-1.57	31.24	50	25.15	282.1	2.14	0.43	1438.
75	-1.53	31.83	75	25.62	236.6	2.77	0.83	1439.
100	-1.51	32.15	99	25.88	211.9	3.35	1.34	1440.
125	-1.60	32.50	124	26.17	184.8	3.84	1.91	1440.

DEEPEST MEASUREMENT:

145	-1.62	32.80	144	26.41	161.6	4.19	2.38	1441.

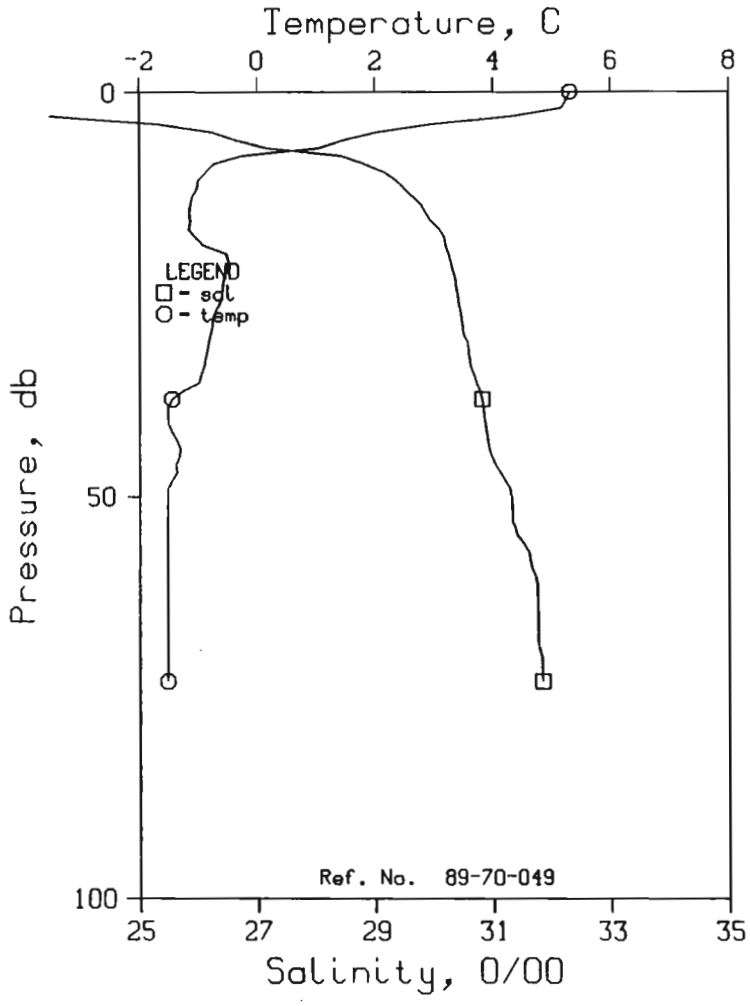


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 48 DATE 1/ 9/89
POSITION 70- 5.8N, 139-22.1W GMT 16:32 STATION D05
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.42	21.79	0	17.24	1040.9	0.00	0.00	1455.
10	-0.47	29.32	10	23.58	432.3	0.76	0.03	1439.
20	-0.53	30.31	20	24.37	356.7	1.14	0.09	1441.
30	-0.67	30.49	30	24.52	342.4	1.49	0.18	1440.
50	-1.54	31.29	50	25.19	278.2	2.12	0.43	1438.
75	-1.52	31.82	75	25.62	237.1	2.75	0.83	1439.

DEEPEST MEASUREMENT:

96	-1.53	31.91	95	25.69	230.2	3.24	1.26	1439.

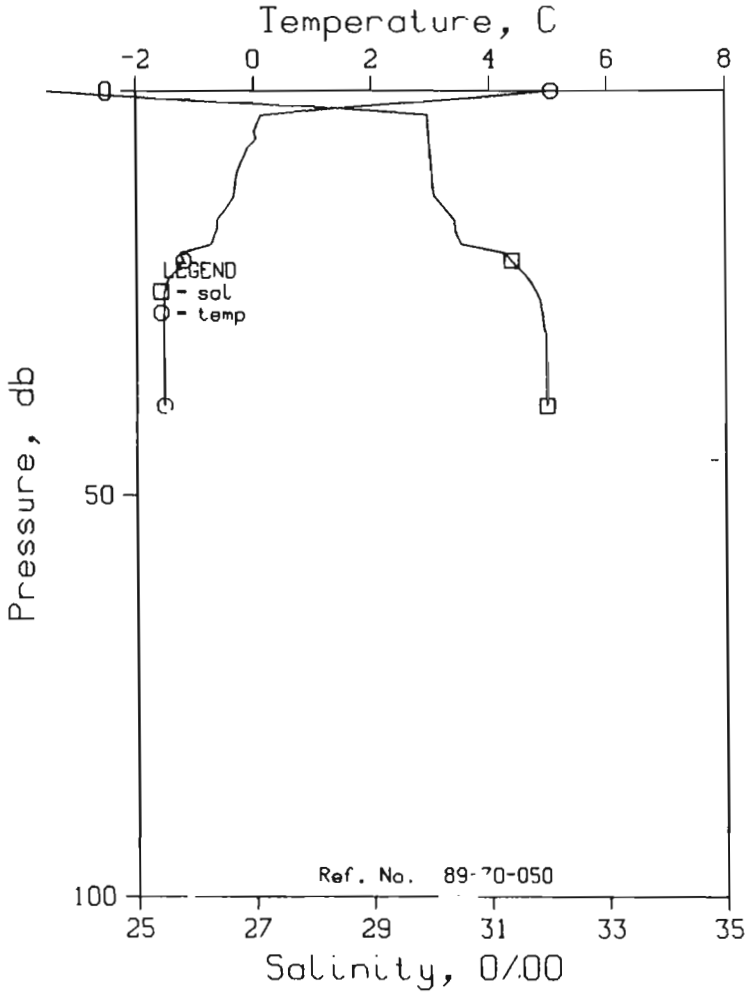


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 49 DATE 1/ 9/89
POSITION 70- 5.6N, 139-22.1W GMT 17: 0 STATION D06
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.31	21.94	0	17.37	1028.5	0.00	0.00	1455.
10	-0.86	29.17	10	23.46	443.2	0.73	0.03	1437.
20	-0.52	30.25	20	24.32	360.8	1.12	0.09	1441.
30	-0.79	30.51	30	24.54	340.0	1.47	0.18	1440.
50	-1.53	31.31	50	25.20	276.9	2.10	0.43	1438.
75	-1.52	31.85	75	25.64	235.1	2.74	0.83	1439.

DEEPEST MEASUREMENT:

73	-1.52	31.84	73	25.63	235.9	2.69	0.80	1439.



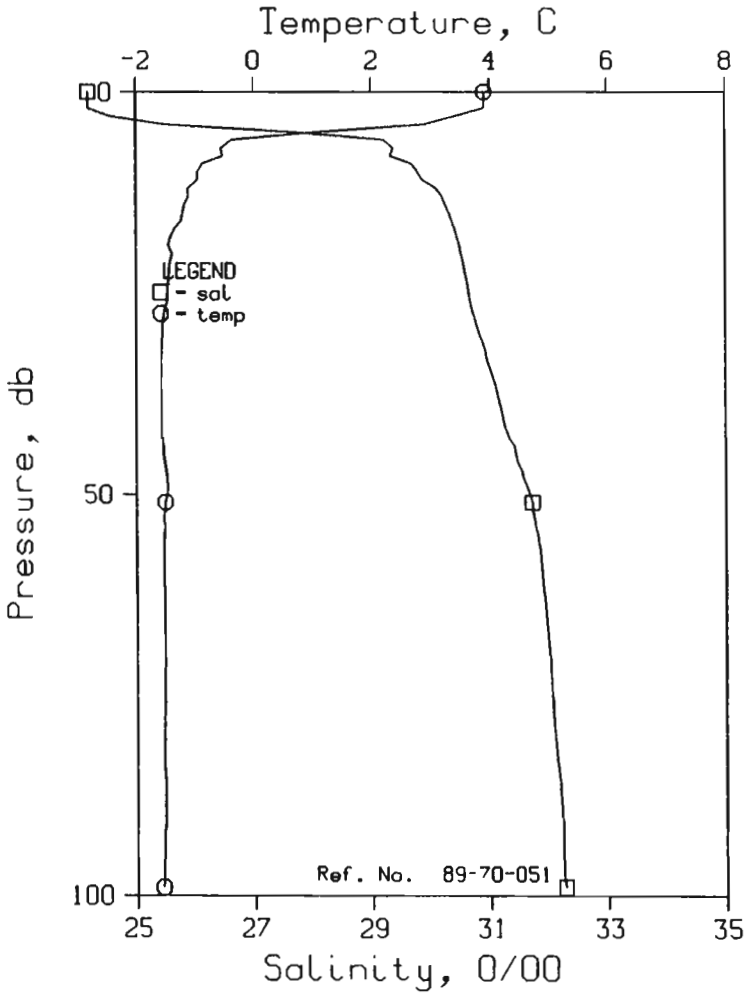
OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 50 DATE 1/ 9/89
POSITION 69-51.6N, 139-30.2W GMT 17:16 STATION D07
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA 0	POT. EN	SOUND
0	5.05	23.34	0	18.50	919.6	0.00	0.00	1456.
10	-0.28	30.02	10	24.13	379.4	0.46	0.02	1441.
20	-1.25	31.25	20	25.15	282.0	0.82	0.07	1439.
30	-1.53	31.94	30	25.72	228.1	1.06	0.14	1438.

DEEPEST MEASUREMENT:

39	-1.53	31.97	39	25.74	226.3	1.27	0.21	1439.

PRES	DEPTH	TEMP	SAL	PRES	DEPTH	TEMP	SAL
0.		5.047	23.344	20.		-1.247	31.253
1.		3.568	25.426	21.		-1.193	31.380
2.		1.638	28.151	22.		-1.292	31.499
3.		0.126	29.955	23.		-1.432	31.626
4.		0.060	29.960	24.		-1.489	31.734
5.		0.004	29.970	25.		-1.526	31.808
6.		0.052	29.980	26.		-1.527	31.856
7.		-0.108	29.990	27.		-1.528	31.886
8.		-0.164	30.000	28.		-1.529	31.901
9.		-0.220	30.010	29.		-1.530	31.913
10.		-0.276	30.020	30.		-1.529	31.945
11.		-0.300	30.030	31.		-1.529	31.955
12.		-0.327	30.047	32.		-1.528	31.958
13.		-0.336	30.063	33.		-1.528	31.962
14.		-0.426	30.180	34.		-1.527	31.967
15.		-0.516	30.293	35.		-1.527	31.968
16.		-0.622	30.408	36.		-1.526	31.969
17.		-0.624	30.419	37.		-1.526	31.971
18.		-0.673	30.466	38.		-1.526	31.972
19.		-0.719	30.526	39.		-1.526	31.968

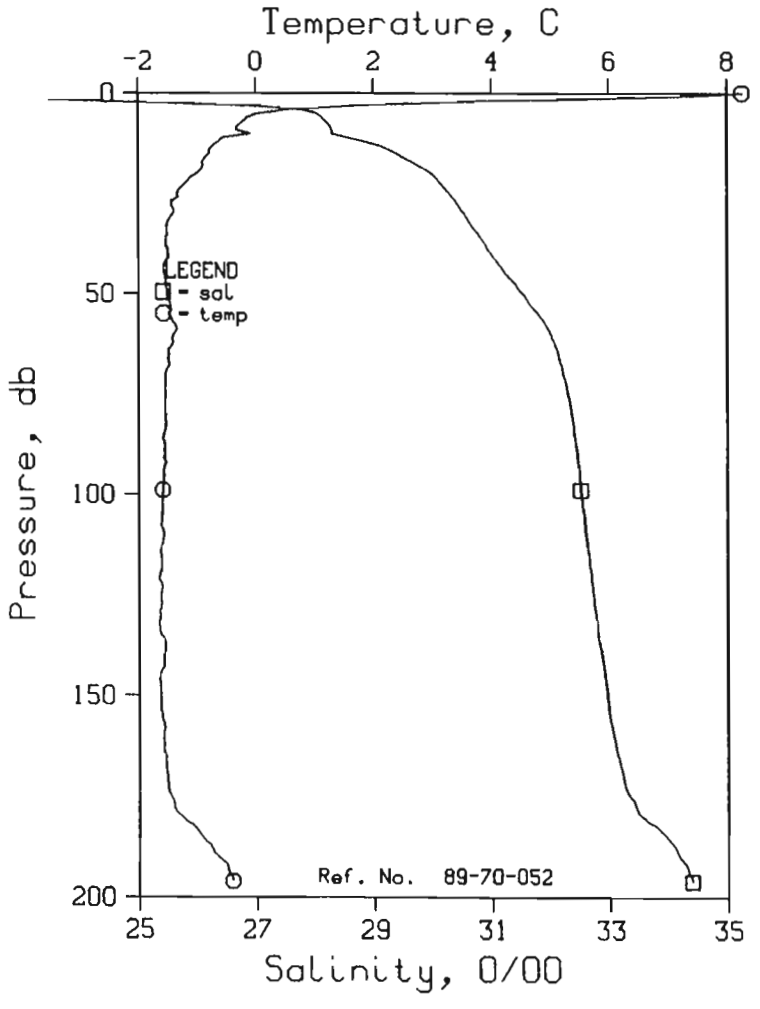


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 51 DATE 1/ 9/89
POSITION 69-54.9N, 139- 6.3W GMT 19:20 STATION D08
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	3.91	24.19	0	19.25	846.7	0.00	0.00	1452.
10	-0.95	29.79	10	23.96	395.2	0.61	0.03	1438.
20	-1.38	30.52	20	24.56	337.9	0.97	0.08	1437.
30	-1.55	30.83	30	24.82	313.9	1.30	0.16	1437.
50	-1.49	31.68	50	25.50	248.4	1.86	0.39	1439.
75	-1.52	32.05	74	25.80	219.7	2.44	0.76	1439.
100	-1.56	32.28	99	25.99	201.5	2.97	1.22	1440.

DEEPEST MEASUREMENT:

99	-1.55	32.26	98	25.98	203.0	2.95	1.20	1440.

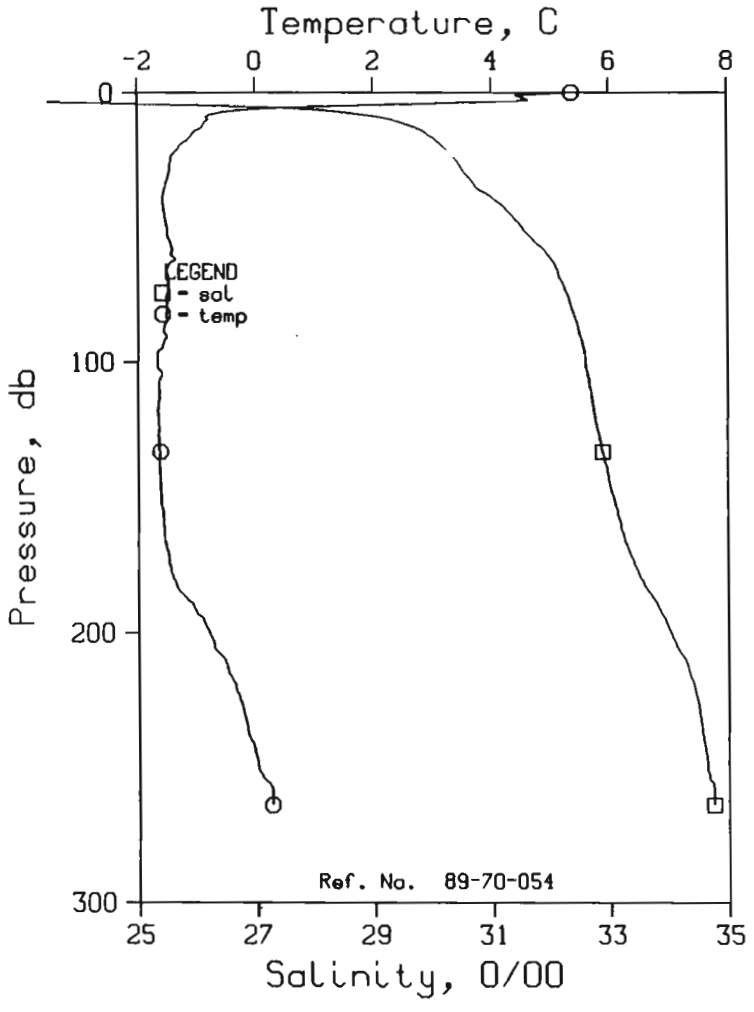


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 52 DATE 1/ 9/89
POSITION 69-56.0N, 138-54.9W GMT 19:58 STATION D09
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.26	18.72	0	14.55	1301.2	0.00	0.00	1463.
10	-0.09	28.30	10	22.74	512.0	0.67	0.03	1440.
20	-1.00	29.99	20	24.13	379.4	1.10	0.09	1438.
30	-1.40	30.54	30	24.58	336.2	1.46	0.18	1437.
50	-1.51	31.52	50	25.38	260.5	2.06	0.43	1438.
75	-1.55	32.29	74	26.00	201.0	2.62	0.78	1440.
100	-1.59	32.52	99	26.19	183.0	3.10	1.20	1440.
125	-1.62	32.72	124	26.35	167.7	3.53	1.70	1441.
150	-1.63	32.95	149	26.53	149.6	3.93	2.26	1441.
175	-1.45	33.35	174	26.85	119.6	4.27	2.82	1443.

DEEPEST MEASUREMENT:

196	-0.41	34.39	194	27.65	44.4	4.45	3.14	1450.

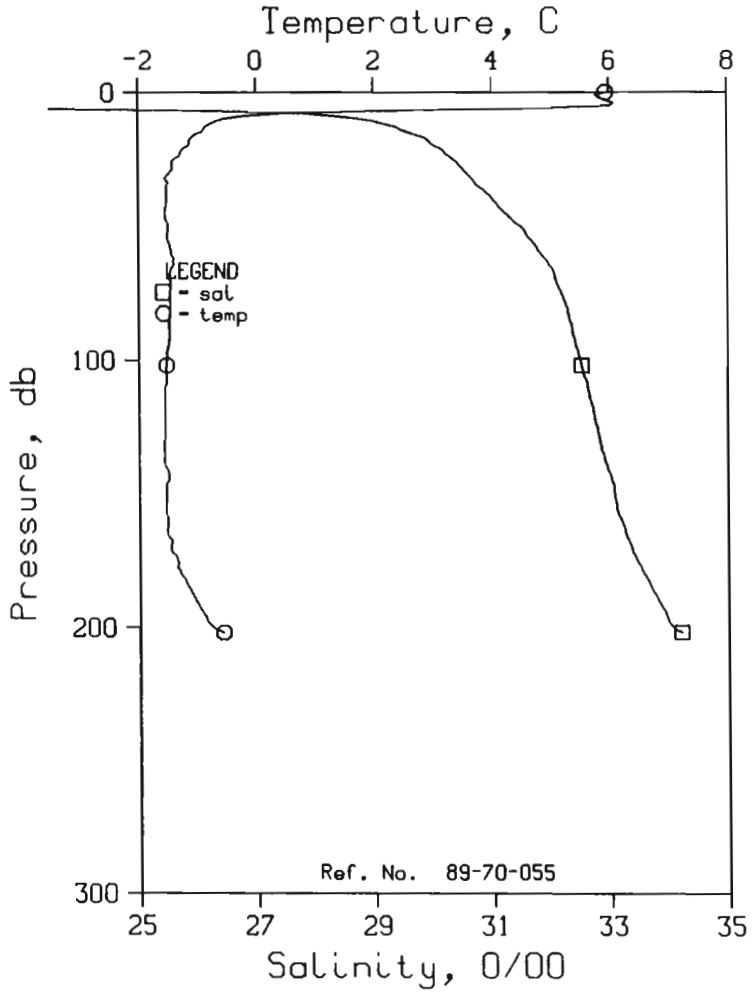


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 54 DATE 1/ 9/89
POSITION 69-59.1N, 138-34.6W GMT 21:10 STATION D10
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.36	21.93	0	17.35	1029.9	0.00	0.00	1455.
10	-0.79	29.31	10	23.57	432.6	0.70	0.03	1438.
20	-1.29	30.19	20	24.30	363.4	1.09	0.09	1437.
30	-1.46	30.56	30	24.60	334.6	1.43	0.18	1437.
50	-1.49	31.53	50	25.38	259.6	2.03	0.41	1438.
75	-1.50	32.29	74	26.00	201.2	2.59	0.77	1440.
100	-1.66	32.59	99	26.24	177.6	3.06	1.19	1440.
125	-1.65	32.79	124	26.41	162.0	3.48	1.67	1441.
150	-1.61	33.06	149	26.62	141.6	3.86	2.20	1442.
175	-1.46	33.43	174	26.91	113.6	4.19	2.74	1443.
200	-0.80	34.03	198	27.38	70.2	4.41	3.17	1448.
225	-0.28	34.47	223	27.71	38.8	4.54	3.45	1451.
250	0.03	34.64	248	27.83	27.6	4.63	3.65	1453.

