KITIMAT HYDROCARBON BASELINE STUDY: OCEANOGRAPHIC OBSERVATIONS

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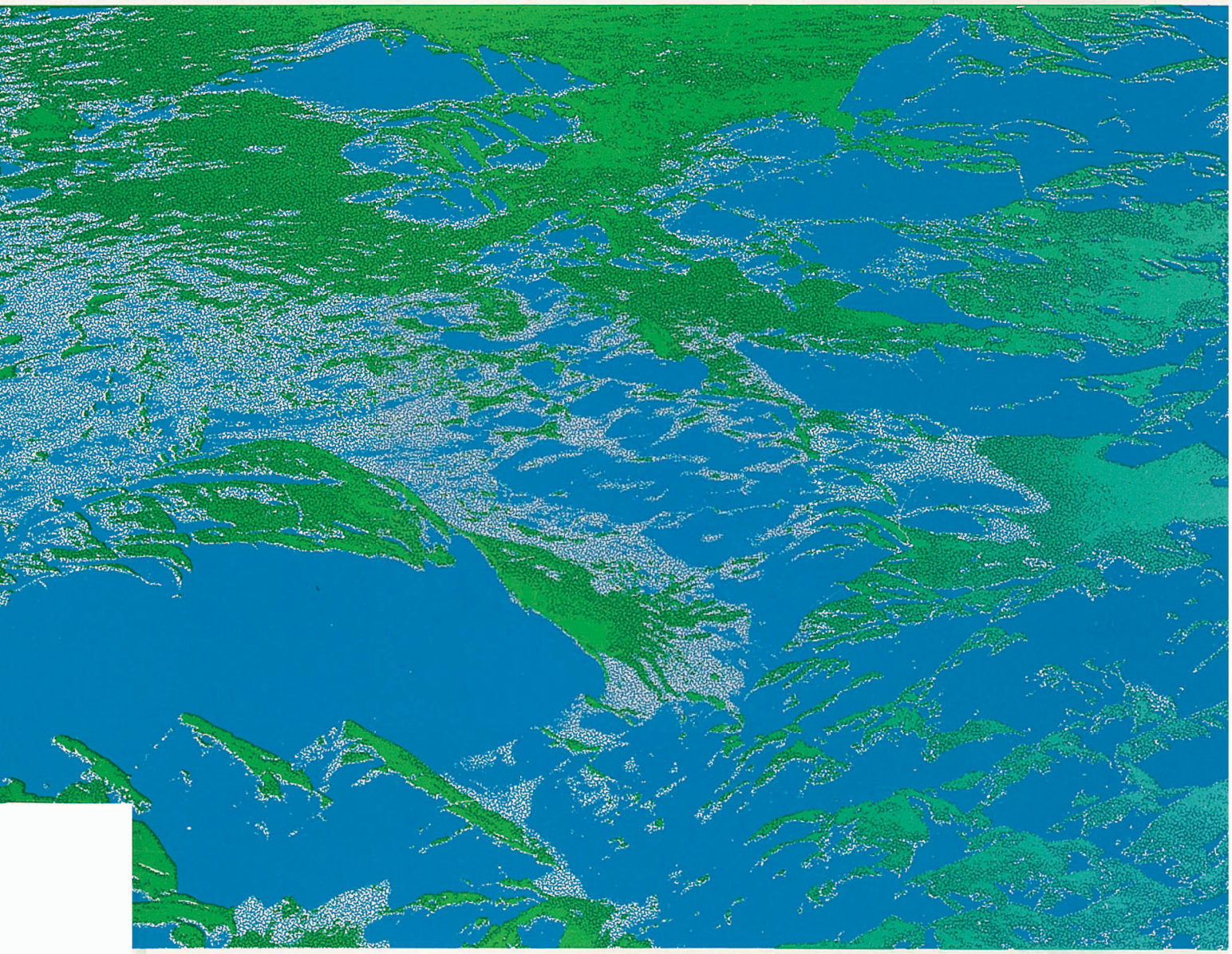
PATRICIA BAY, SIDNEY, B.C.

PAUL ERICKSON



AKEM OCEANOGRAPHY LTD SIDNEY, BRITISH COLUMBIA, CANADA

KITIMAT HYDROCARBON BASELINE STUDY:
OCEANOGRAPHIC OBSERVATIONS:

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ABSTRACT

Three oceanographic cruises were carried out to the Kitimat Arm, Douglas Channel region of the B.C. Coast in June and October, 1978 and February, 1979 as part of an overall study to determine baseline hydrocarbon levels in the area. Using standard hydrocasts on all cruises and CTD casts in June, measurements were made of temperature, salinity, dissolved oxygen, reactive nutrients and suspended solids. The results of these observations are presented along with a brief discussion of each parameter. The hydrocarbon data are presented in a companion report entitled "Hydrocarbon Levels in the marine environment of Kitimat Arm and its seaward approaches" (Erickson et al, 1979).

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1.0 INTRODUCTION

In May, 1978, Seakem Oceanography Ltd. initiated a study on behalf of the Department of Fisheries and Oceans to determine the present levels of hydrocarbons in the water, sediments and biota of Kitimat Arm, Douglas Channel and their approaches out to Hecate Strait. As part of this study, three cruises were carried out in the study area during June and October 1978 and February, 1979. The purpose of this report is to provide a summary of the oceanographic data collected. A companion report (Erickson et al, 1979) presents the hydrocarbon data and provides a discussion of those data in terms of the general oceanographic features presented here.