DEEPEST MEASUREMENT:

264	0.26	34.75	262	27.91	20.7	4.66	3.74	1454.

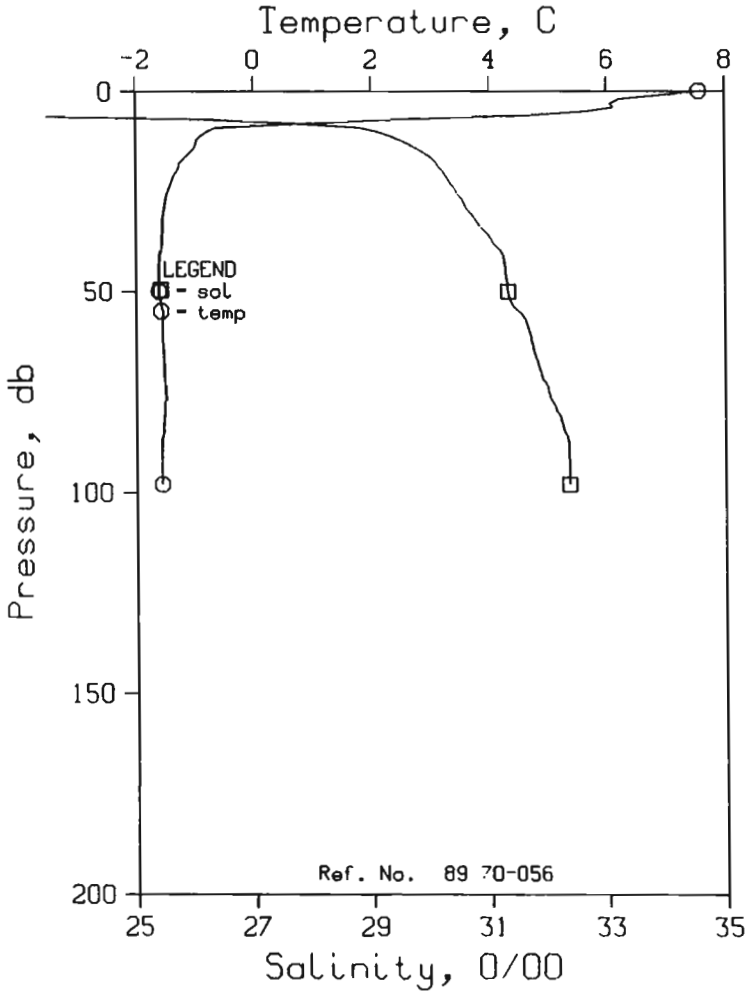


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 55 DATE 1/ 9/89
POSITION 70- 2.2N, 138- 9.3W GMT 23:23 STATION D11
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.94	20.79	0	16.41	1121.0	0.00	0.00	1456.
10	-0.53	28.72	10	23.09	478.9	0.91	0.04	1438.
20	-1.14	30.03	20	24.17	375.9	1.33	0.10	1437.
30	-1.46	30.57	30	24.60	334.4	1.68	0.19	1437.
50	-1.49	31.49	50	25.35	263.1	2.28	0.43	1438.
75	-1.46	32.19	75	25.92	208.9	2.86	0.80	1440.
100	-1.52	32.50	99	26.17	184.6	3.35	1.24	1440.
125	-1.56	32.78	124	26.39	163.3	3.79	1.73	1441.
150	-1.53	33.07	149	26.63	141.0	4.17	2.26	1442.
175	-1.35	33.46	174	26.94	111.3	4.49	2.79	1444.
200	-0.75	34.05	198	27.40	68.2	4.71	3.22	1448.

DEEPEST MEASUREMENT:

202	-0.58	34.20	200	27.51	57.9	4.72	3.24	1449.

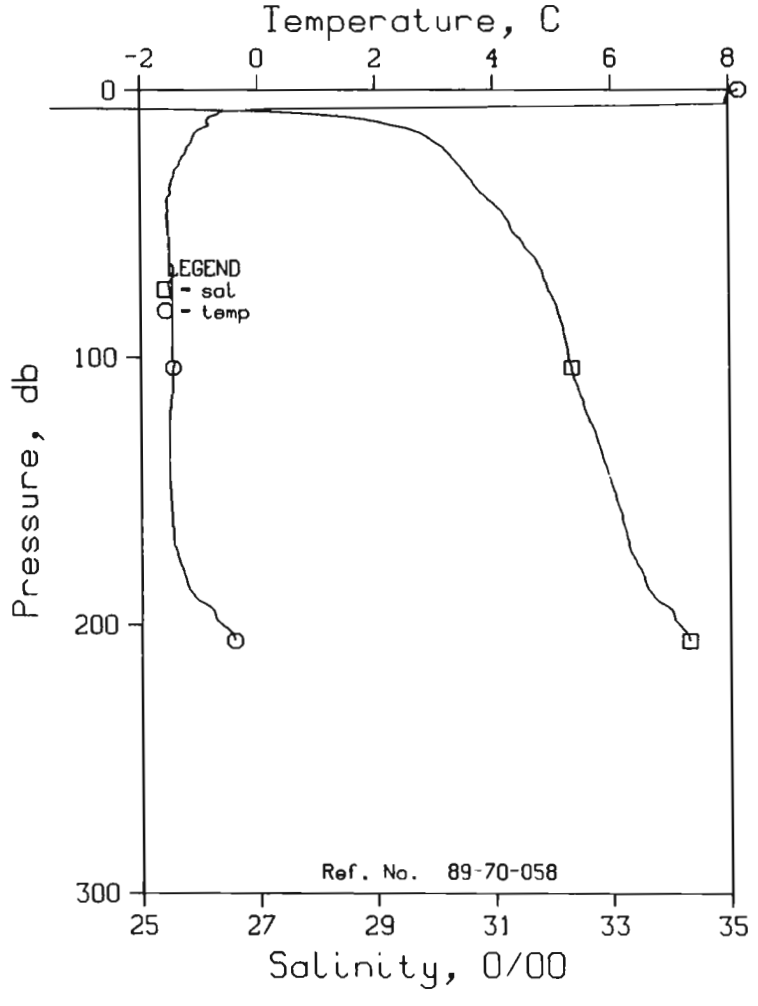


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 56 DATE 2/ 9/89
POSITION 70- 5.7N, 137-46.2W GMT 0:21 STATION D12
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.56	18.96	0	14.82	1275.2	0.00	0.00	1461.
10	-0.79	29.11	10	23.41	447.9	0.93	0.04	1438.
20	-1.32	30.22	20	24.32	361.4	1.33	0.10	1437.
30	-1.52	30.65	30	24.67	327.4	1.67	0.19	1437.
50	-1.61	31.31	50	25.21	276.6	2.26	0.42	1437.
75	-1.50	32.00	75	25.76	223.6	2.88	0.81	1439.
100	-1.57	32.34	99	26.04	196.8	3.40	1.28	1440.

DEEPEST MEASUREMENT:

98	-1.57	32.34	97	26.04	196.9	3.36	1.24	1440.

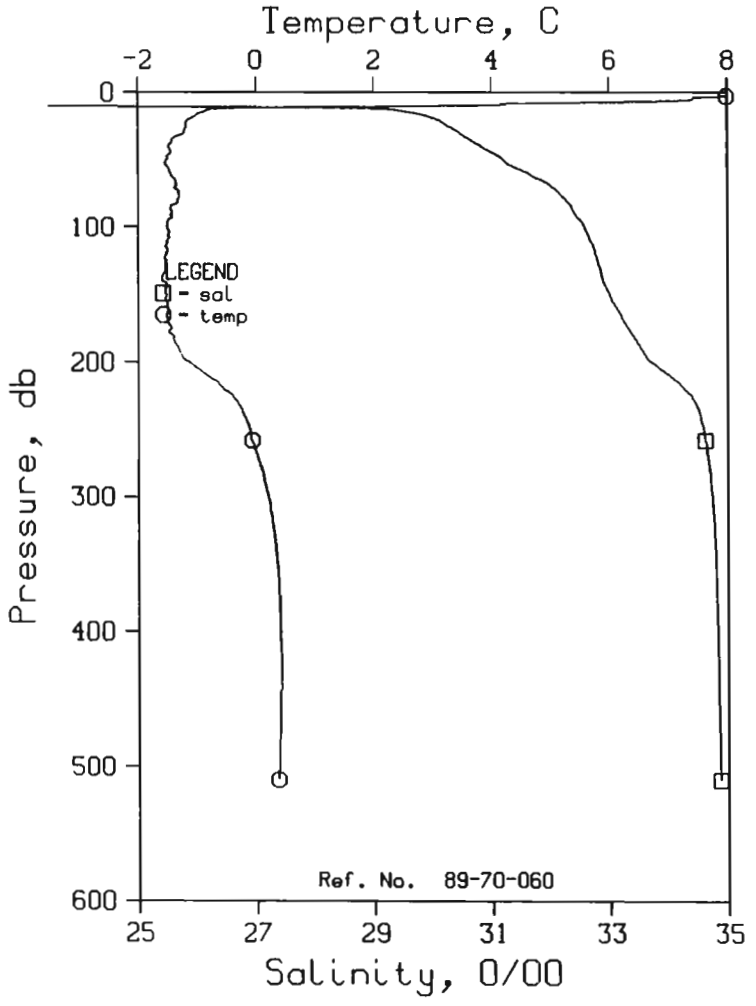


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 58 DATE 2/ 9/89
POSITION 70-21.3N, 137-15.9W GMT 14:12 STATION E01
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.17	15.42	0	11.99	1550.8	0.00	0.00	1459.
10	-0.80	28.45	10	22.88	498.3	1.18	0.05	1437.
20	-1.15	30.06	20	24.19	374.1	1.60	0.11	1437.
30	-1.41	30.49	30	24.54	340.3	1.95	0.20	1437.
50	-1.53	31.27	50	25.18	279.4	2.57	0.45	1438.
75	-1.50	31.94	75	25.71	228.5	3.20	0.85	1439.
100	-1.46	32.27	99	25.98	202.8	3.73	1.32	1440.
125	-1.51	32.65	124	26.29	172.9	4.21	1.86	1441.
150	-1.50	33.04	149	26.60	143.5	4.60	2.41	1442.
175	-1.36	33.38	174	26.88	117.2	4.93	2.95	1444.
200	-0.63	34.13	198	27.46	62.9	5.16	3.39	1448.

DEEPEST MEASUREMENT:

206	-0.42	34.30	204	27.58	50.8	5.20	3.46	1450.

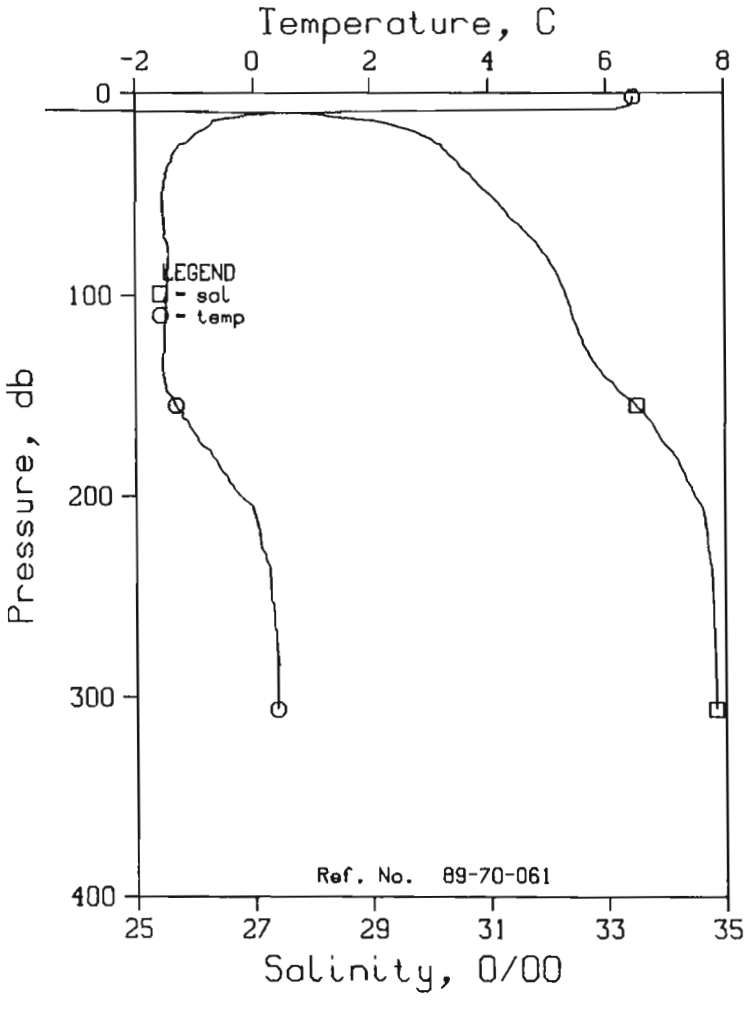


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 60 DATE 2/ 9/89
POSITION 70-17.9N, 138-32.6W GMT 18:17 STATION D13
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.98	16.09	0	12.53	1497.9	0.00	0.00	1459.
10	2.82	23.07	10	18.44	925.2	1.34	0.06	1446.
20	-1.13	30.07	20	24.19	373.4	1.78	0.13	1438.
30	-1.22	30.46	30	24.51	342.7	2.14	0.22	1438.
50	-1.52	31.21	50	25.12	284.6	2.77	0.47	1438.
75	-1.31	32.15	75	25.88	212.2	3.38	0.86	1440.
100	-1.51	32.58	99	26.23	179.2	3.87	1.29	1441.
125	-1.53	32.80	124	26.41	161.8	4.29	1.78	1441.
150	-1.52	33.00	149	26.57	146.2	4.68	2.32	1442.
175	-1.42	33.32	174	26.83	121.9	5.02	2.87	1443.
200	-1.14	33.71	198	27.13	93.3	5.29	3.38	1446.
225	-0.40	34.38	223	27.65	45.0	5.45	3.74	1450.
250	-0.10	34.59	248	27.80	30.7	5.55	3.96	1452.
300	0.20	34.73	297	27.90	21.6	5.67	4.32	1455.
400	0.41	34.82	396	27.96	16.3	5.86	4.96	1457.
500	0.38	34.86	495	27.99	13.3	6.00	5.64	1459.

DEEPEST MEASUREMENT:

510	0.37	34.86	505	28.00	12.8	6.02	5.70	1459.

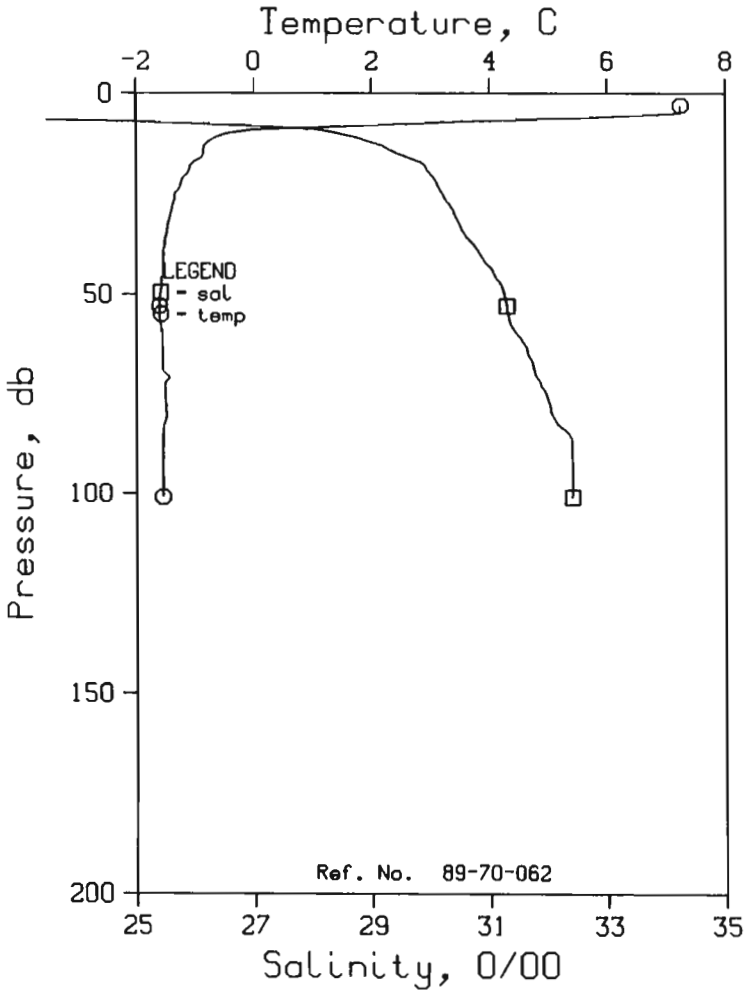


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 61 DATE 2/ 9/89
POSITION 70-14.3N, 138-11.9W GMT 19:21 STATION D14
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.46	20.28	0	15.97	1164.2	0.00	0.00	1458.
10	0.49	27.78	10	22.30	553.9	1.09	0.05	1442.
20	-0.95	29.82	20	23.98	393.2	1.54	0.12	1438.
30	-1.35	30.31	30	24.39	354.0	1.91	0.21	1437.
50	-1.54	31.00	50	24.95	300.6	2.56	0.48	1437.
75	-1.46	31.83	75	25.62	236.9	3.24	0.90	1439.
100	-1.47	32.31	99	26.01	199.5	3.77	1.38	1440.
125	-1.52	32.62	124	26.27	175.3	4.24	1.92	1441.
150	-1.41	33.30	149	26.81	123.8	4.63	2.45	1443.
175	-0.86	33.99	174	27.35	72.7	4.86	2.84	1447.
200	-0.23	34.49	198	27.73	37.5	4.99	3.08	1451.
225	0.13	34.71	223	27.88	22.9	5.06	3.23	1453.
250	0.29	34.78	248	27.94	18.0	5.11	3.35	1454.
300	0.39	34.83	297	27.97	15.0	5.19	3.58	1456.

DEEPEST MEASUREMENT:

306	0.39	34.83	303	27.97	14.9	5.20	3.61	1456.

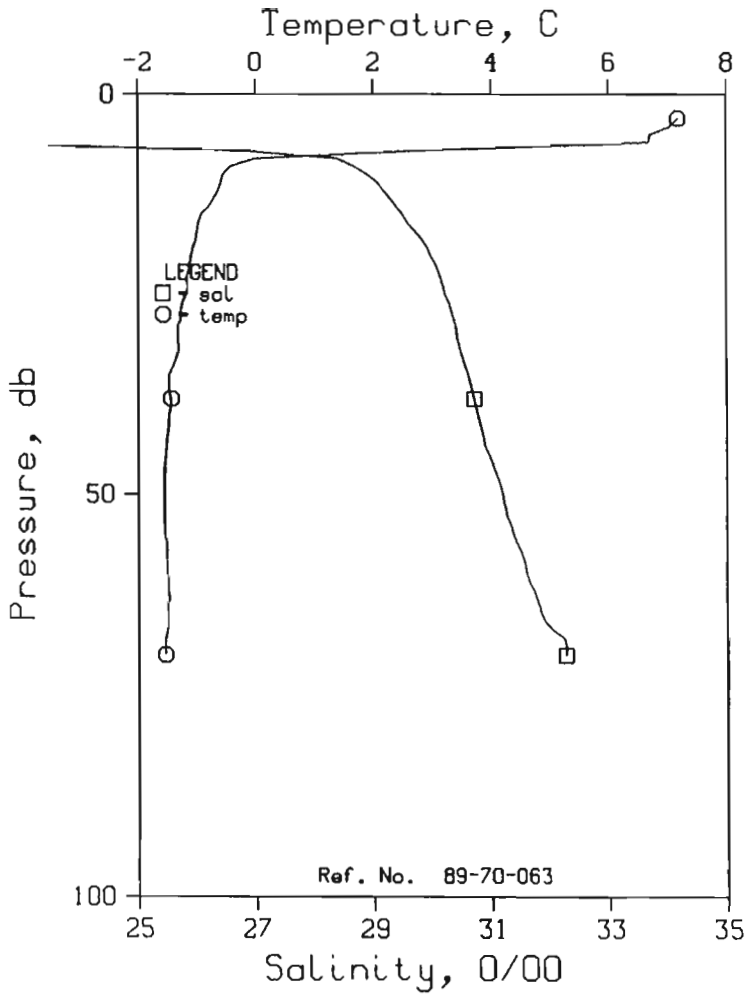


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 62 DATE 2/ 9/89
POSITION 70- 9.1N, 137-45.7W GMT 20:30 STATION D15
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.24	19.91	0	15.59	1200.5	0.00	0.00	1461.
10	-0.48	28.46	10	22.88	498.4	0.98	0.04	1438.
20	-1.13	30.00	20	24.14	378.8	1.41	0.11	1437.
30	-1.41	30.41	30	24.48	346.2	1.77	0.20	1437.
50	-1.60	31.26	50	25.16	280.5	2.40	0.45	1437.
75	-1.50	31.96	75	25.73	226.7	3.04	0.86	1439.
100	-1.55	32.40	99	26.08	192.8	3.54	1.30	1440.

DEEPEST MEASUREMENT:

101	-1.55	32.40	100	26.08	192.9	3.56	1.32	1440.

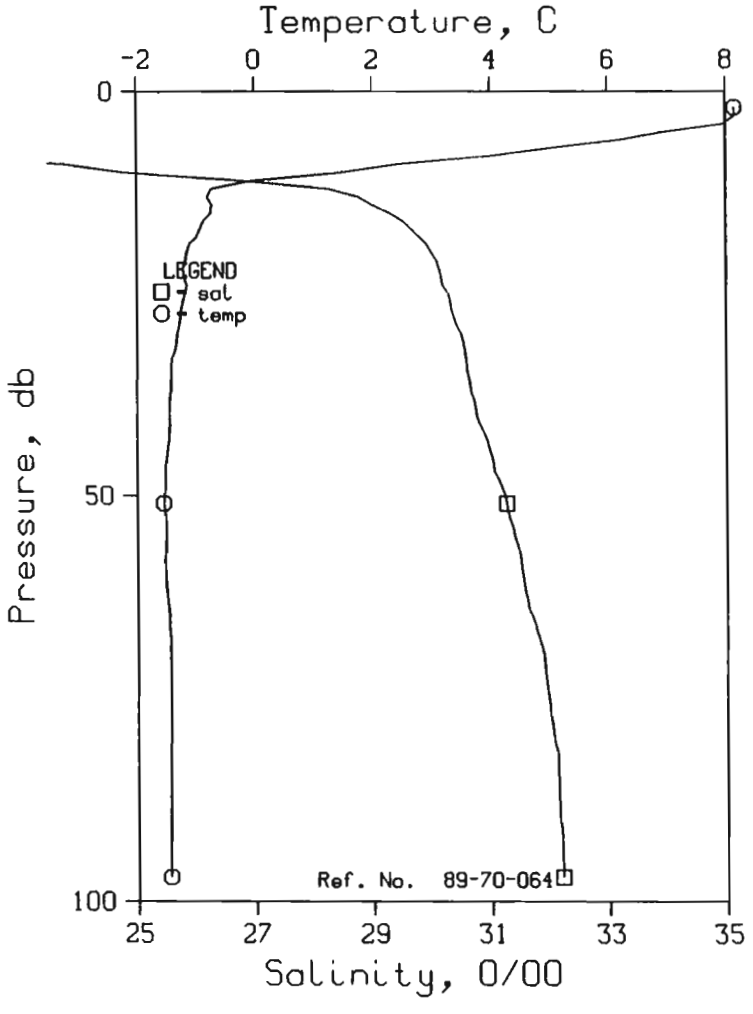


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 63 DATE 2/ 9/89
POSITION 70- 7.1N, 137-36.4W GMT 21: 4 STATION D16
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.18	20.06	0	15.72	1187.8	0.00	0.00	1460.
10	-0.56	28.92	10	23.25	463.4	0.94	0.04	1438.
20	-1.10	29.97	20	24.11	381.3	1.36	0.10	1438.
30	-1.33	30.41	30	24.47	346.7	1.72	0.19	1437.
50	-1.57	31.19	50	25.11	285.9	2.35	0.45	1437.

DEEPEST MEASUREMENT:

70	-1.55	32.26	70	25.97	203.7	2.84	0.74	1439.

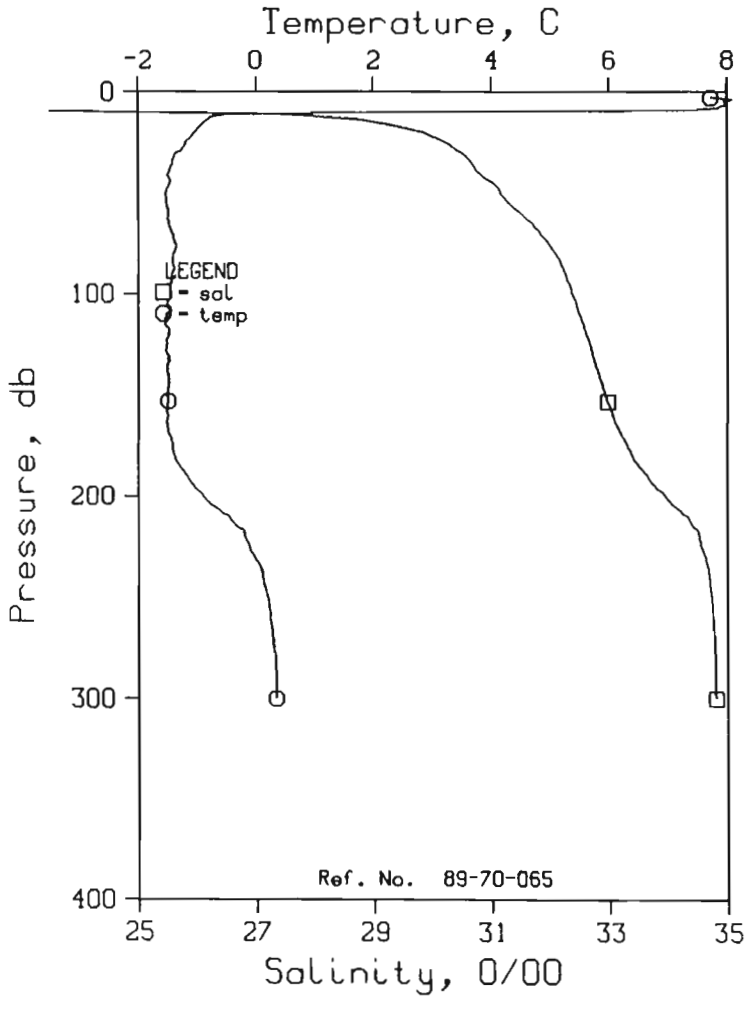


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 64 DATE 2/ 9/89
POSITION 70-20.2N, 137-15.8W GMT 22:26 STATION E02
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.15	16.41	0	12.77	1474.8	0.00	0.00	1460.
10	1.43	24.81	10	19.89	785.5	1.28	0.06	1442.
20	-1.15	30.01	20	24.15	377.8	1.75	0.13	1437.
30	-1.32	30.50	30	24.55	339.3	2.11	0.22	1437.
50	-1.54	31.24	50	25.15	282.1	2.74	0.47	1438.
75	-1.43	31.97	75	25.74	225.8	3.37	0.87	1440.
100	-1.46	32.21	99	25.93	207.3	3.91	1.35	1440.

DEEPEST MEASUREMENT:

97	-1.45	32.20	96	25.92	208.1	3.85	1.29	1440.

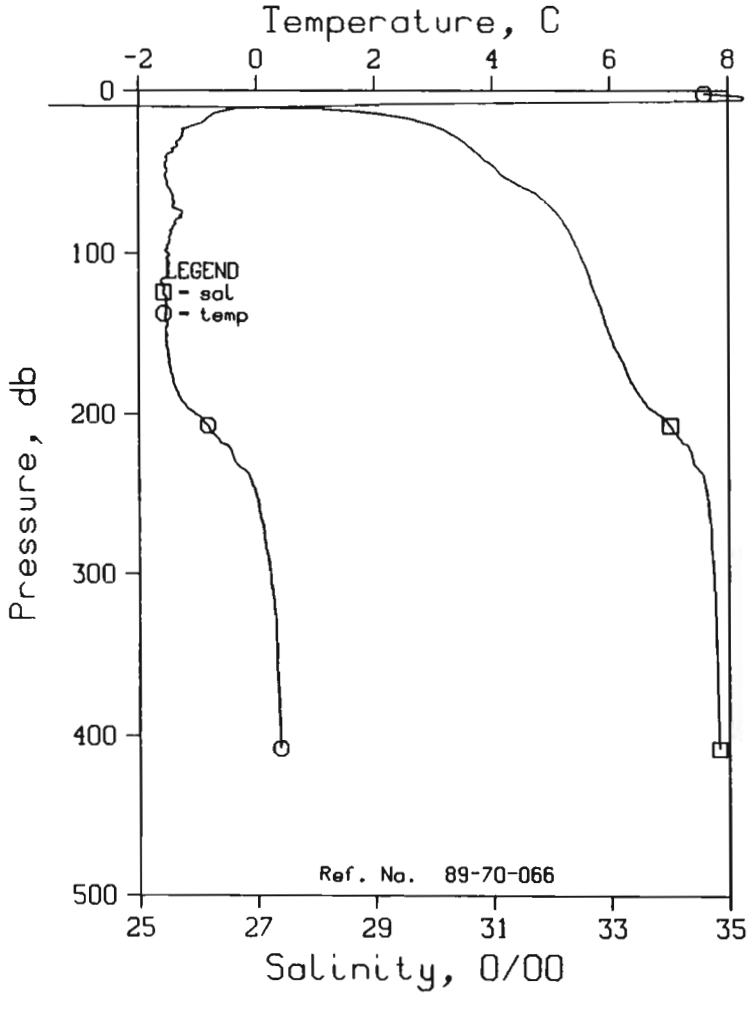


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 65 DATE 2/ 9/89
POSITION 70-21.7N, 137-14.1W GMT 22:45 STATION E03
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.72	3.41	0	2.64	2472.7	0.00	0.00	1442.
10	2.39	25.00	10	20.00	775.0	1.61	0.07	1447.
20	-1.03	29.84	20	24.01	390.9	2.09	0.14	1438.
30	-1.33	30.49	30	24.54	340.5	2.46	0.23	1437.
50	-1.53	31.15	50	25.08	288.7	3.09	0.49	1438.
75	-1.37	31.98	75	25.74	225.8	3.73	0.89	1440.
100	-1.44	32.38	99	26.07	194.3	4.25	1.35	1441.
125	-1.52	32.67	124	26.31	171.5	4.71	1.87	1441.
150	-1.53	32.94	149	26.52	151.2	5.11	2.44	1442.
175	-1.41	33.30	174	26.81	123.4	5.46	3.01	1443.
200	-0.90	33.96	198	27.32	75.1	5.71	3.50	1447.
225	-0.11	34.56	223	27.77	33.1	5.84	3.76	1452.
250	0.19	34.72	248	27.89	22.1	5.90	3.92	1454.
300	0.34	34.80	297	27.94	17.5	6.00	4.18	1455.

DEEPEST MEASUREMENT:

300	0.34	34.80	297	27.94	17.5	6.00	4.18	1455.

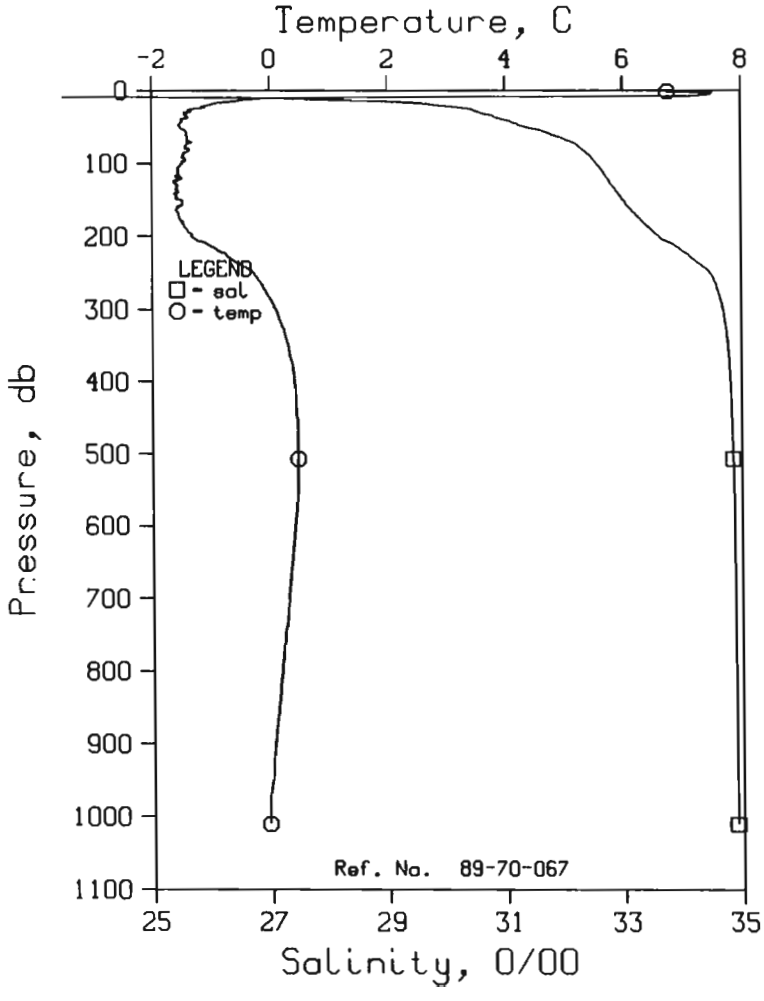


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 66 DATE 2/ 9/89
POSITION 70-24.0N, 137-11.4W GMT 23: 3 STATION E04
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.59	0.13	0	0.06	2729.7	0.00	0.00	1438.
10	0.63	25.84	10	20.74	703.4	1.67	0.07	1440.
20	-0.93	29.87	20	24.03	389.1	2.13	0.14	1438.
30	-1.26	30.45	30	24.50	343.6	2.50	0.23	1438.
50	-1.53	31.10	50	25.04	292.6	3.13	0.48	1438.
75	-1.25	32.09	75	25.83	217.6	3.76	0.88	1441.
100	-1.50	32.47	99	26.15	186.9	4.26	1.33	1440.
125	-1.60	32.74	124	26.36	166.3	4.70	1.83	1441.
150	-1.53	32.98	149	26.55	147.8	5.09	2.38	1442.
175	-1.44	33.29	174	26.80	124.0	5.43	2.94	1443.
200	-1.03	33.82	198	27.22	85.0	5.71	3.45	1446.
225	-0.41	34.38	223	27.65	44.9	5.86	3.79	1450.
250	-0.01	34.63	248	27.83	27.6	5.95	4.00	1453.
300	0.23	34.74	297	27.91	20.8	6.07	4.33	1455.
400	0.39	34.82	396	27.96	15.8	6.25	4.97	1457.

DEEPEST MEASUREMENT:

408	0.39	34.83	404	27.97	15.4	6.26	5.02	1458.

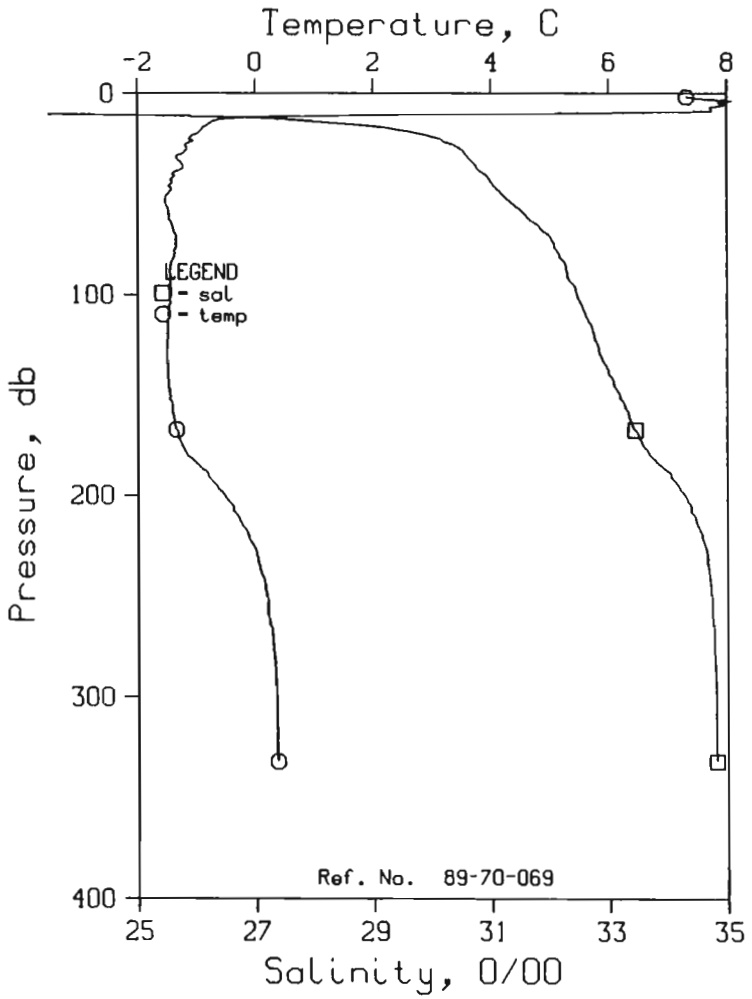


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 67 DATE 3/ 9/89
POSITION 70-35.8N, 136-50.7W GMT 0:46 STATION E05
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.76	1.18	0	0.94	2641.9	0.00	0.00	1435.
10	0.49	26.28	10	21.10	669.0	1.70	0.07	1440.
20	-1.03	29.82	20	23.99	392.7	2.19	0.14	1438.
30	-1.45	30.58	30	24.61	333.5	2.54	0.23	1437.
50	-1.52	31.32	50	25.21	276.3	3.15	0.48	1438.
75	-1.42	32.22	75	25.94	206.9	3.74	0.85	1440.
100	-1.46	32.54	99	26.20	181.7	4.22	1.28	1441.
125	-1.63	32.77	124	26.39	163.7	4.65	1.77	1441.
150	-1.52	32.99	149	26.56	147.3	5.04	2.31	1442.
175	-1.53	33.26	174	26.79	125.8	5.38	2.88	1443.
200	-1.34	33.60	198	27.05	100.4	5.67	3.42	1444.
225	-0.75	34.10	223	27.44	64.3	5.87	3.86	1448.
250	-0.28	34.47	248	27.72	38.3	6.00	4.16	1451.
300	0.10	34.69	297	27.87	24.2	6.15	4.58	1454.
400	0.41	34.81	396	27.95	17.1	6.35	5.28	1457.
500	0.47	34.85	495	27.98	14.7	6.50	6.00	1459.
600	0.42	34.87	594	28.00	12.9	6.64	6.76	1461.
800	0.18	34.88	791	28.02	10.1	6.87	8.38	1463.
1000	-0.04	34.90	988	28.04	7.4	7.04	9.95	1465.

DEEPEST MEASUREMENT:

1010	-0.04	34.89	998	28.04	7.6	7.05	10.03	1466.

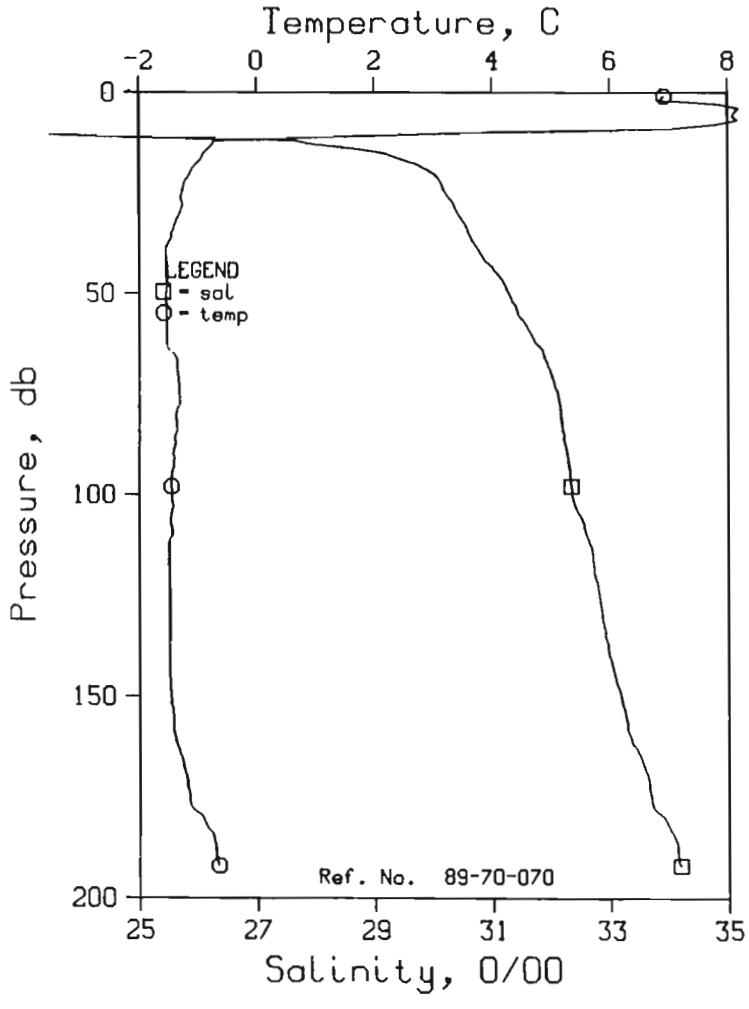


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 69 DATE 3/ 9/89
POSITION 70-28.5N, 136-36.5W GMT 22:18 STATION E07
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.31	0.59	0	0.44	2691.8	0.00	0.00	1437.
10	5.74	19.52	10	15.43	1216.3	1.75	0.08	1454.
20	-0.99	29.76	20	23.94	397.3	2.31	0.16	1438.
30	-1.23	30.56	30	24.59	335.6	2.67	0.25	1438.
50	-1.47	31.18	50	25.10	287.0	3.29	0.50	1438.
75	-1.36	32.07	75	25.81	218.7	3.92	0.89	1440.
100	-1.44	32.45	99	26.13	188.7	4.42	1.34	1441.
125	-1.51	32.80	124	26.41	162.1	4.86	1.84	1441.
150	-1.45	33.17	149	26.71	133.2	5.23	2.36	1442.
175	-1.25	33.56	174	27.02	103.8	5.53	2.85	1444.
200	-0.52	34.28	198	27.57	51.7	5.73	3.22	1449.
225	-0.04	34.61	223	27.81	29.4	5.82	3.43	1452.
250	0.19	34.72	248	27.89	22.2	5.89	3.58	1454.
300	0.35	34.80	297	27.95	17.0	5.98	3.85	1456.