1.1 Study Area

Kitimat Arm and Douglas Channel form part of a major complex of inlets and channels on the north-central British Columbia coast (Figure 1). The study area includes Kitimat Arm and all connecting passages leading out to Hecate Strait, a distance of over 170 km. (Figure 2)

The area is quite complex geographically with several large islands and adjoining inlets and passages. There are four possible entrances: Grenville Channel on the west, Princess Royal Channel on the east, Caamano Sound and Otter Channel on the south. The latter two are the most important in terms of relative volume transport. The bathymetry of the area is also complex (Figure 3) with several sills (Figure 4) dividing the area into a number of deeper basins. The limiting sill depth to Hecate Strait is 150 m through Caamano Sound. Inside Caamano Sound, sills of approximately 200 m in Otter Channel and Campania Sound mark the southern boundary of the deepest basin of the study area which extends around both sides of Gil Island, into Ursula Channel and Verney Passage and north into Douglas Channel. Depths exceed 600 m on the west side of Gil Island. A sill with a limiting depth of 240 m splits Douglas Channel roughly in half. The northern basin reaches depths of 400 m and extends to the head of Kitimat

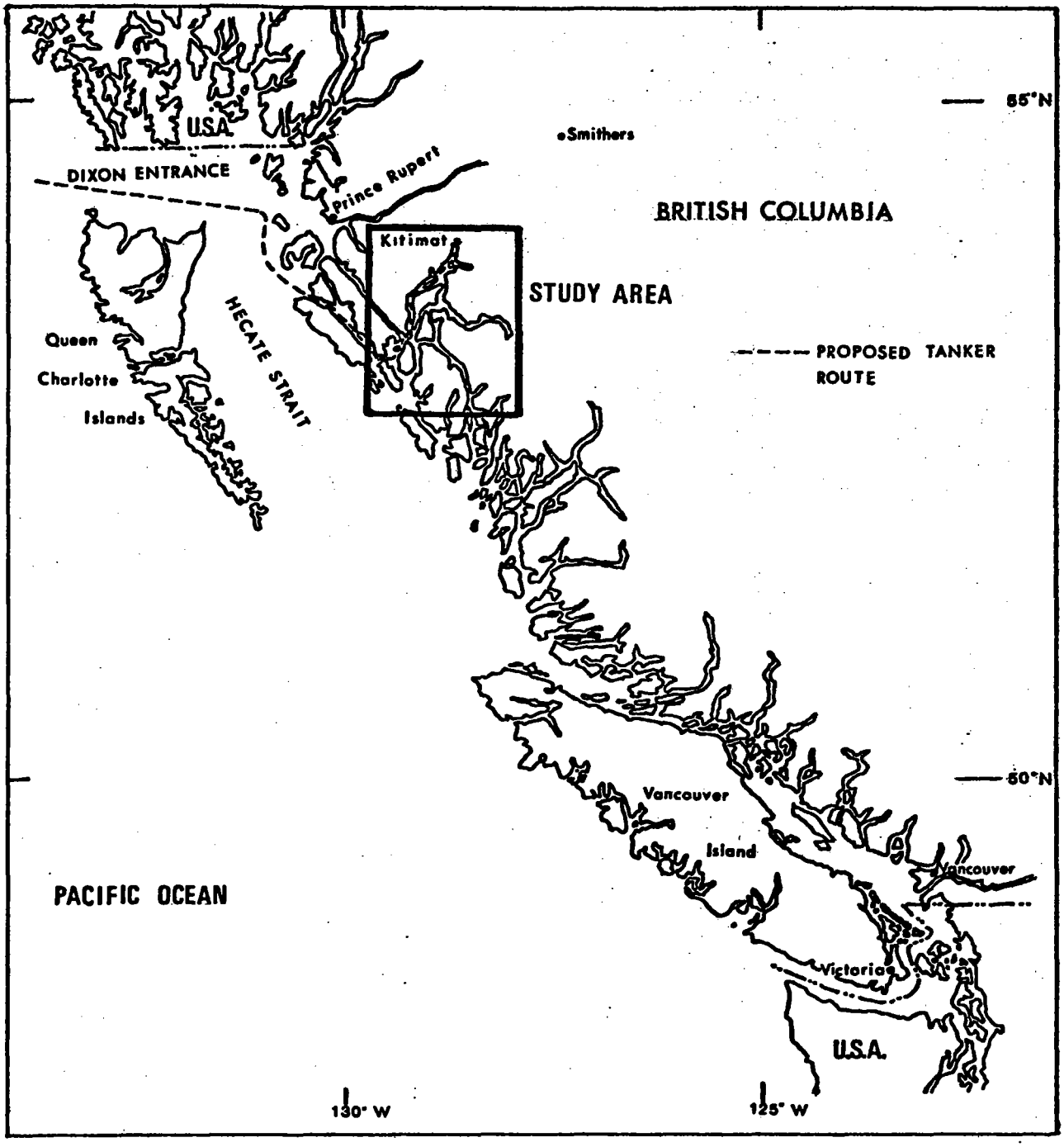

Figure 1. Location of the Study Area

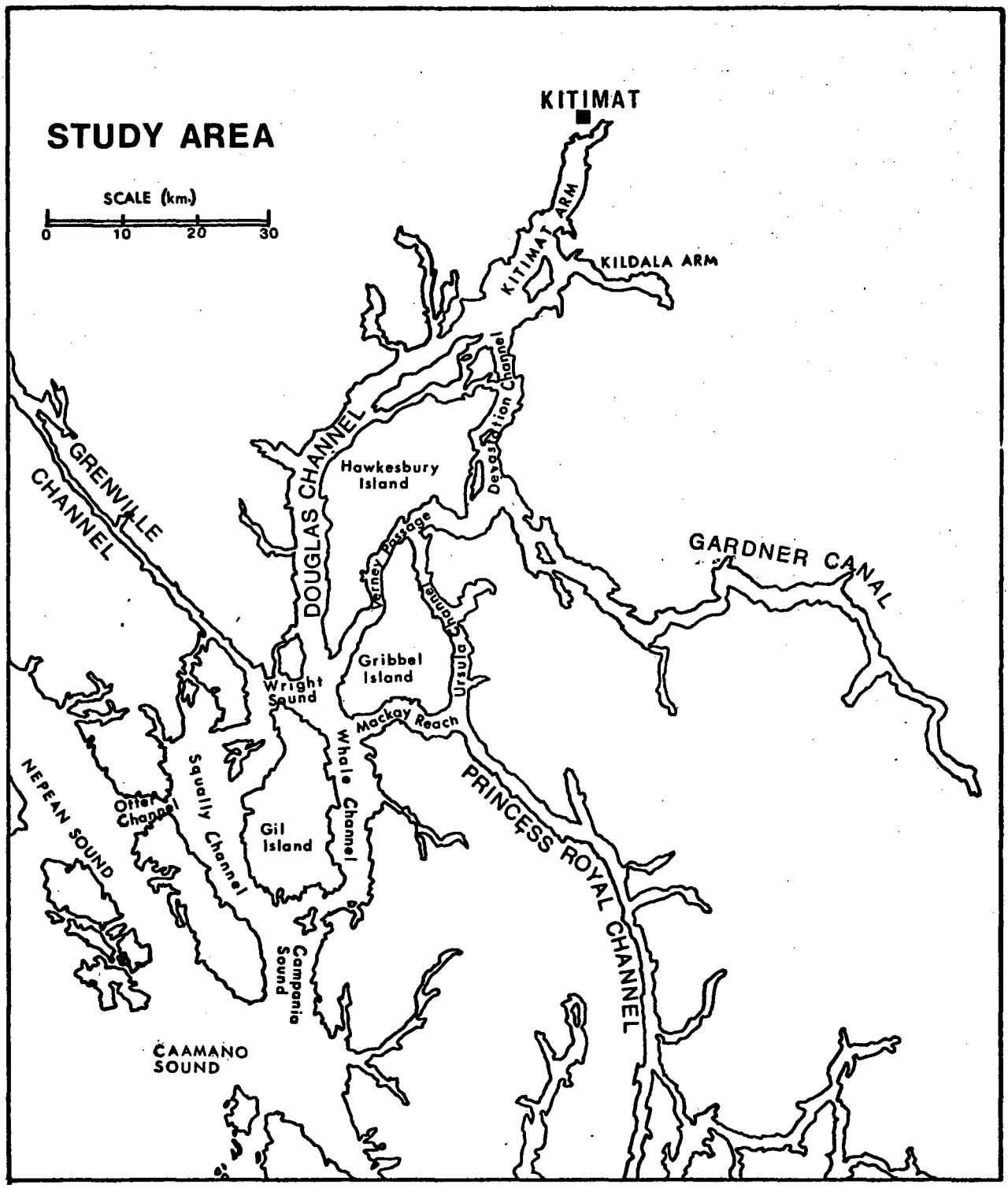

Figure 2. Study Area

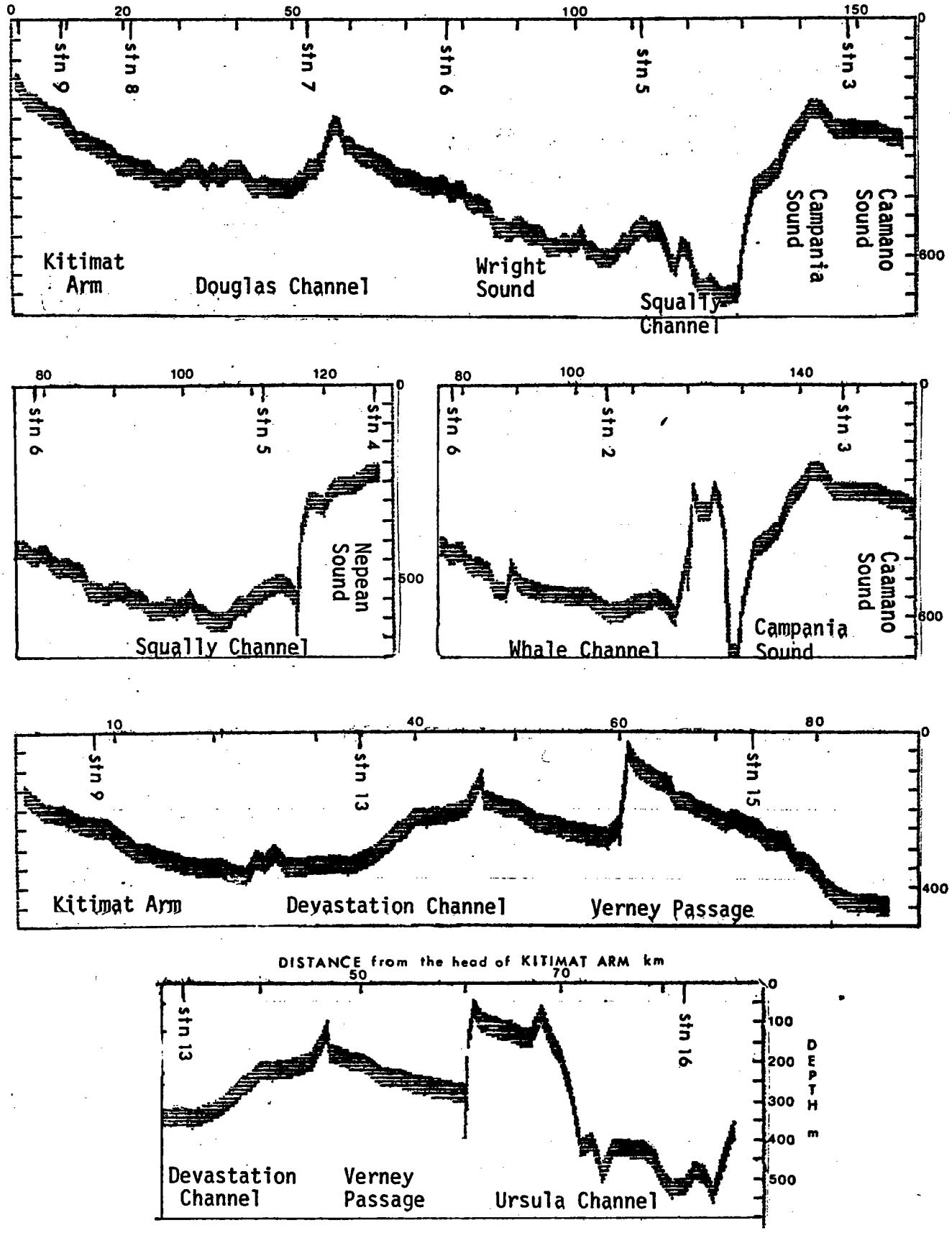

Figure 3. Bathymetric profiles of the major channels and basins of the Study Area

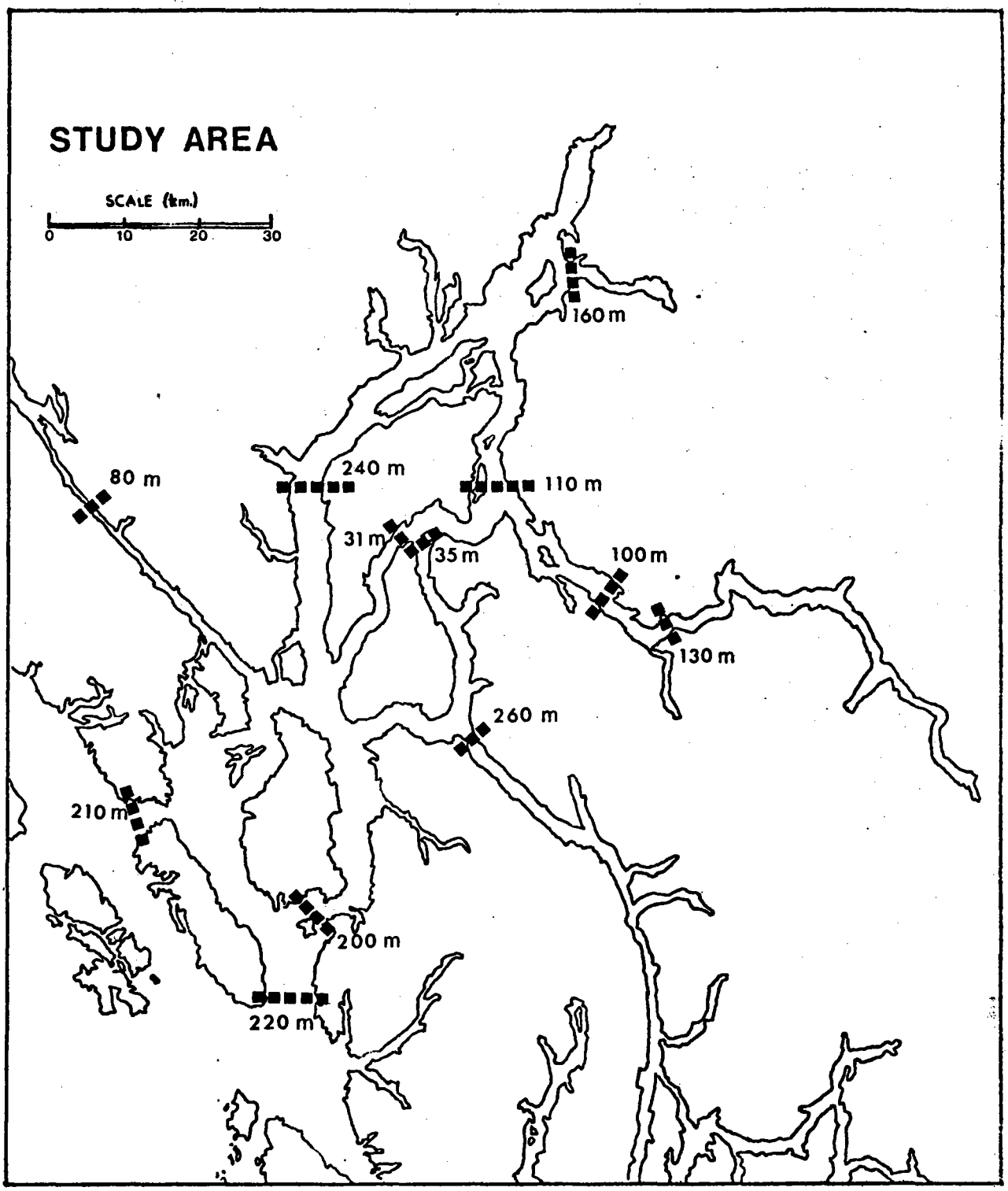

Figure 4. Depths of the prominent sills (from Webster, 1979)

Arm and into the northern portion of Devastation Channel. Kildala Arm is a short inlet off of Kitimat Arm with a maximum depth of 220 m and a sill depth of 160 m in Amos Passage. A fourth basin with a maximum depth of 260 m includes the southern portion of Devastation Channel and the outer reaches of Gardner Canal. Limiting sill depths are 100 m through Devastation Channel in the north, 100 m through Gardner Canal on the east and 31 and 35 m respectively through Verney Passage and Ursula Channel on the south.

Gardner Canal, with a length of almost 90 km joins the system through the basin in Devastation Channel. Gardner Canal,except for that portion common with Devastation Channel, was not included in the study area because of its size and its relative isolation bathymetrically from Kitimat Arm and Douglas Channel. Webster (1979) indicated that it appeared that major water transport out of and into Gardner Canal occurred to the south through Verney Passage and Ursula Channel.

2.0 SAMPLING

All sampling was carried out from the motor vessel 'Sea Lion' under charter from Dobrocky Seatech Ltd. A detailed history of each cruise was presented in a series of three cruise reports submitted to the Institute of Ocean Sciences, Ocean Chemistry Division.

Cruise dates and sampling are summarized in Table 1. Although potential tanker traffic and present shipping follows Douglas Channel to Kitimat, a broad areal coverage of the system rather than a more detailed study of Douglas Channel and Kitimat Arm was carried out. A total of 26 stations were sampled. At 10 of these stations noted with a CTD designation, only CTD casts were to be made. At the remaining 16 stations, a full sampling program was carried out. A station was planned in Hecate Strait but was not sampled during any of the cruises because of rough weather.

Figure 5 shows the station locations and cruise tracks followed on each of the three cruises. Station 8 was occupied as a 25 hour time series station on cruises in October and February. Sampling methods are summarized

TABLE 1

CRUISE SUMMARY

CRUISE DESIGNATION	DATES	STATIONS OCCUPIED	COMMENTS
78.01	June 19-29, 1978	Stations 1-16 plus all CTD stations	no time series at Station 8. Box cores at Stn. 14 and Stn. 10. No Coulter Counter measurements.
78.02	October 18-27, 1978	All stations; Hydrocasts only at all CTD stations except CTD 3, CTD 4.	CTD inoperative no data stations CTD 3, CTD 4.
79.01	February 5 - 15, 1979	All full stations.	CTD inoperative for most of cruise; no data for CTD stations.