DEEPEST MEASUREMENT:

332	0.37	34.81	329	27.95	16.8	6.04	4.02	1456.

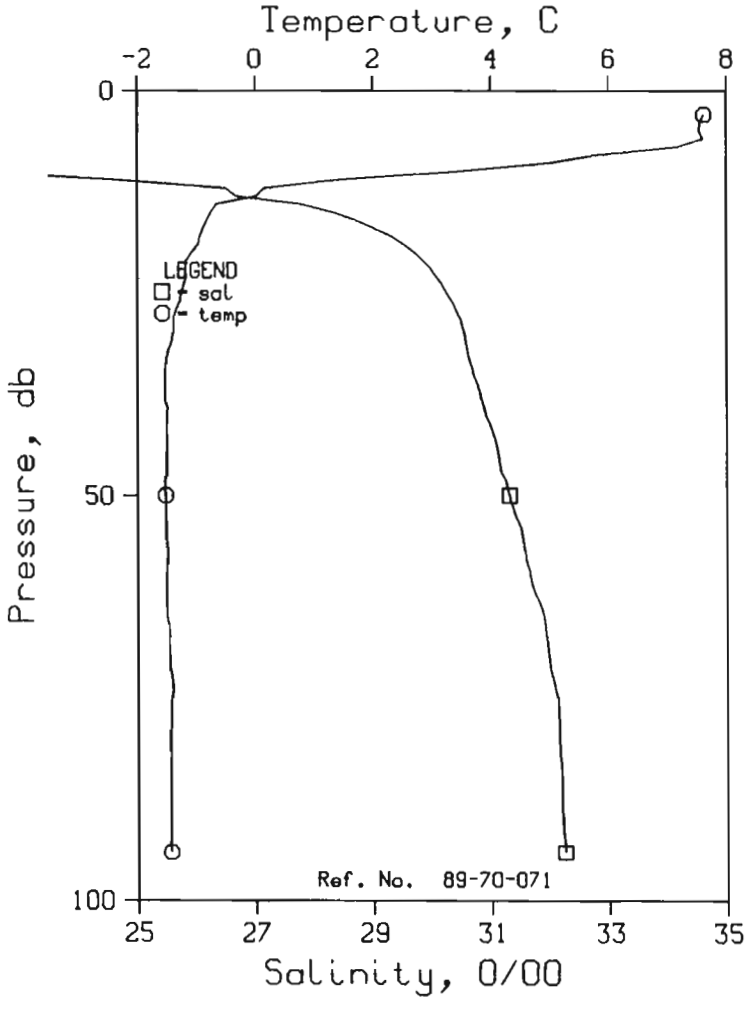


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 70 DATE 3/ 9/89
POSITION 70-27.5N, 136-35.3W GMT 22:43 STATION E08
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA 0	POT. EN	SOUND
0	6.92	0.27	0	0.21	2715.0	0.00	0.00	1435.
10	3.65	22.11	10	17.63	1003.0	1.83	0.08	1448.
20	-1.13	30.00	20	24.14	378.3	2.35	0.15	1437.
30	-1.30	30.42	30	24.48	345.7	2.71	0.24	1437.
50	-1.53	31.28	50	25.18	278.8	3.34	0.50	1438.
75	-1.31	32.11	75	25.85	215.6	3.95	0.88	1440.
100	-1.45	32.35	99	26.04	196.8	4.46	1.34	1440.
125	-1.47	32.81	124	26.41	161.3	4.90	1.84	1441.
150	-1.46	33.17	149	26.71	133.1	5.27	2.36	1442.
175	-1.15	33.69	174	27.11	94.9	5.56	2.83	1445.

DEEPEST MEASUREMENT:

192	-0.65	34.18	191	27.50	59.1	5.69	3.07	1448.

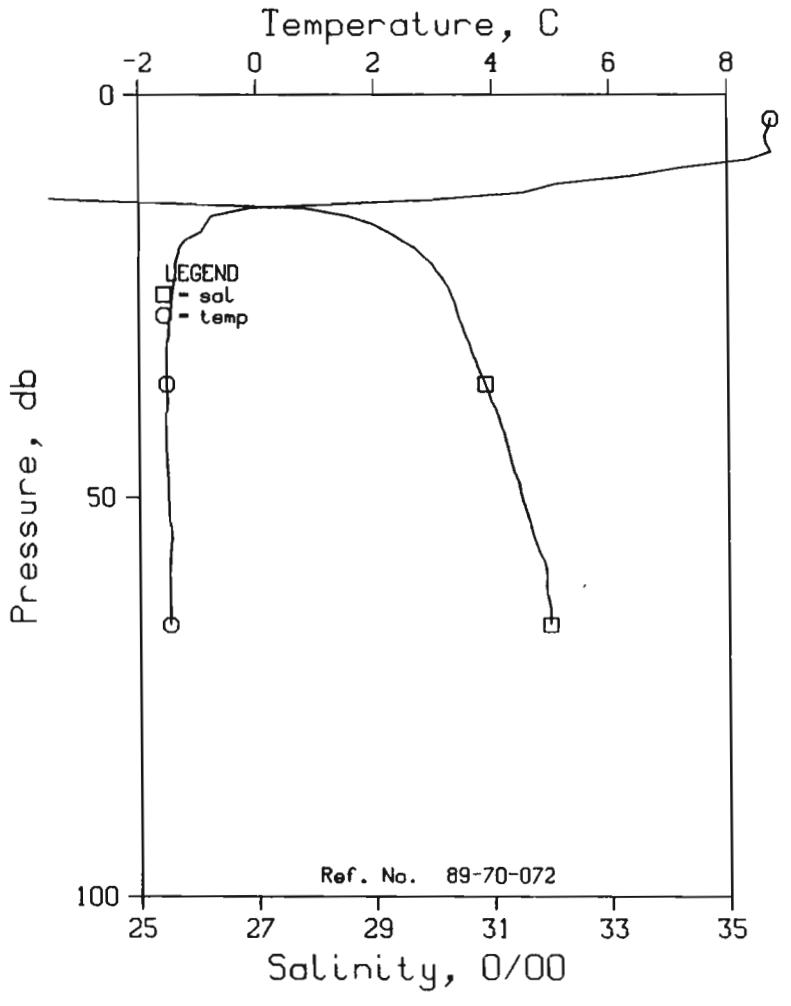


OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 71 DATE 3/ 9/89
POSITION 70-27.1N, 136-34.6W GMT 23: 1 STATION E09
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA 0	POT. EN	SOUND
0	7.61	16.38	0	12.80	1471.8	0.00	0.00	1458.
10	3.38	22.00	10	17.56	1010.0	1.38	0.07	1447.
20	-1.09	29.72	20	23.91	400.4	1.95	0.15	1437.
30	-1.40	30.55	30	24.59	335.6	2.31	0.24	1437.
50	-1.52	31.31	50	25.20	276.7	2.92	0.49	1438.
75	-1.42	32.13	75	25.86	214.1	3.53	0.87	1440.

DEEPEST MEASUREMENT:

94	-1.44	32.25	93	25.96	204.7	3.93	1.21	1440.

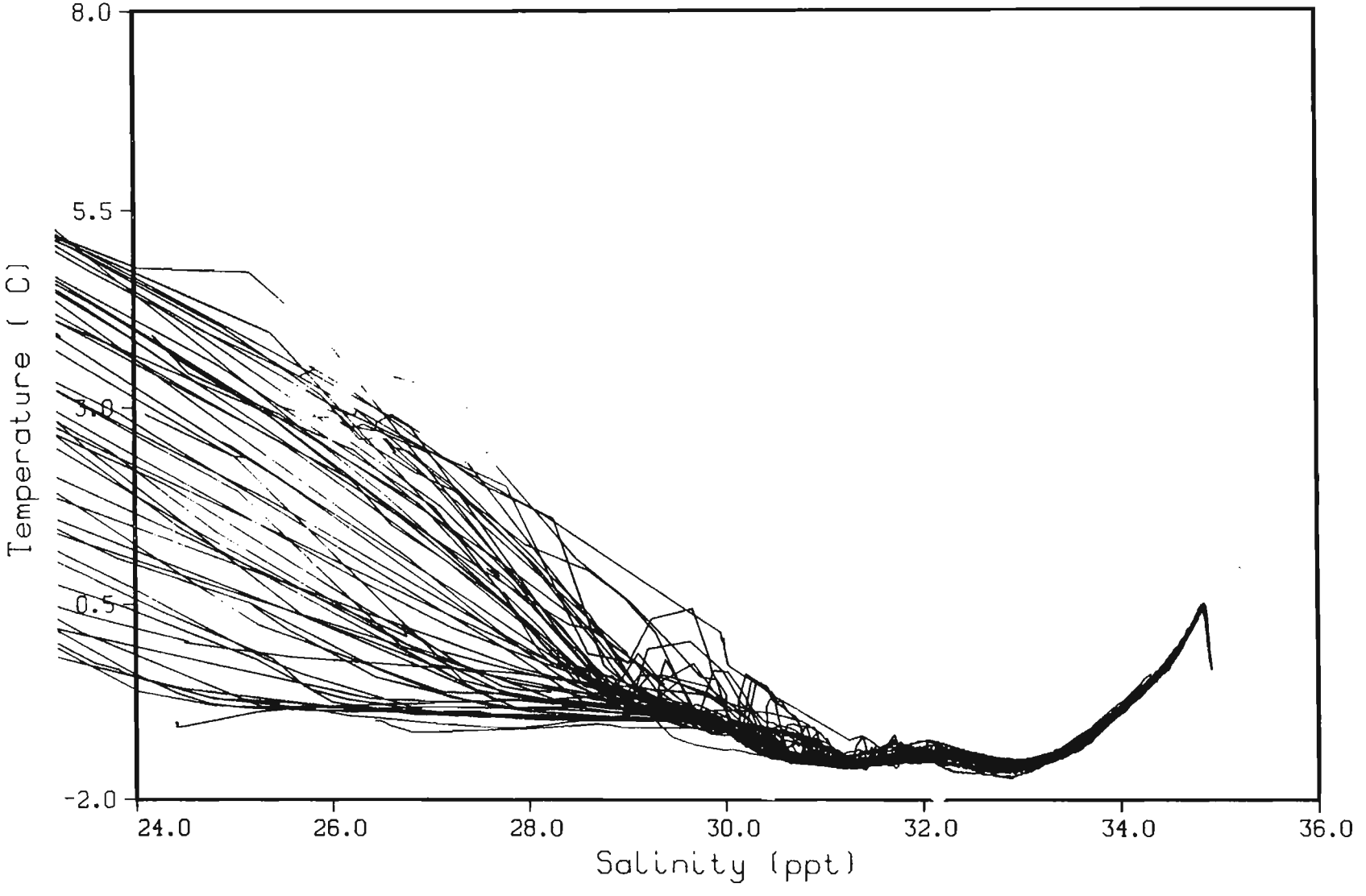


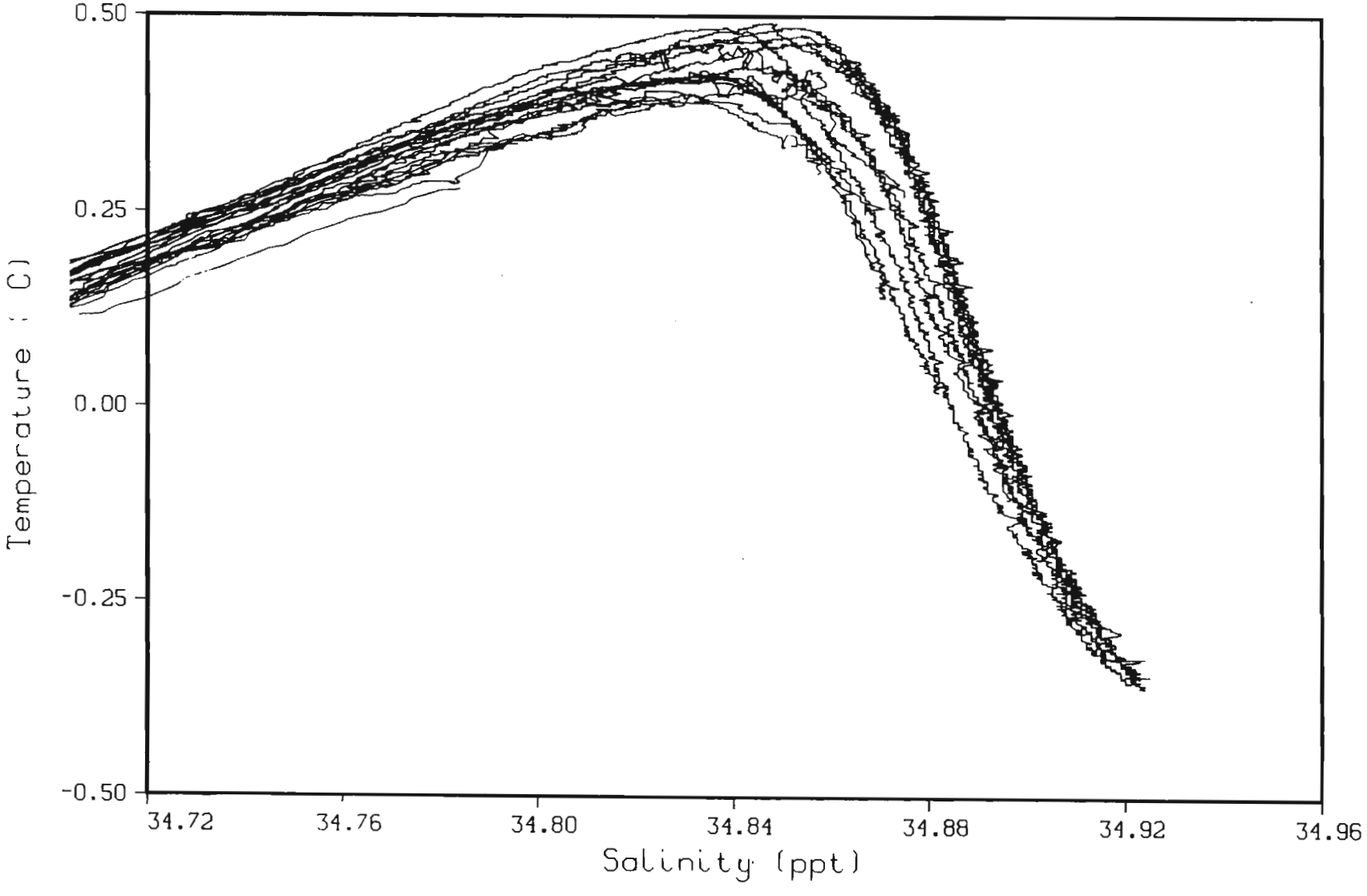
OCEAN PHYSICS DIVISION
REFERENCE NO. 89-7 - 72 DATE 3/ 9/89
POSITION 70-24.9N, 136-30.4W GMT 23:48 STATION E10
RESULTS OF STP CAST
GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.74	14.11	0	10.91	1656.4	0.00	0.00	1459.
10	6.35	18.55	10	14.62	1294.8	1.57	0.08	1455.
20	-1.34	29.82	20	24.00	391.9	2.24	0.17	1436.
30	-1.49	30.55	30	24.59	335.2	2.60	0.26	1437.
50	-1.50	31.50	50	25.36	262.2	3.19	0.50	1438.

DEEPEST MEASUREMENT:

66	-1.48	31.97	66	25.73	226.2	3.58	0.73	1439.


8.0
5.5
3.0
0.5
-2.0
Temperature (C)
24.0
26.0
28.0
30.0
32.0
34.0
36.0
Salinity (ppt)


0.50
0.25
0.00
-0.25
-0.50
Temperature (°C)
34.72
34.76
34.80
34.84
34.88
34.92
34.96
Salinity (ppt)

5 APPENDIX 2; CHEMICAL DATA TABLES AND PLOTS

STATION A01 DATE : 28/8/89 TIME (Z+6): 0940
DEPTH : 3300
LATITUDE : 72 34.0 N LONGITUDE : 143 25.6 W

DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
0	819	-0.99	26.403	395	0.65	3.6	0.0	0.046
10	820	-1.11	27.488	402	0.69	3.9	0.0	0.048
20	821	-1.13	29.914	410	0.77	3.9	0.0	0.049
30	822	-1.27	30.895	416	0.69	4.1	0.0	0.045
40	823	-1.38	31.073	418	0.82	4.3	0.0	
50	824	-1.42	31.248	419	0.84	4.8	0.0	0.082
60	825	-1.41	31.575	404	1.00	7.5	1.7	
70	826	-1.29	31.869	381	1.10	10.8	4.1	0.316
80	827	-1.28	32.129	343	1.39	17.8	8.4	
100	828	-1.38	32.421	319	1.62	22.5	11.5	0.026
120	829	-1.44	32.657	305	1.81	28.3	13.4	
140	830	-1.51	32.862	295	1.89	32.4	15.0	
150	831	-1.51	32.966	291	1.92	33.8	15.6	0.011
160	832	-1.52	33.030	289	1.96	34.9	16.0	
170	833	-1.48	33.104	287	1.95	35.3	16.2	
180	834	-1.51	33.214	287	1.84	35.8	16.3	
190	835	-1.46	33.375	284	1.91	36.1	16.4	
200	836	-1.41	33.429	278	1.71	36.2	16.7	0.005
225	837	-1.01	33.923	266	1.66	31.0	16.3	
250	838	-0.65	34.277	261	1.42	25.5	15.6	
275	839	-0.31	34.519	267	1.13	18.9	14.7	
300	840	-0.10		276	1.09	15.1	14.0	
325	841	0.07	34.703	281	0.95	12.8	13.4	

STATION A01 DATE : 28/8/89 TIME (Z+6): 0940
DEPTH : 3300
LATITUDE : 72 34.0 N LONGITUDE : 143 25.6 W

DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
350	842	0.19	34.739	286	0.91	11.7	13.3	
375	843	0.27	34.768	290	0.94	10.4	13.2	
400	844	0.36	34.791	293	0.92	9.7	13.0	
450	845	0.42	34.815	294	0.93	9.2	13.1	
500	846	0.46	34.850	296	0.90	8.7	13.0	
550	847	0.48	34.852	298	0.87	8.6	13.1	
600	848	0.47	34.870	300	0.92	8.6	13.1	
700	849	0.36	34.873	303	0.91	8.2	13.0	
800	850	0.25	34.876	306	0.90	8.0	12.9	
900	851	0.14	34.893	308	0.88	8.0	13.0	
1000	852	0.03	34.879	309	0.88	8.1	12.9	
1250	853	-0.19	34.899	309	0.94	8.6	13.3	
1500	854	-0.32	34.915	309	0.97	9.5	13.6	
1600	858	-0.40	34.913	306	0.91	10.0	13.8	
1700	856	-0.39	34.919	305	0.93	10.5	14.1	
1800	855	-0.42	34.924	305	1.01	11.0	14.1	
1900	857	-0.35	34.926	302	0.96	11.4	14.3	
2000	859	-0.43	34.930	302	1.02	11.5	14.4	
2250	860	-0.41	34.939	298	1.04	12.6	14.7	
2500	861	-0.38	34.940	296	1.03	13.1	14.8	
3000	862	-0.33	34.946	294	1.06	13.9	14.8	
3100	863	-0.33	34.953	292	1.06	14.0	14.8	
3200	864	-0.33	34.940	294	0.99	13.8	14.8	

STATION B09 DATE : 30/08/89 TIME (Z+6): 1726
DEPTH : 190
LATITUDE : 70 21.6 N LONGITUDE : 141 18.6 W

DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
2	865	2.77	26.484	372	0.55	9.1	0.0	0.389
6	866	2.60	26.912	378	0.59	8.9	0.0	0.481
10	867	0.66	28.563	403	0.69	9.5	0.1	0.496
15	868	-1.07	29.900	428	0.76	6.4	0.0	0.171
20	869	-1.21	30.169	421	0.78	6.7	0.0	0.217
30	870	-1.28	30.525	402	0.78	9.9	1.8	0.412
40	871	-1.47	30.748	398	0.96	9.7	2.3	
50	872	-1.38	31.624	362	1.22	18.0	5.1	0.161
60	873	-1.29	31.755	359	1.24	19.7	5.4	
70	874	-1.41	31.993	356	1.29	20.6	6.5	0.076
80	875	-1.54	32.205	347	1.41	21.6	8.0	
100	876	-1.62	32.518	331	1.51	28.2	10.5	
125	877	-1.65	32.708	323	1.69	31.5	11.8	0.015
140	878	-1.67	32.851	317	1.77	33.9	13.0	
150	879	-1.64	33.007	311	1.80	34.8	13.7	0.016
160	880	-1.54	33.201	307	1.74	34.2	14.1	
170	881	-1.38	33.546	295	1.69	32.3	14.5	
190	882	-0.76	34.135	275	1.45	24.8	15.1	

STATION B10 DATE : 31/08/89 TIME (Z+6): 0817
DEPTH : 190
LATITUDE : 70 16.0 N LONGITUDE : 140 17.2 W

DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
2	883	5.82	22.236	344	0.39	12.4	0.1	0.375
6	884	2.18	27.509	393	0.59	11.1	0.0	0.480
10	885	-1.04	29.717	431	0.72	6.4	0.0	0.498
15	886	-1.28	30.175	413	0.79	6.4	0.0	0.274
20	887	-1.39	30.321	408	0.86	6.8	0.4	0.491
30	888	-1.49	30.628	394	0.89	9.4	2.0	0.243
40	889	-1.50	31.118	378	1.05	13.6	4.1	
50	890	-1.52	31.566	382	1.15	13.4	4.7	0.164
60	891	-1.49	31.913	359	1.42	17.4	6.4	
70	892	-1.54	32.131	348	1.42	21.1	7.8	0.058
80	893	-1.55	32.275	343	1.31	23.3	8.8	
100	894	-1.64	32.491	333	1.59	29.2	10.7	
125	895	-1.63	32.725	320	1.64	31.6	12.3	0.011
140	896	-1.65	32.909	314	1.75	34.0	13.5	
150	897	-1.65	33.021	312	1.55	36.4	14.2	0.006
160	898	-1.53	33.234	306	1.68	34.3	14.5	
170	899	-1.13	33.824	282	1.68	30.0	15.3	
190	900	-0.60	34.285	272	1.40	23.2	15.1	

STATION C01 DATE : 27/08/89 TIME (Z+6): 0836
DEPTH : 190
LATITUDE : 70 57.8 N LONGITUDE : 134 28.6 W

DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
2	801	7.45	13.326	344	0.06	20.2	0.2	0.387
6	802	-0.68	21.734	395	0.44	7.2	0.0	0.200
10	803	-0.89	27.212	408	0.60	4.2	0.0	0.080
15	804		29.269	411	0.73	3.8	0.0	0.093
20	805	-1.07	30.036	414	0.73	3.7	0.0	0.134
30	806	-1.14	30.535	415	0.77	3.9	0.0	0.167
40	807	-1.32	30.956	417	0.86	4.4	0.0	
50	808	-1.51	31.320	407	0.84	5.8	0.5	0.133
60	809	-1.49	31.606	365	1.17	13.5	4.0	
70	810	-1.40	32.109	353	1.35	17.0	6.8	0.080
80	811	-1.46	32.256	328	1.53	23.0	8.5	
100	812	-1.50	32.339	330	1.53	23.1	9.0	
125	813	-1.51	32.608	317	1.66	26.1	11.5	0.025
140	814	-1.55	32.746	312	1.67	29.3	12.4	
150	815	-1.53	32.926	299	1.75	32.0	14.1	0.013
160	816	-1.44	33.249	286	1.62	34.3	15.5	
170	817	-1.44	33.286	285	1.89	34.4	15.6	
190	818	-1.30	33.494	276	1.83	33.9	15.9	0.010

STATION D03 DATE : 01/09/89 TIME (Z+6): 0812
DEPTH : 190
LATITUDE : 70 08.3 N LONGITUDE : 139 22.0 W

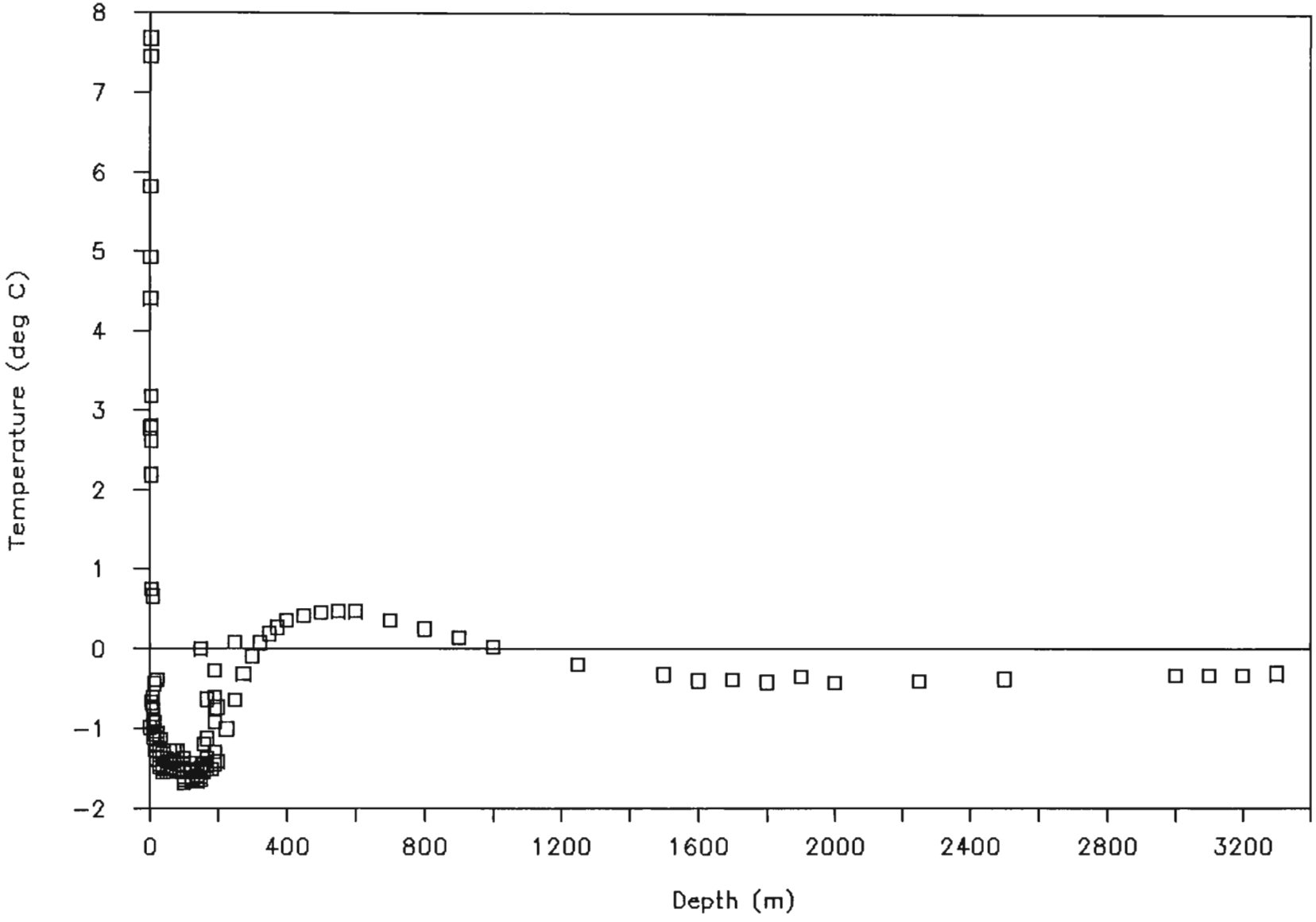
DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
2	901	4.93	23.211	353	0.39	12.4	0.0	0.357
6	902	3.17	26.016	379	0.58	11.6	0.0	0.371
10	903	-0.61	28.837	437	0.61	6.9	0.0	0.274
15	904	-0.44	29.877	407	0.82	10.1	1.2	0.493
20	905	-0.39	30.259	381	0.96	13.7	2.9	0.607
30	906	-1.45	30.661	398	0.93	8.5	1.8	0.510
40	907	-1.52	30.928	400				
50	908	-1.54	31.440	369	1.02	14.5	5.0	0.170
60	909	-1.55	31.644	360	1.23	16.8	5.9	
70	910	-1.55	31.828	355	1.29	18.7	6.7	0.080
80	911	-1.51	31.946	355	1.26	19.7	7.0	
100	912	-1.56	32.313	341	1.46	22.7	8.5	
125	913	-1.62	32.596	326	1.63	29.7	11.0	0.013
140	914	-1.59	32.784	312	1.73	31.3	12.9	
150	915	-1.61	32.942	309	1.71	34.0	13.6	0.013
160	916	-1.20	33.531	289	1.65	32.7	14.9	
170	917	-0.64	34.230	266	1.45	24.6	15.6	0.011
190	918	-0.28	34.514	268	1.23	18.9	15.1	

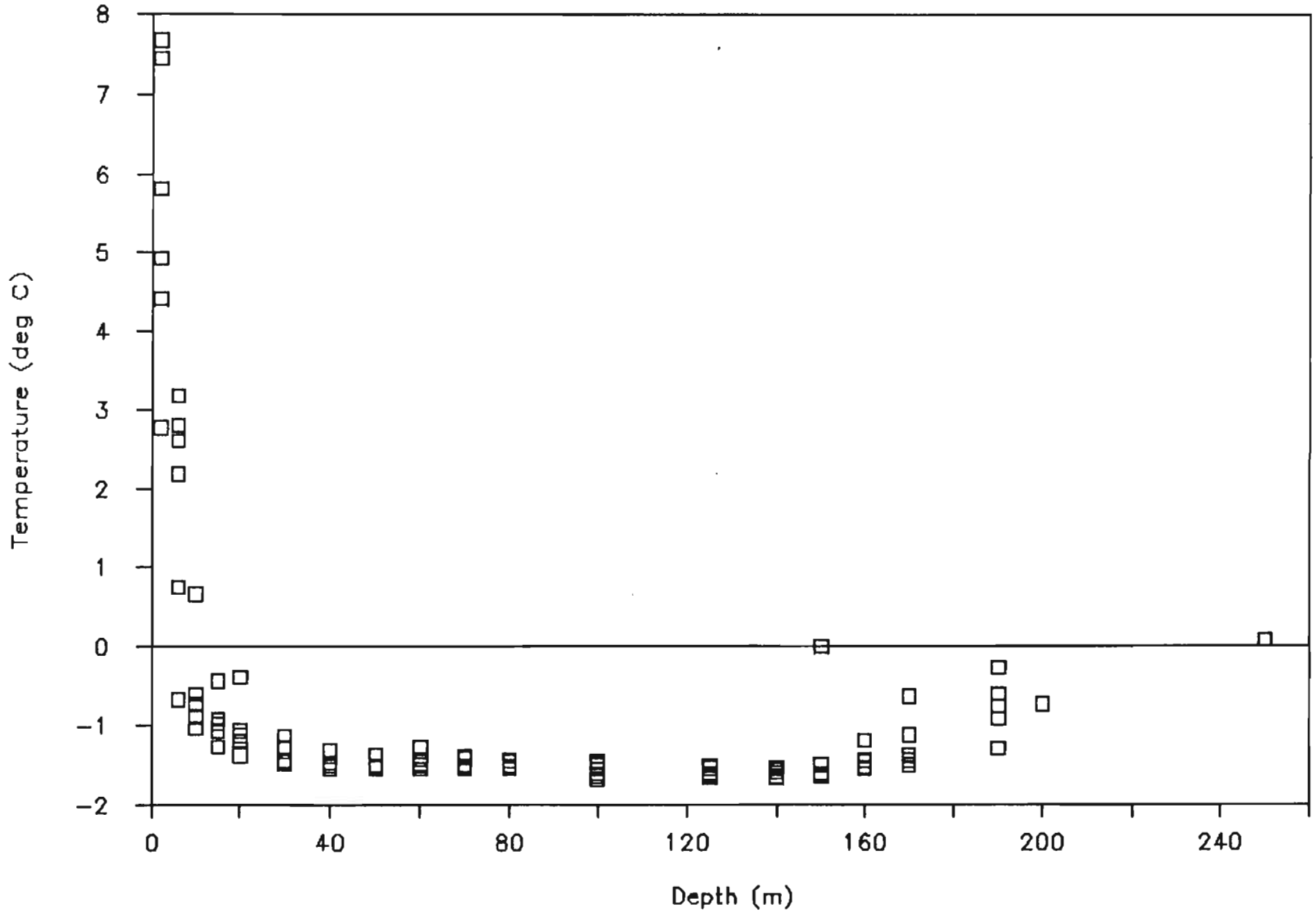
STATION D10 DATE : 1/08/89 TIME (Z+6): 1504
DEPTH : 250
LATITUDE : 69 59.1 N LONGITUDE : 138 34.6 W

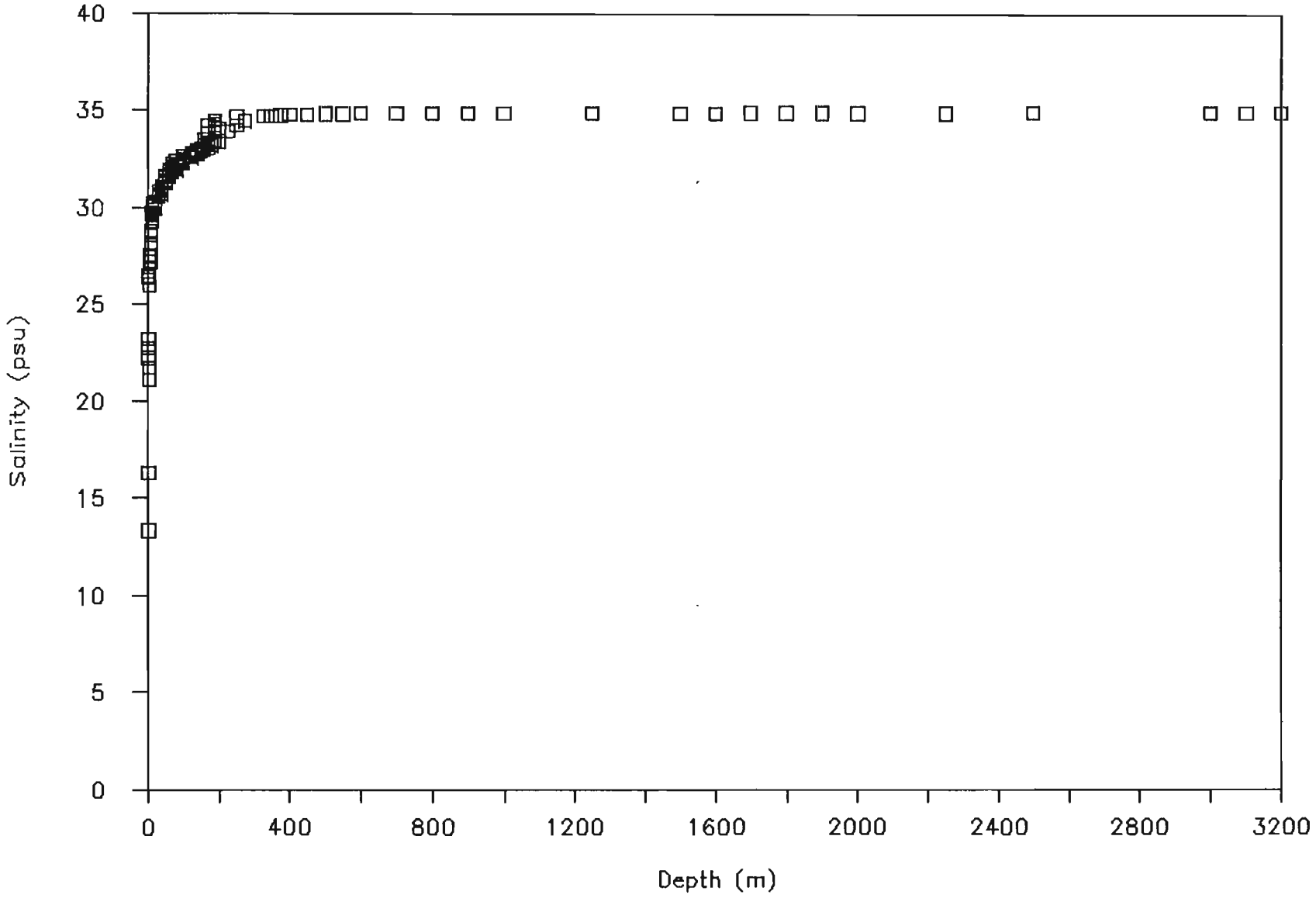
DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
2	919	4.41	22.747	358	0.37	12.0	0.0	0.334
6	920	0.75	27.251	414	0.55	8.3	0.0	0.500
10	921	-0.75	28.807	420	0.68	7.0	0.1	0.426
15	922	-0.92	29.781	422	0.75	5.4	0.0	0.210
20	923	-1.20	30.124	416	0.78	5.7	0.1	0.203
30	924	-1.49	30.565	401	0.86	7.2	1.5	0.221
40	925	-1.55	31.033	381	1.03	12.1	4.0	
50	926	-1.54	31.558	356	1.25	17.2	6.3	0.092
60	927	-1.43	31.966	363	1.17	15.2	5.9	
70	928	-1.51	32.230	347	1.22	19.7	8.0	0.027
80	929	-1.53	32.413	336	1.31	23.1	9.6	
100	930	-1.69	32.627	328	1.68	33.4	11.4	
125	931	-1.67	32.845	319	1.74	33.7	12.9	0.011
140	932	-1.64	32.979	310	1.77	34.2	14.2	
150	933	-1.62	33.088	309	1.82	34.6	14.4	0.011
160	934	-1.55	33.221		1.81	33.9	14.4	
170	935	-1.50	33.371	301	1.78	33.4	14.6	
200	936	-0.74	34.130	266	1.51	25.8	15.9	
250	937	0.08	34.691	278	1.07	13.8	14.4	

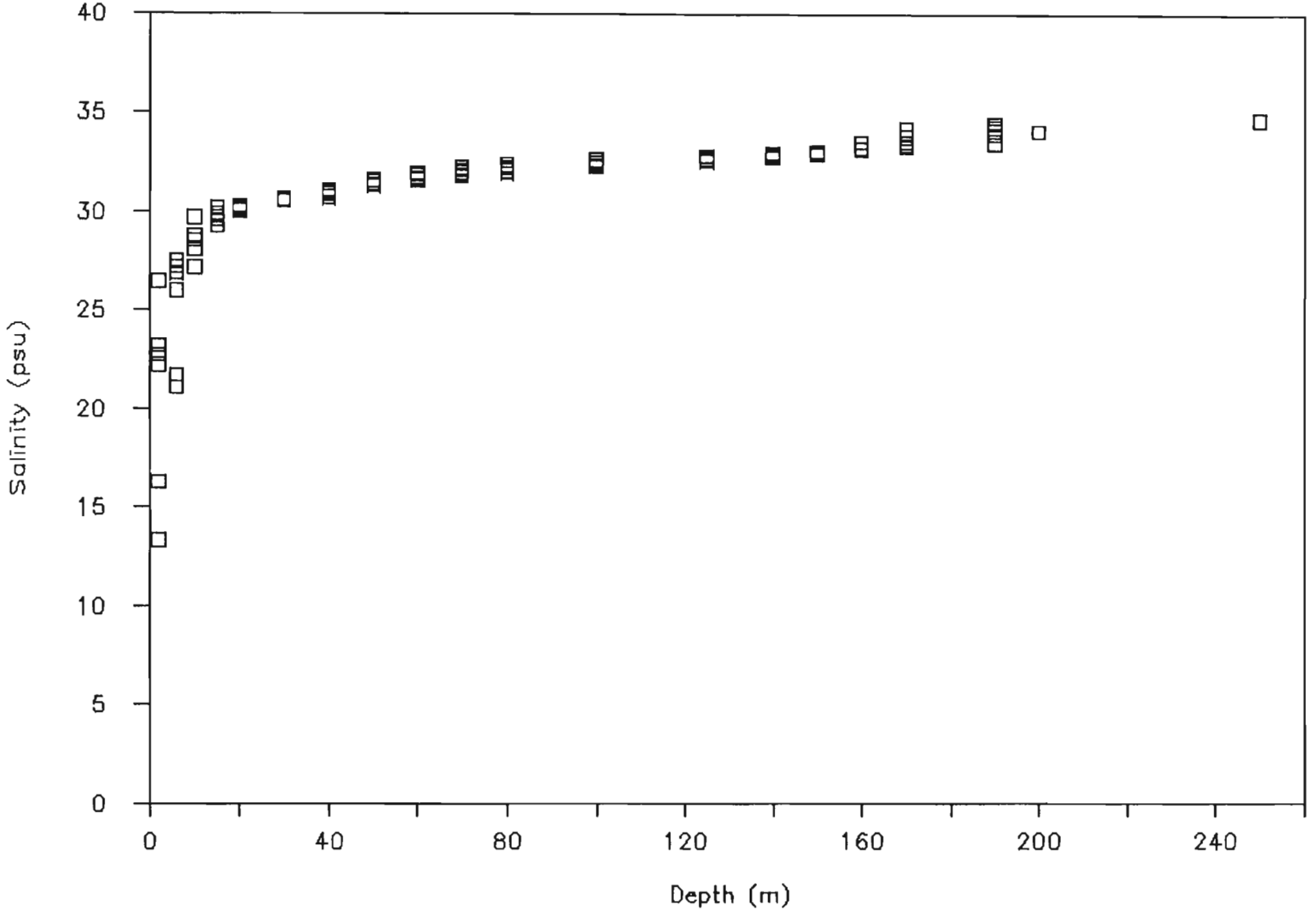
STATION E01 DATE : 2/09/89 TIME (Z+6): 0807
DEPTH : 190
LATITUDE : 70 21.3 N LONGITUDE : 137 15.9 W