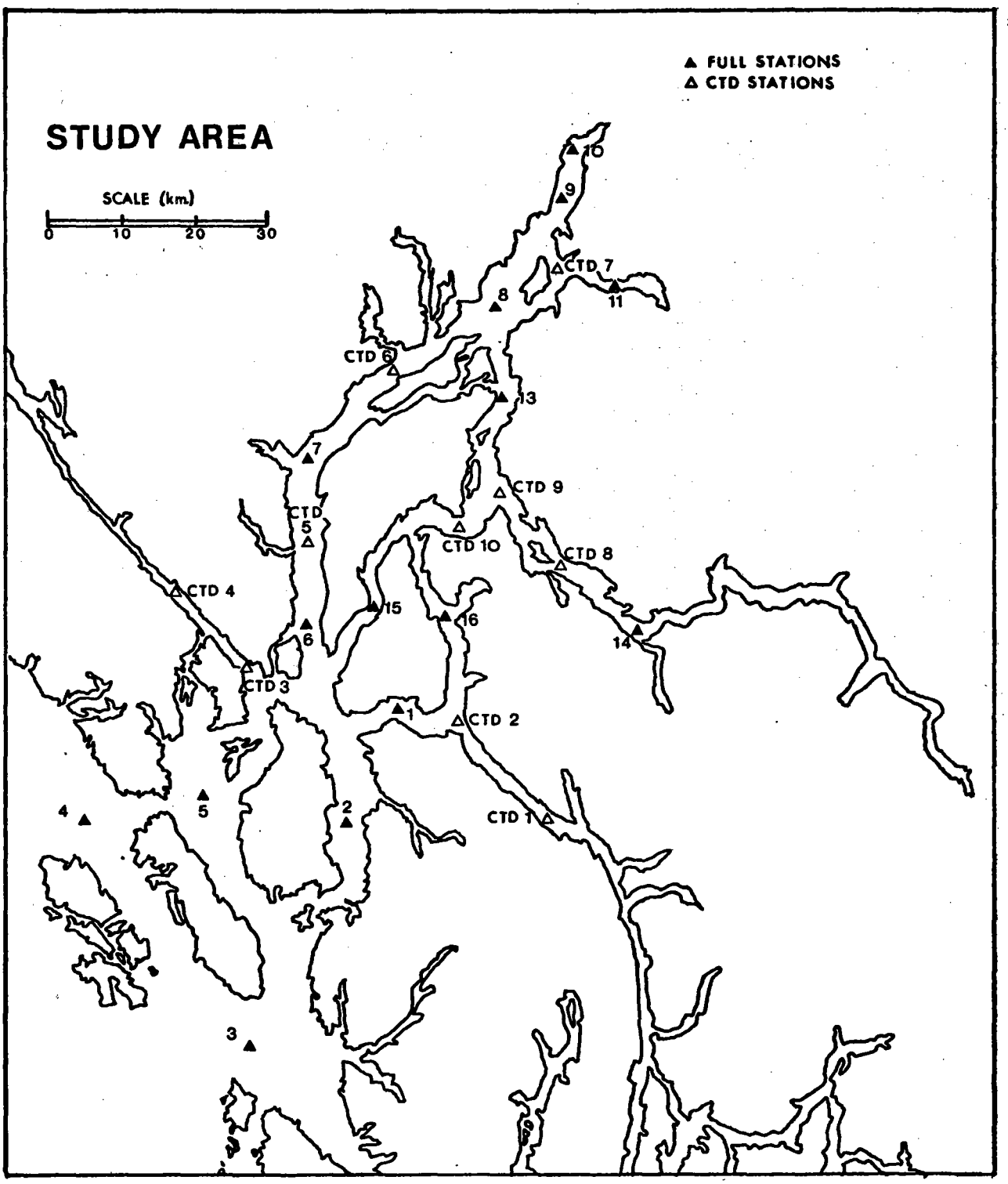

Figure 5. Station Locations

below:

2.1 Sampling Methods

Hydrocasts were made with three litre capacity PVC samplers (Seakem Oceanography Ltd.) at standard depths (H.O. Publication 607, 1968) with some modifications in the surface layer to obtain greater detail. Subsamples were taken for dissolved oxygen, salinity, total suspended matter, particle size analysis, and reactive nutrients (silicate, nitrate, phosphate). Water bottles were equipped with protected reversing thermometers; in most cases, two per bottle.

Oxygen samples were drawn off first into calibrated nominal 125 ml capacity stoppered Erlenmeyer flasks and then 'pickled' with manganous chloride/alkali iodide in accordance with the recommendations of Carritt and Carpenter (1966). Analysis was carried out within one day.

Salinity samples were collected and stored in glass 300 ml screw-cap bottles.

Nutrients were collected in duplicate in 1 N HCl acid-washed glass (for PO4) and plastic vials (for SiO_3 and NO_3) which were inserted directly into the sampling tray of a Technicon Autoanalyser II.

Samples for particle size analysis were collected in salinity type glass bottles reserved exclusively for that purpose.

CTD profiles were obtained with an Applied Microsystems model CTD 12. A profile was obtained at each station on the first cruise in June. However, instrument malfunctions resulted in no data on the second cruise and only partial data from the third. The manufacturer's specifications are given below:

Conductivity:	Six electrode conductivity cell; accuracy 0.03 ppt equivalent salinity over the range 27 to 41 ppt.
Temperature:	Accuracy $\pm$ 0.02°C. Range -2°C to 30°C Thermistor sensor.
Depth:	Resistive element bourdon tube. Repeatability $\pm$ 1% FSP.
Response Time:	Less than 250 msec all sensors.

Data was recorded internally on magnetic tape. Casts were made to 250 m or for shallower stations to within 25 m of the bottom. A PVC water sampler equipped with two reversing protected thermometers was attached to the line immediately above the CTD to provide salinity and temperature calibration. Complete CTD data was obtained only on the June cruise. Hydrocasts for temperature and salinity were made at CTD designated stations in October when it was found that the CTD was inoperative. CTD data for February also proved unuseable because of erratic recording. A plot of the difference between CTD salinity and temperature and salinity and temperature measurements obtained from the calibration samples is given in figures 17 and 18 in Appendix B.

Sediment and biological sampling techniques are described in the companion report.

3.0 ANALYTICAL METHODS

Oxygen was determined by the Micro-Winkler technique (Carritt and Carpenter, 1966) and standardized with 0.01N KIO_3 (Sagami Corp.). The percent saturation was calculated by using the formula given by Weiss (1970) for oxygen solubility as a function of temperature and salinity.

Salinities were analyzed during each cruise with a Hytech model 621 according to the manufacturers directions. The instrument was standardized with Copenhagen water.

Analysis for reactive silicate, nitrate and phosphate was carried out immediately after collection with a Technicon II auto-analyzer using the methods outlined in the Reference Manual for Ocean Chemistry Division Sampling Techniques (1976). The basis of the technique for silicate involves formation of β-molybdosilicic acid in acid medium which is subsequently reduced by ascorbic acid to form the characteristic molybdenum blue colour. Oxalic acid is used to prevent interference from phosphate. Nitrate is analyzed by reduction to nitrite in a copper-cadmium reductor column. The nitrite reacts with sulfanilamide in acid to form a diazo compound which on coupling with N-1 napthylethylenediamine dihydrochloride forms a red azo dye. Orthophosphate is determined by forming molybdophosphoric acid which is reduced by ascorbic acid to give the molybdenum blue colour. In all three cases absorbance of the coloured complex is measured. Samples were not filtered and the absorbance was uncorrected for turbidity. Nitrite measurements were not corrected for nitrite.