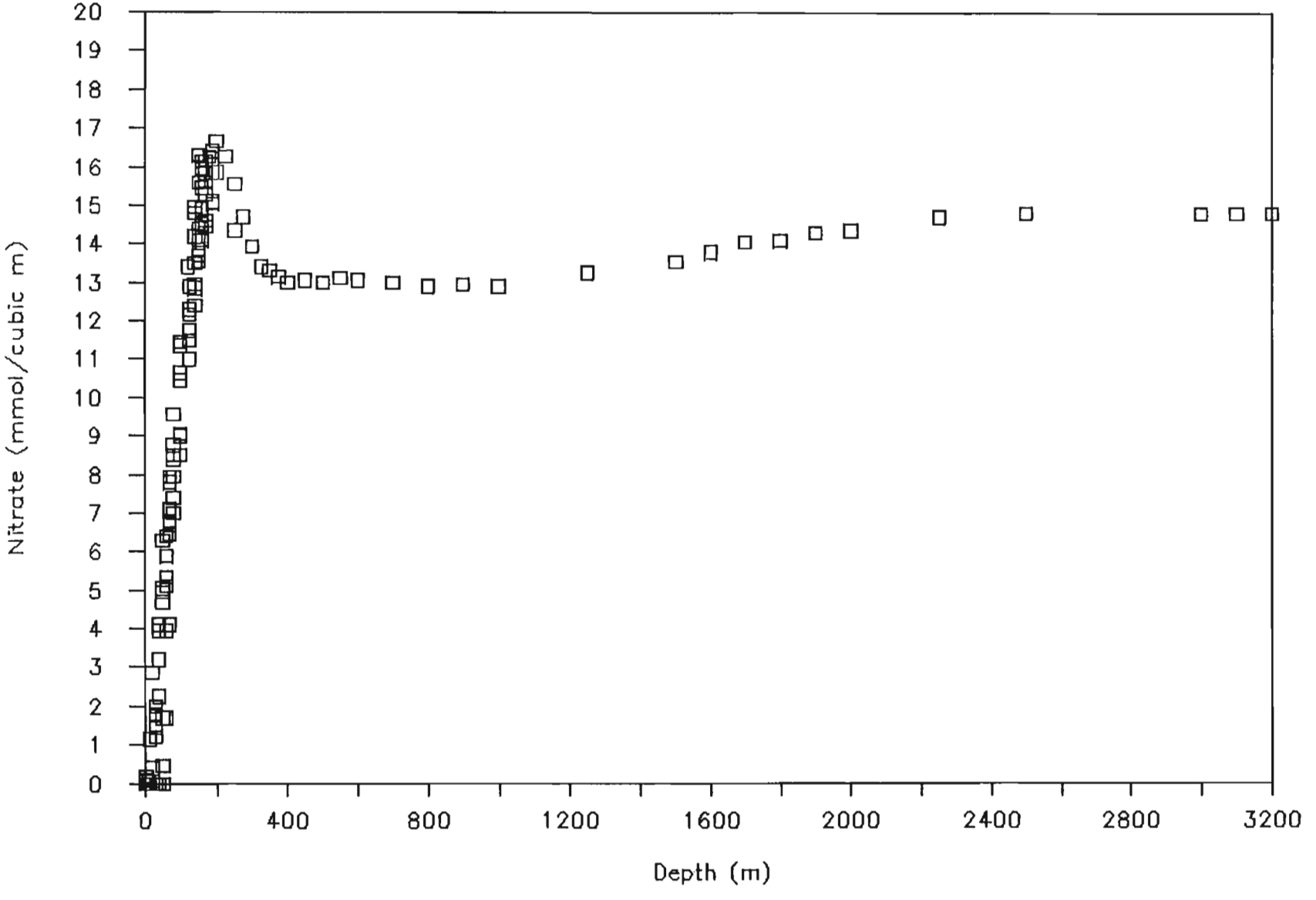
DEPTH m	SAMPLE #	TEMP deg C	SALINITY psu	OXYGEN mmol/cu m	PHOSPHATE mmol/cu m	SILICATE mmol/cu m	NITRATE mmol/cu m	CHL a mg/cu m
2	938	7.68	16.294	336	0.27	21.3	0.1	0.469
6	939	2.80	21.096	371	0.36	14.5	0.0	0.394
10	940	-0.74	28.137	410	0.65	7.3	0.0	0.258
15	941	-0.98	29.612	414	0.75	6.8	0.0	0.206
20	942	-1.13	30.082	419	0.64	6.2	0.0	0.201
30	943	-1.46	30.567	400	0.76	7.8	1.2	0.167
40	944	-1.55	30.910	387	0.86	10.7	3.2	
50	945	-1.51	31.315	398	0.84	7.9	1.7	0.082
60	946	-1.50	31.666	371	1.04	15.0	5.1	
70	947	-1.51	31.917	353	1.26	19.4	7.1	0.044
80	948	-1.45	32.091	351		19.2	7.4	
100	949	-1.46	32.321	338		21.7	9.1	
125	950	-1.54	32.688	315	1.64	29.1	12.2	0.022
140	951	-1.53	32.970	297	1.78	33.7	14.8	
150	952	-1.50	33.084	285	1.93	35.8	16.3	0.014
160	953	-1.46	33.208	285	1.90	35.5	16.2	
170	954	-1.39	33.376	286	1.84	34.4	15.9	
190	955	-0.93	33.958	266	1.60	29.7	16.2	

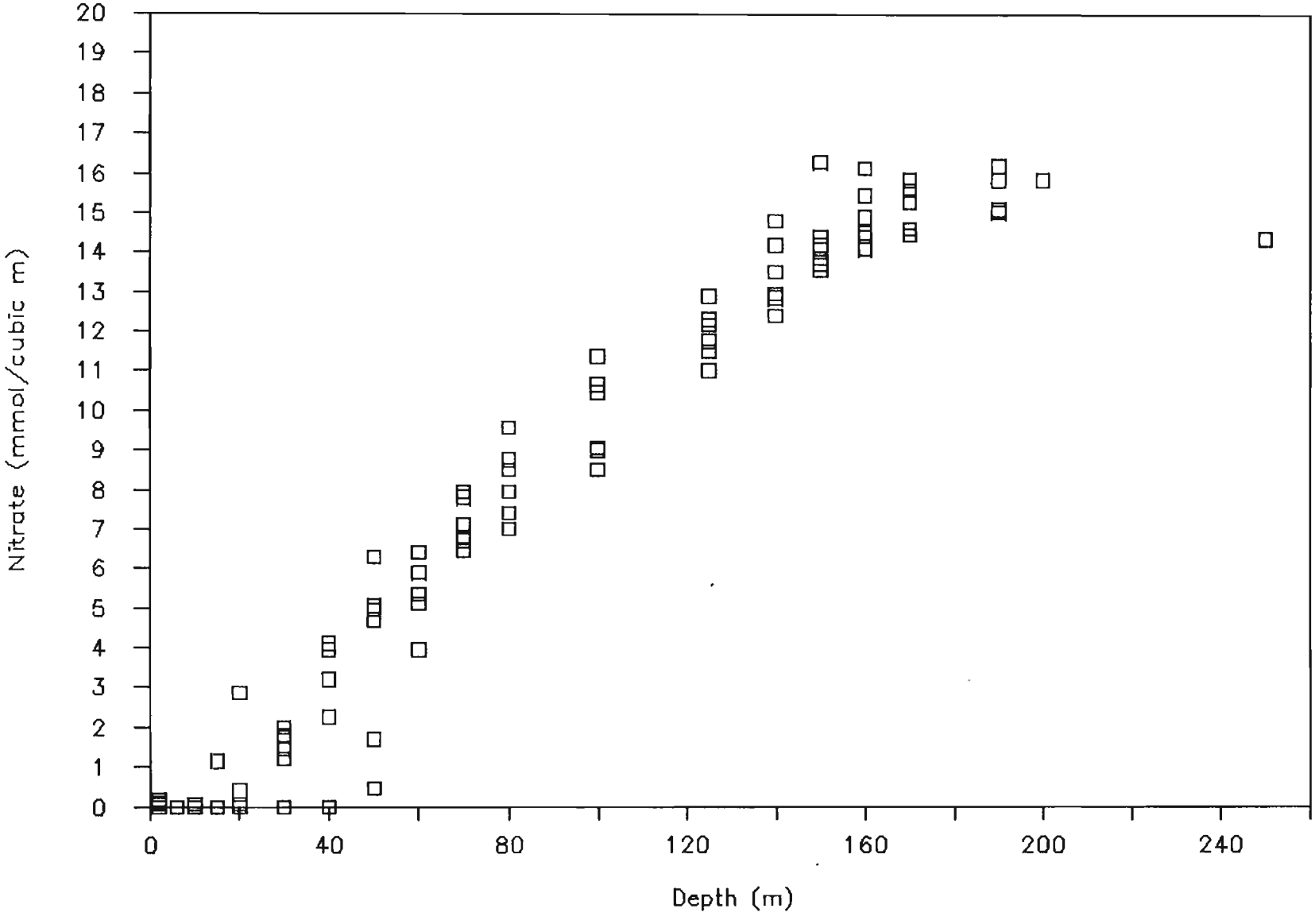

Temperature (deg C)
8
7
6
5
4
3
2
1
0
−1
−2
0
400
800
1200
1600
2000
2400
2800
3200
Depth (m)

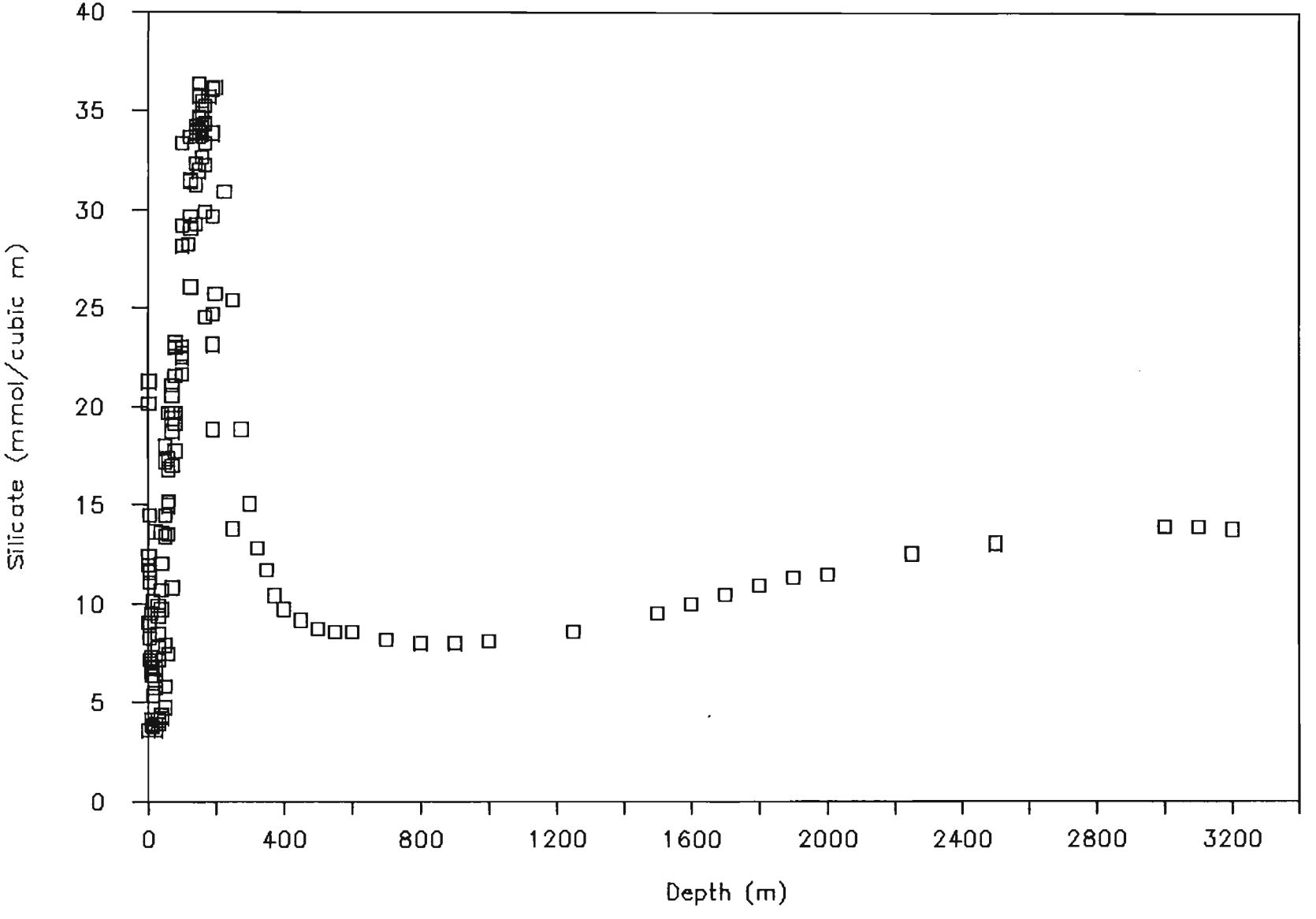

Temperature (deg C)
8
7
6
5
4
3
2
1
0
−1
−2
0
40
80
120
160
200
240
Depth (m)

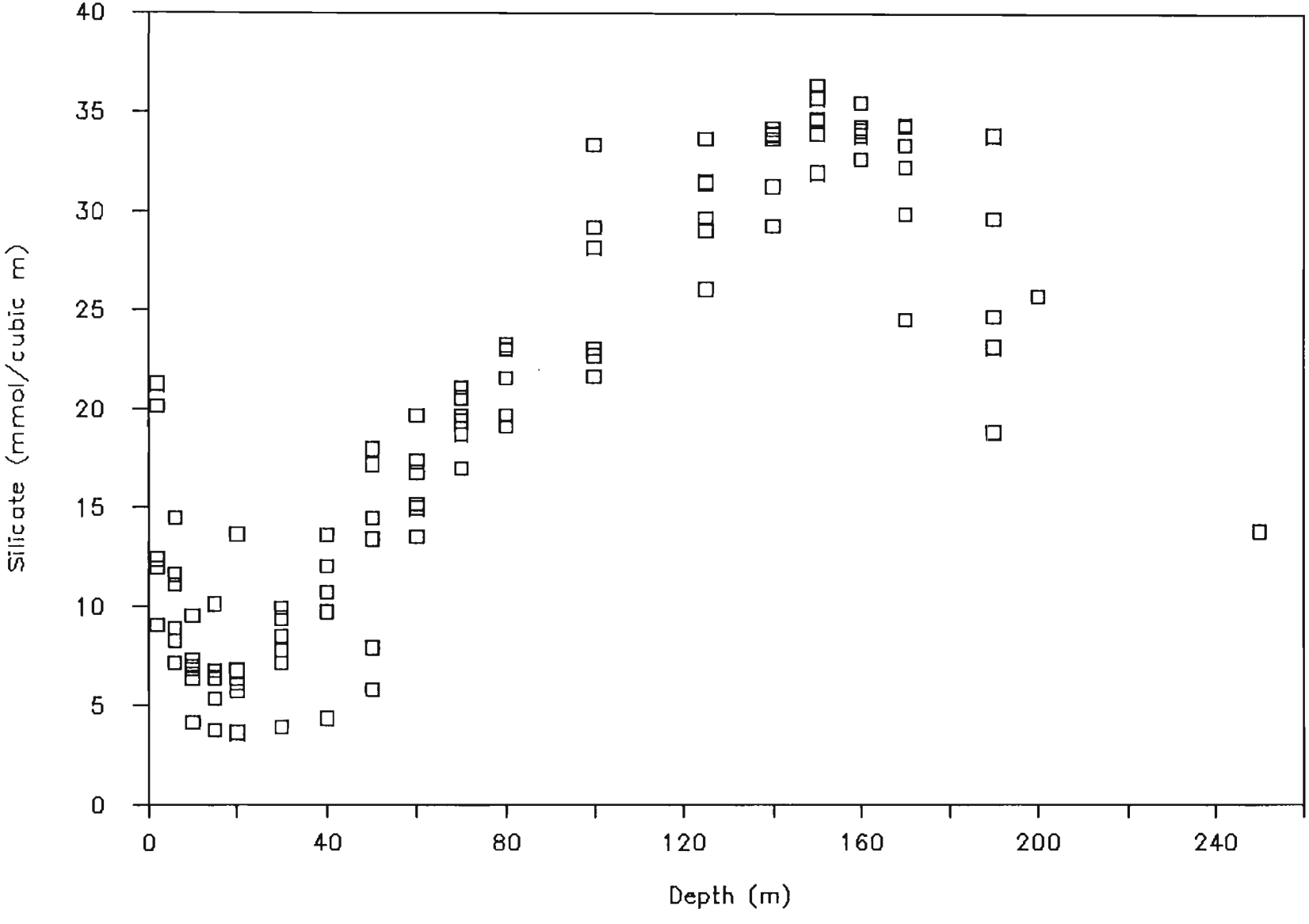

Salinity (psu)
40
35
30
25
20
15
10
5
0
0
400
800
1200
1600
2000
2400
2800
3200
Depth (m)

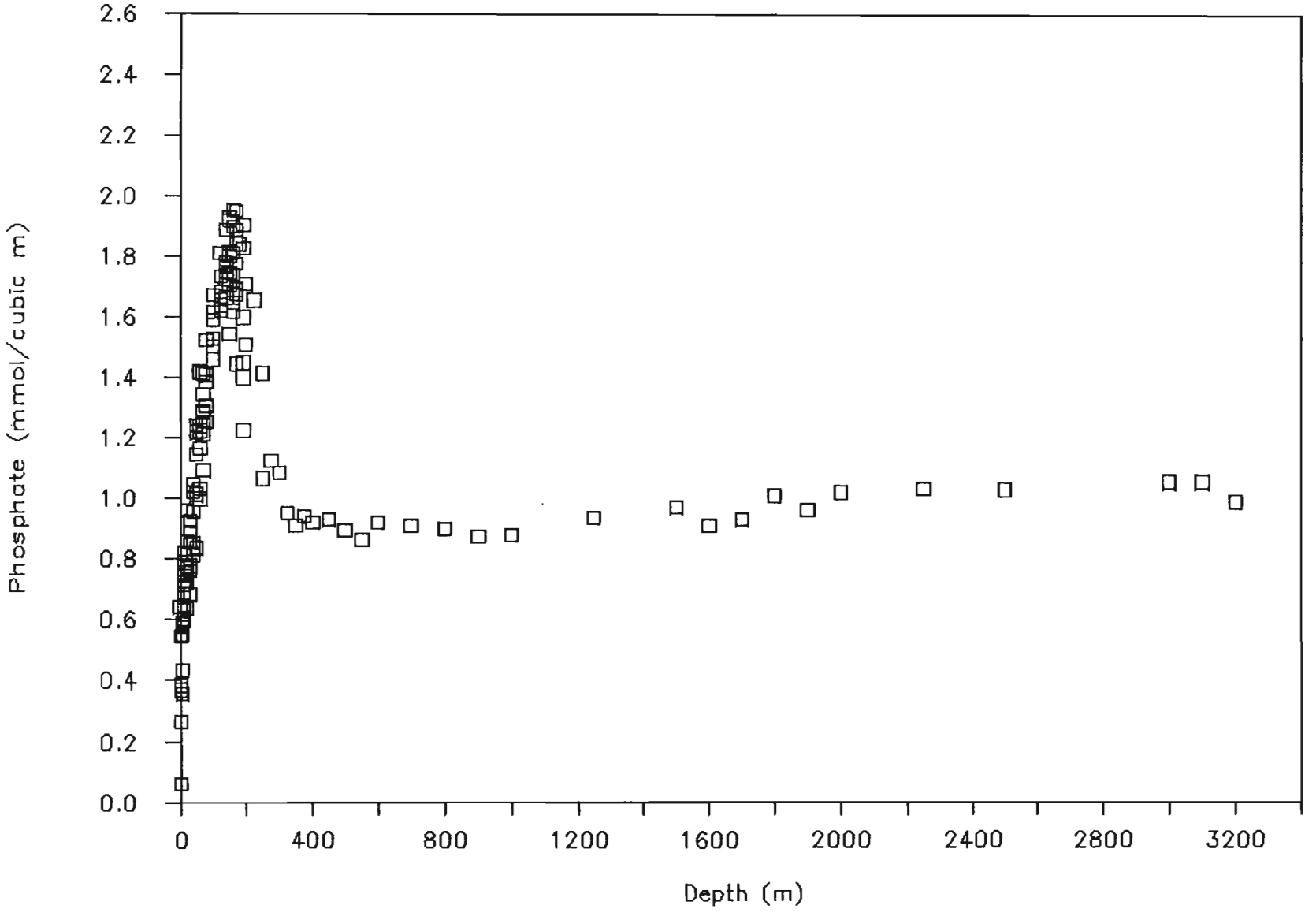

Salinity (psu)
40
35
30
25
20
15
10
5
0
0
40
80
120
160
200
240
Depth (m)

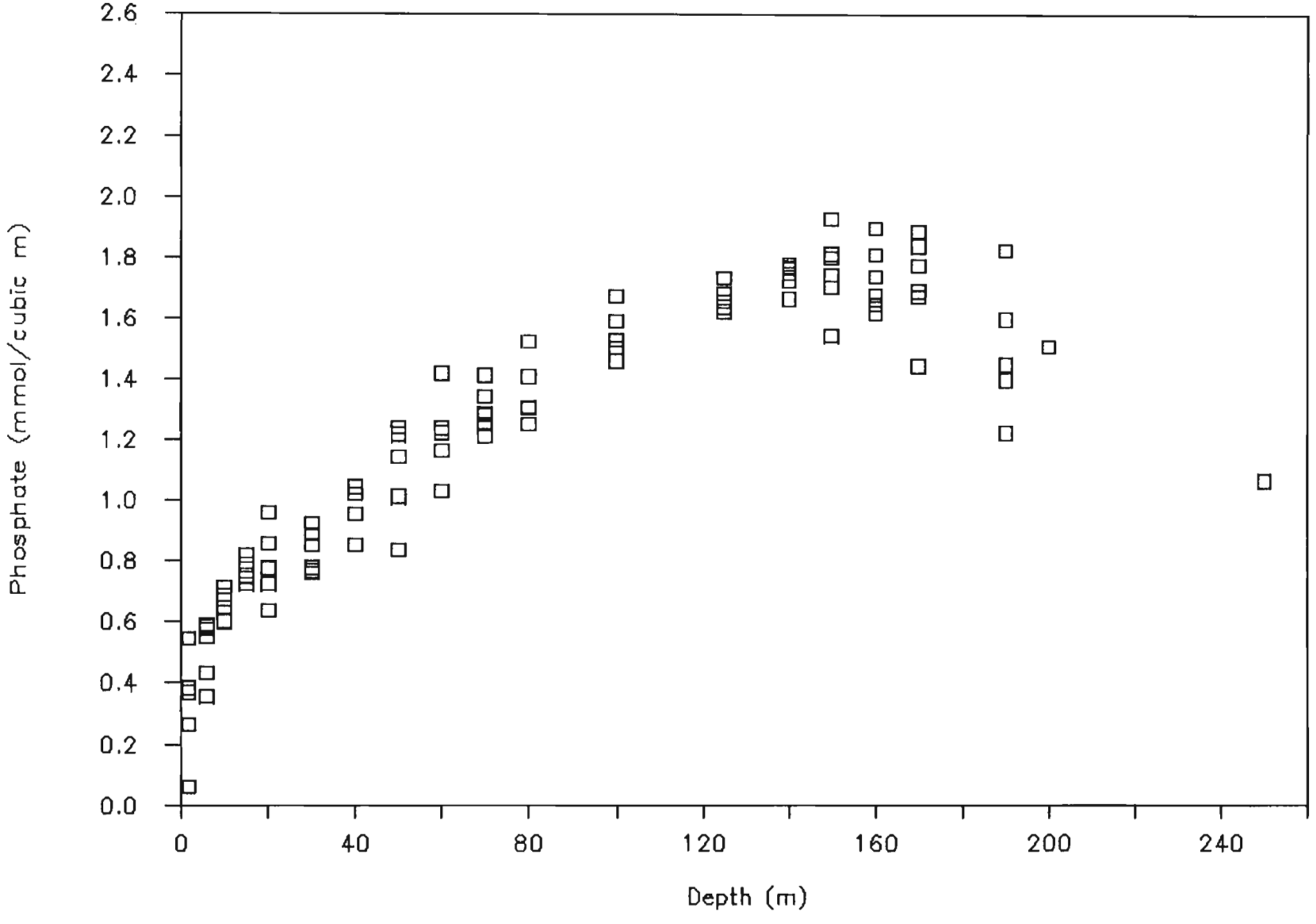

Nitrate (mmol/cubic m)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
0
400
800
1200
1600
2000
2400
2800
3200
Depth (m)

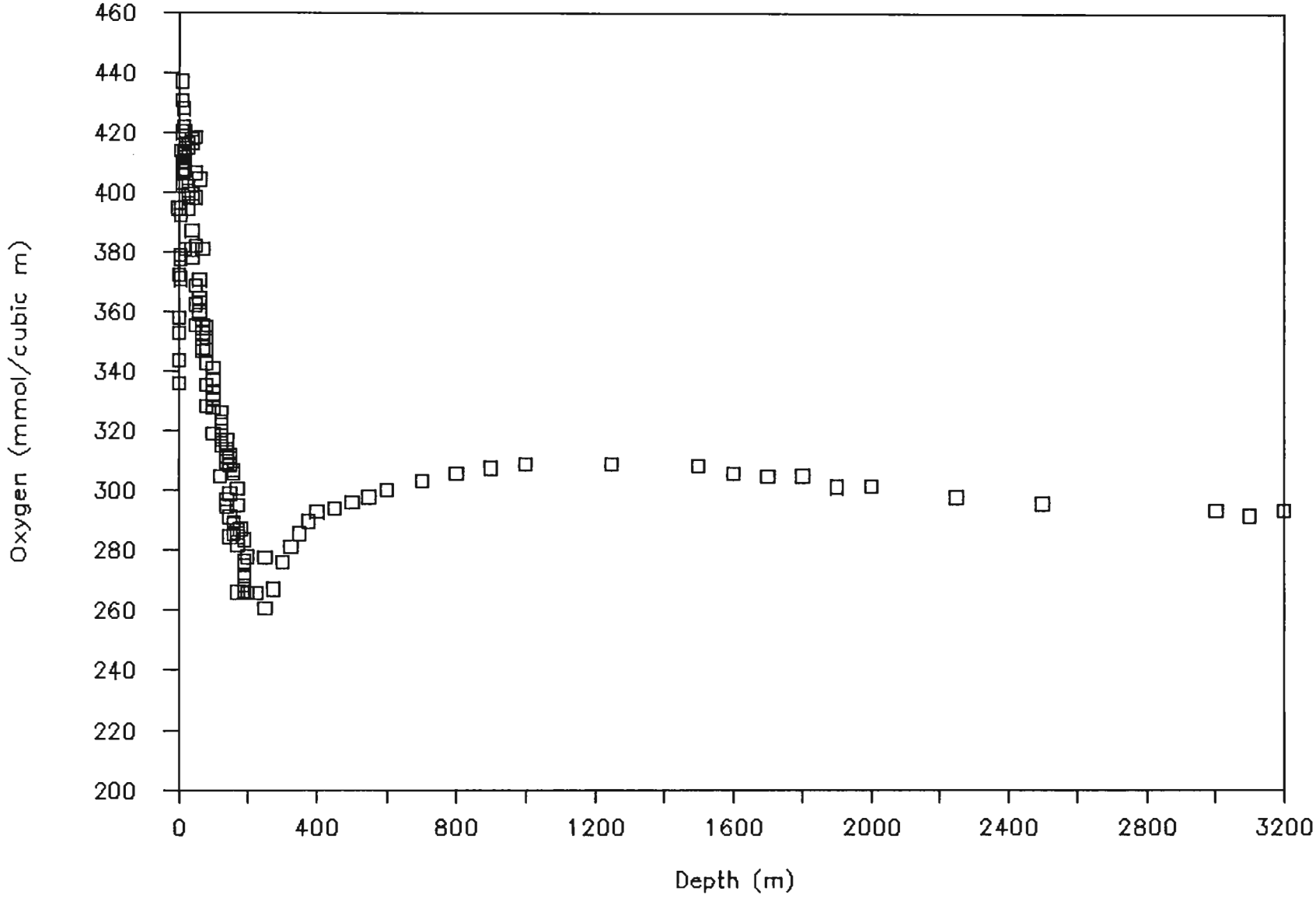

Nitrate (mmol/cubic m)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
40
80
120
160
200
240
Depth (m)

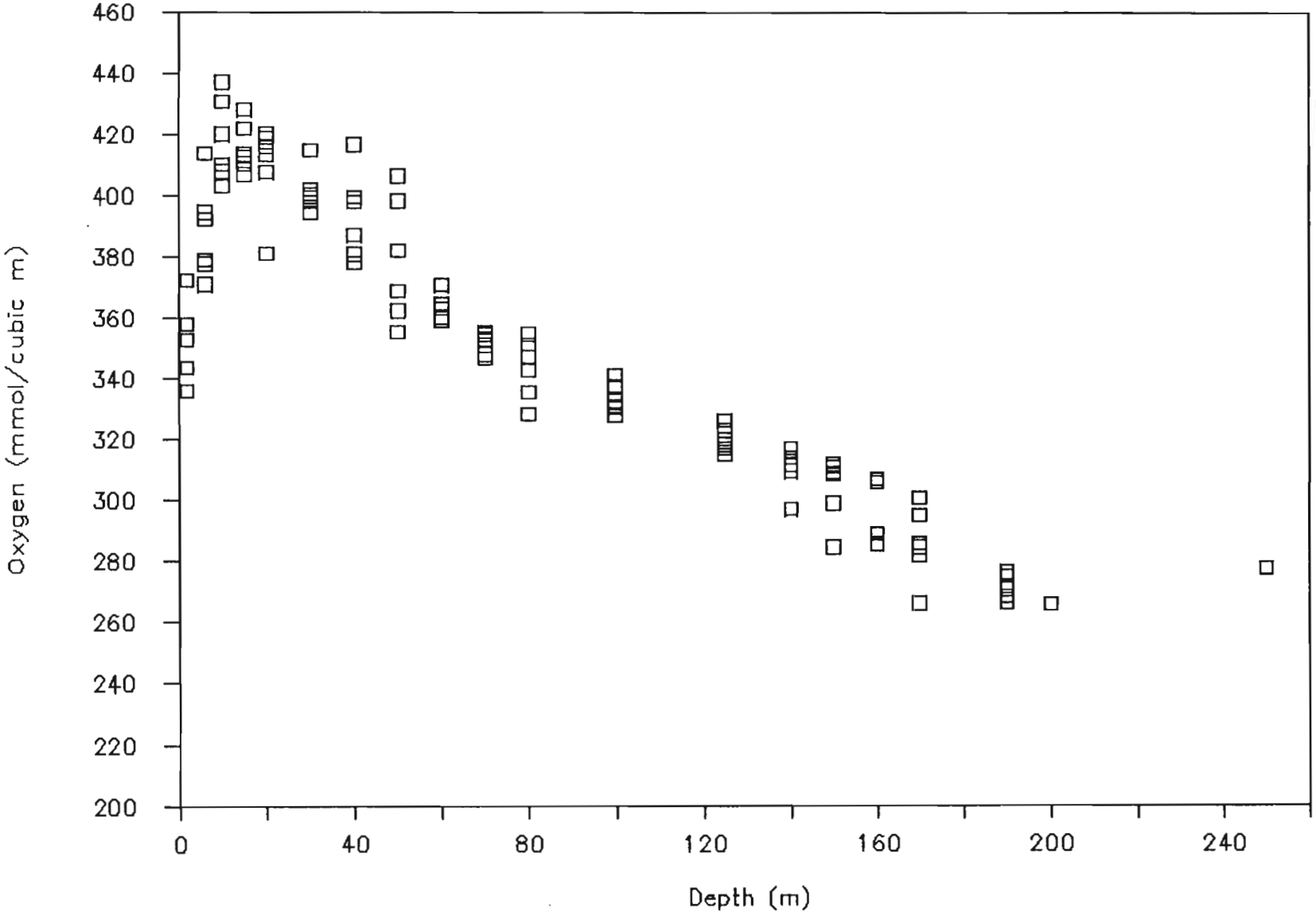

Silicate (mmol/cubic m)
40
35
30
25
20
15
10
5
0
0
400
800
1200
1600
2000
2400
2800
3200
Depth (m)

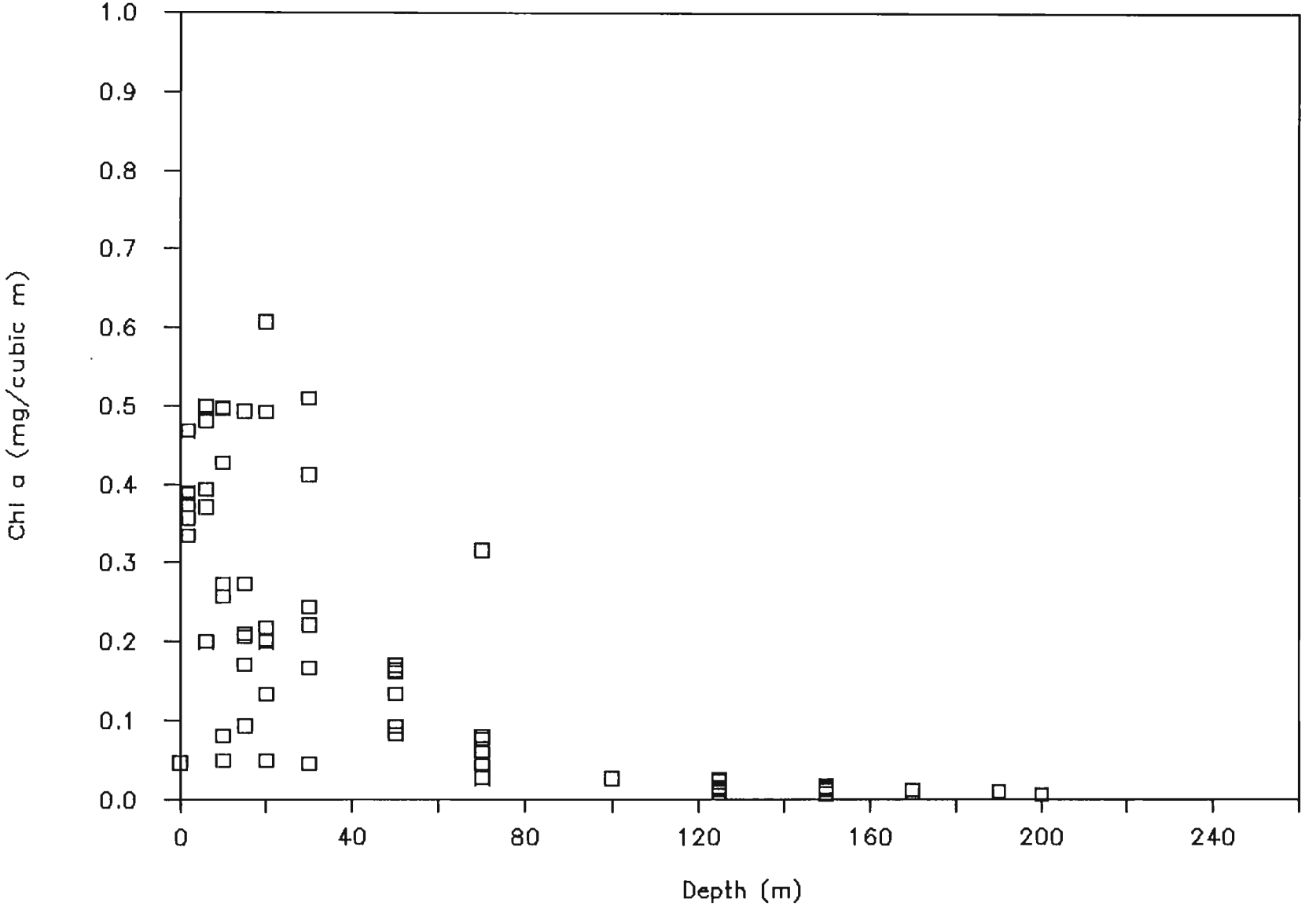

Silicate (mmol/cubic m)
40
35
30
25
20
15
10
5
0
0
40
80
120
160
200
240
Depth (m)

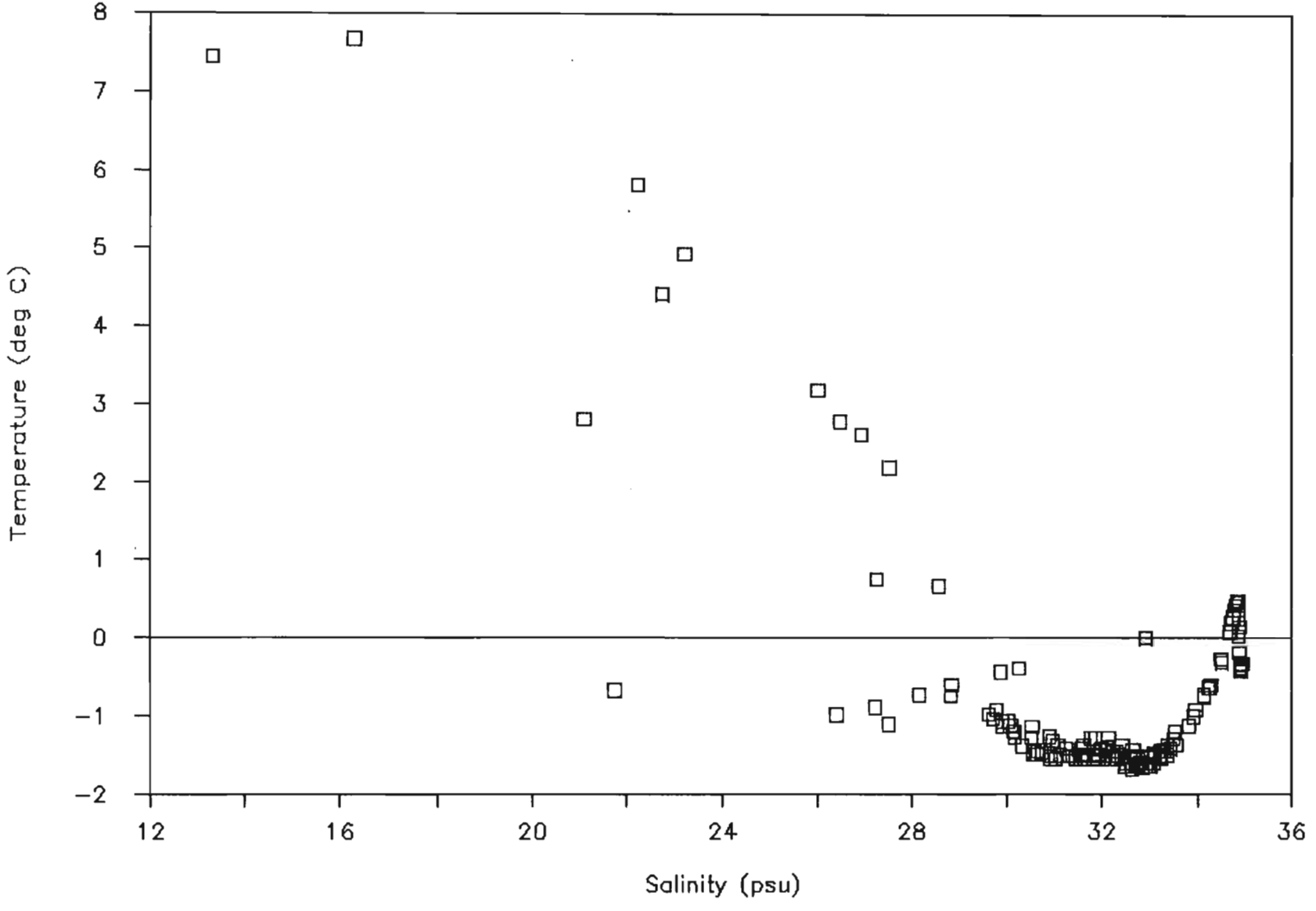

Phosphate (mmol/cubic m)
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
400
800
1200
1600
2000
2400
2800
3200
Depth (m)