Particle size measurements were made with a Coulter Counter model TA II immediately after collection for all station on cruise 79-01 and the latter half of cruise 78-12. Total suspended solids were determined on cruises 78-01 and 78-02 by filtering the contents of a PVC water sampler directly through a pre-weighed 0.4 μm Nuclepore filter under reduced pressure. The filter was then washed with a small volume of distilled water, the total volume of water filtered noted and the filter stored frozen. Filters were dried to a constant weight defined as three consecutive weighings which agree to ± 0.0005 g to obtain the weight of suspended matter.

The precision and accuracies of the various analyses used here are reported in Table 2. The 95% confidence, or 2σ limits are given.

Hydrocarbon and sediment analytical procedures are given in the companion report.

TABLE 2

PRECISION AND ACCURACIES OF ANALYTICAL METHODS

Measurement	Precision	Accuracy (+ 2σ Limits)
Temperature	$\pm$ .01C^{o}	$\pm$ .02 C^{o}
Oxygen	$\pm$ .0005 ml l^{-1}	$\pm$ .02 ml l^{-1}
Salinity	$\pm$ .003 ppt	$\pm$ .02 ppt
Nitrate	$\pm$ 0.4%	$\pm$ 4%
Silicate	$\pm$ 0.3%	$\pm$ 5%
Orthophosphate	$\pm$ 0.3%	$\pm$ 5%

4. RESULTS AND DISCUSSION

A data summary for each station and cruise is given as Appendix A. CTD profiles for cruise 78-01 are given as Appendix B.

The main oceanographic features of the mainland B.C. inlets including Douglas Channel and Gardner Canal have been reviewed by Pickard (1961). Additional chemical and physical oceanographic data from Douglas Channel and Kitimat Arm is available in a report by Waldichuk et al (1968) for the periods April 1962, October 1964 and September 1967, and by Macdonald et al (1978) for a cruise in February 1977. A study recently completed by Dobrocky Seatech Ltd. (Webster 1979) provides a detailed analysis of the estuarine, tidal and wind driven circulation of the whole study area based on data collected over a one year period during 1977-78.

The latter study indicated that for much of the year, a two layer estuarine circulation is present in the study area as a result of the large freshwater input at the head and sides of the main inlets. The magnitude of the freshwater input is at a maximum in late spring and early summer corresponding to maximum snowmelt from higher elevations. There is a second maximum in October as a result of increased rainfall. The fall maximum is generally not as great as the spring but in certain years may be as great in Kitimat Arm. Minimum discharges are experienced in the period mid-December to mid-February. Webster (1979) estimated that Gardner Canal received roughly twice the freshwater input during the spring and summer maximum as Douglas Channel, and that the estuarine circulation was, therefore, a more prominent feature of that inlet.

Tidal and wind induced surface currents also contribute to the overall circulation pattern. The relative importance of the tidal and wind driven circulations increases as the volume of freshwater input decreases. During periods of very low run-off, Webster (1979) concluded that surface water movements are almost totally governed by the wind.

Because of the predominantly estuarine nature of the circulation, in the simplest sense, the distribution of any parameter can be described

in terms of the properties of the brackish surface layer and the subsurface water of oceanic orgin. However, in a discussion of chemical parameters, two types of subsurface water can be distinquished; water of an intermediate depth which exchanges freely with oceanic water outside the system and which interacts with the brackish surface layer above and, the bottom water below sill depth which has restricted circulation and exchange. The following general discussion of the observations made in this study is given on this basis.

4.1 Salinity

Salinity is the dominant factor determining water density and therefore, shows a consistent increase from the surface to bottom. While variations in salinities between cruises were small below 50 m, variations in the upper 50 m showed very marked seasonal fluctuations. The June and October cruises coincided with periods of near maximum freshwater input. The result was very well defined homogeneous surface layer with a thickness of 3 - 10 m. Salinities at the surface increased from near 0 at the head of the main inlets to values of 27 - 30 ppt in Otter Channel and Caamano Sound. Figure 6 shows the variation in the salinity depth profiles for the top 50 m along Douglas Channel in June. This type of horizontal gradient suggests a general down inlet flow in the surface layer characteristic of an estuarine circulation.

The time series data from station 8 in October indicates the short term variations in salinity that can occur under conditions of high freshwater input. At a depth of 1 m the salinity increased from 9 ppt to 17 ppt in a period less than four hours. This large increase in salinity occured despite an ebbing tide and was likely the result of both vertical mixing and advective transport of higher salinity water from down inlet induced by strong up-inlet winds that developed during the time that the station was occupied.