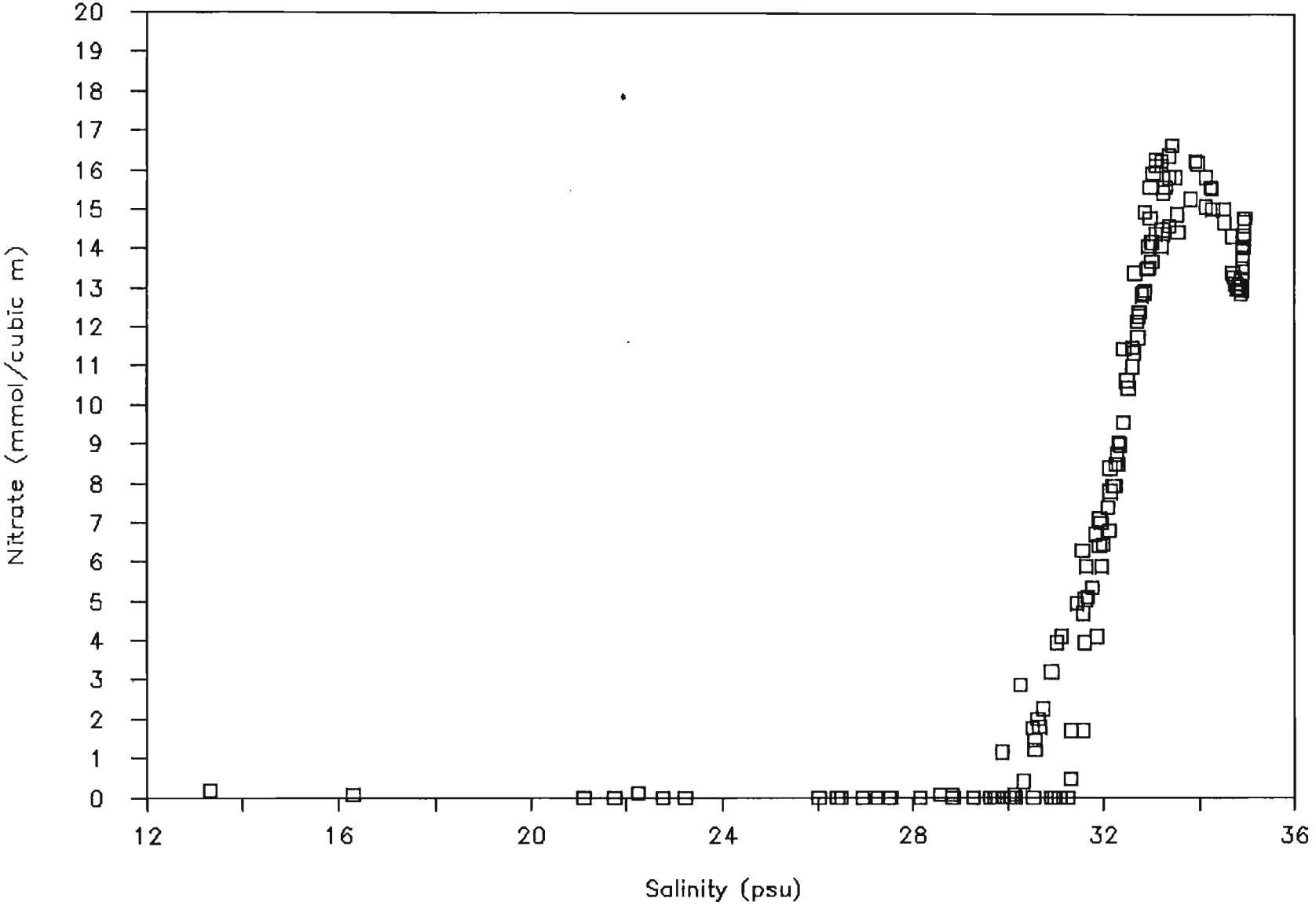

Phosphate (mmol/cubic m)
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
40
80
120
160
200
240
Depth (m)

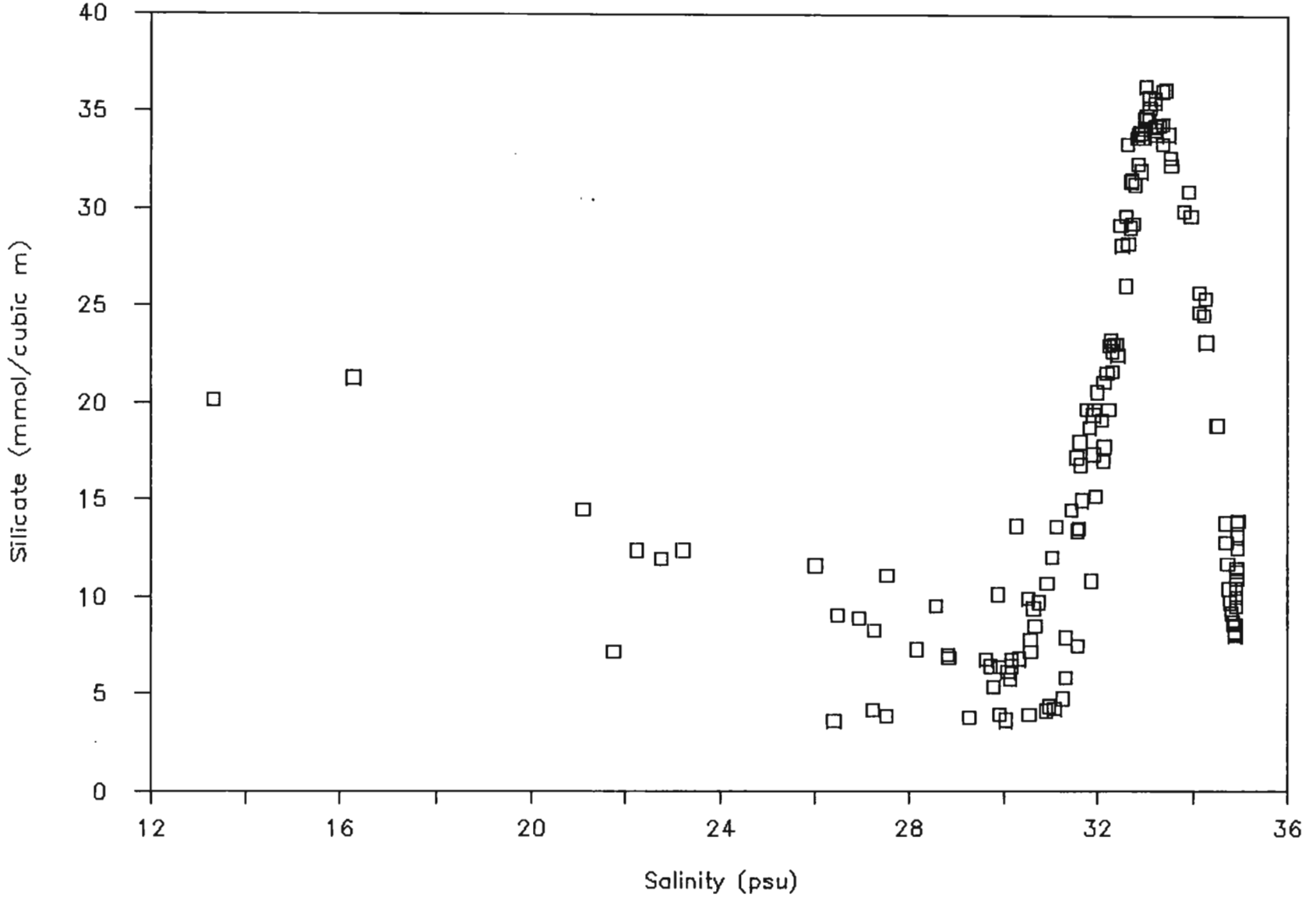

460
440
420
400
380
360
340
320
300
280
260
240
220
200
Oxygen (mmol/cubic m)
0
400
800
1200
1600
2000
2400
2800
3200
Depth (m)

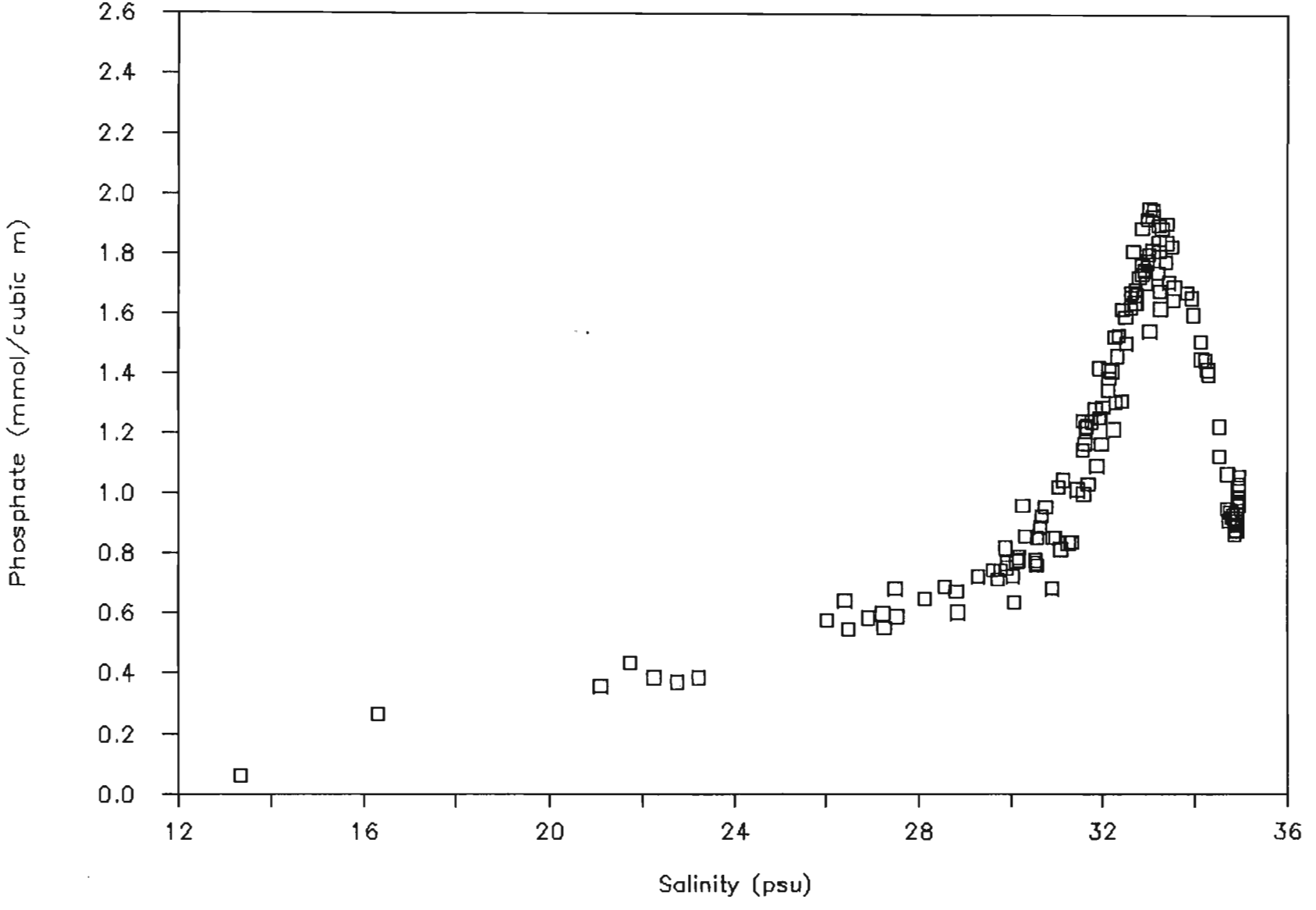

Oxygen (mmol/cubic m)
460
440
420
400
380
360
340
320
300
280
260
240
220
200
0
40
80
120
160
200
240
Depth (m)

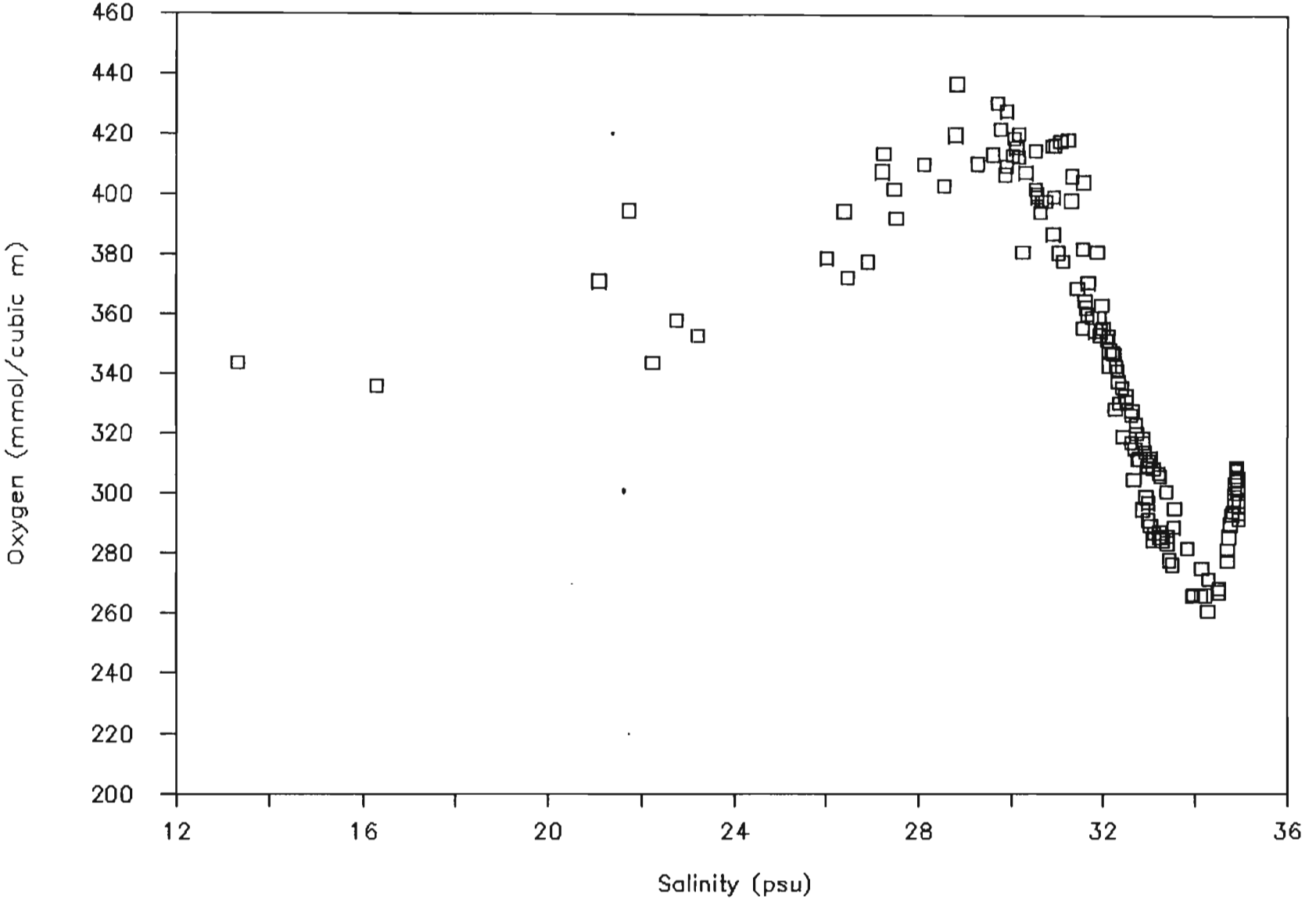

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Chl a (mg/cubic m)
0
40
80
120
160
200
240
Depth (m)

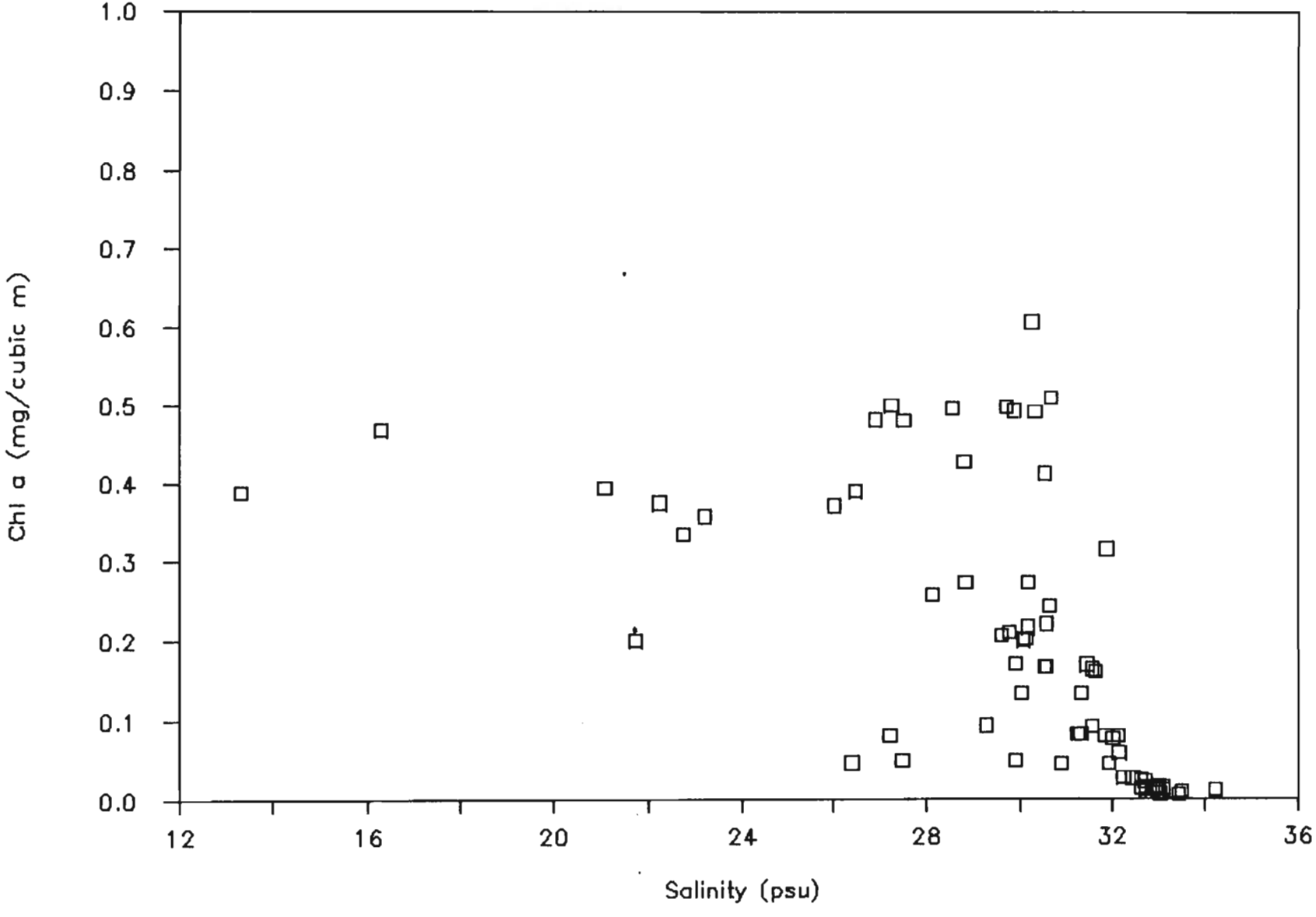

Temperature (deg C)
8
7
6
5
4
3
2
1
0
−1
−2
12
16
20
24
28
32
36
Salinity (psu)


Nitrate (mmol/cubic m)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
12
16
20
24
28
32
36
Salinity (psu)


Silicate (mmol/cubic m)
40
35
30
25
20
15
10
5
0
12
16
20
24
28
32
36
Salinity (psu)


Phosphate (mmol/cubic m)
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12
16
20
24
28
32
36
Salinity (psu)


460
440
420
400
380
360
340
320
300
280
260
240
220
200
Oxygen (mmol/cubic m)
12
16
20
24
28
32
36
Salinity (psu)


1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Chl a (mg/cubic m)
12
16
20
24
28
32
36
Salinity (psu)