Surface salinities during the February cruise were generally greater than 30 ppt reflecting the low freshwater run-off during this period. Vertical and horizontal gradients were slight and in general, no distinct homogeneous surface layer was present. Under these conditions, the wind was the dominant factor in determining the direction of surface flow. This

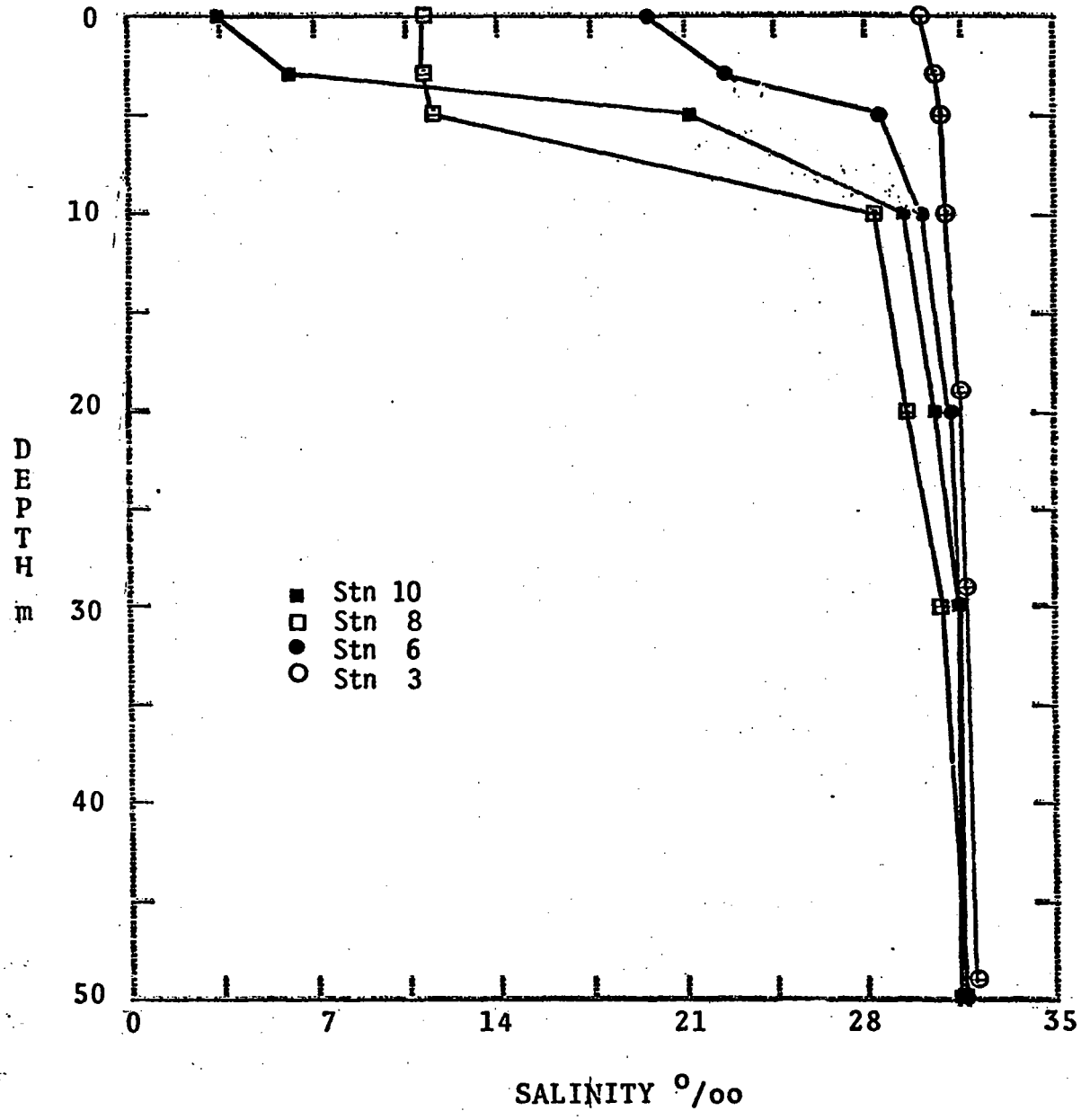

Figure 6. Salinity - depth profiles, upper 50 m, Douglas Channel, June 1978.

was evident in February in Kitimat Arm when winds were very strong in a down-inlet direction. The combination of strong offshore winds and very low river input produced a pronounced upwelling at the head of Kitimat Arm (Figure 7). The resulting net circulation was the same as in the two previous cruises with the wind rather than freshwater discharge being the driving force.

As illustrated in the salinity-depth profiles (figure 8) during the time series at station 8 in February, the wind is also responsible for pronounced vertical mixing effects in the surface layer, especially when vertical density gradients are small. Wave heights reached 1 - 1.5 m during the course of the station as a result of strong down-inlet winds. During the same period of time, a well mixed surface layer was formed to a depth of over 20 m apparently as a result of wave generated turbulence. This was also evident during the time series in October. However, the presence of an intense halocline restricted the mixing depth to less than 10 m.

In the subsurface water, smaller but significant changes in salinity were observed between cruises. The water below the halocline down to sill depth can readily exchange with water from Hecate Strait. In estuarine conditions, there is a net landward flow in this layer to compensate for water carried out of the inlets by entrainment with the net seaward surface flow. As a result, subsurface salinities in the outer basins undergo a seasonal cycle which reflected changes in salinity occurring in the deep water outside the system in Hecate Strait (Barber, 1957). During June and October, the halocline was very pronounced. Below the halocline, salinities were generally 85 to 90% of their maximum value and increased quite gradually with depth. Maximum salinities were found in the deep basins on either side of Gil Island. Between June and October, the 400 m salinity increased at station 5 in Squally Channel from 32.95 to 33.10 ppt. The increase in salinity in the deep water between cruises must result from the intrusion of higher salinity water from Hecate Strait. This apparently occurs on a gradual basis during the spring and summer. From the CTD data for the June

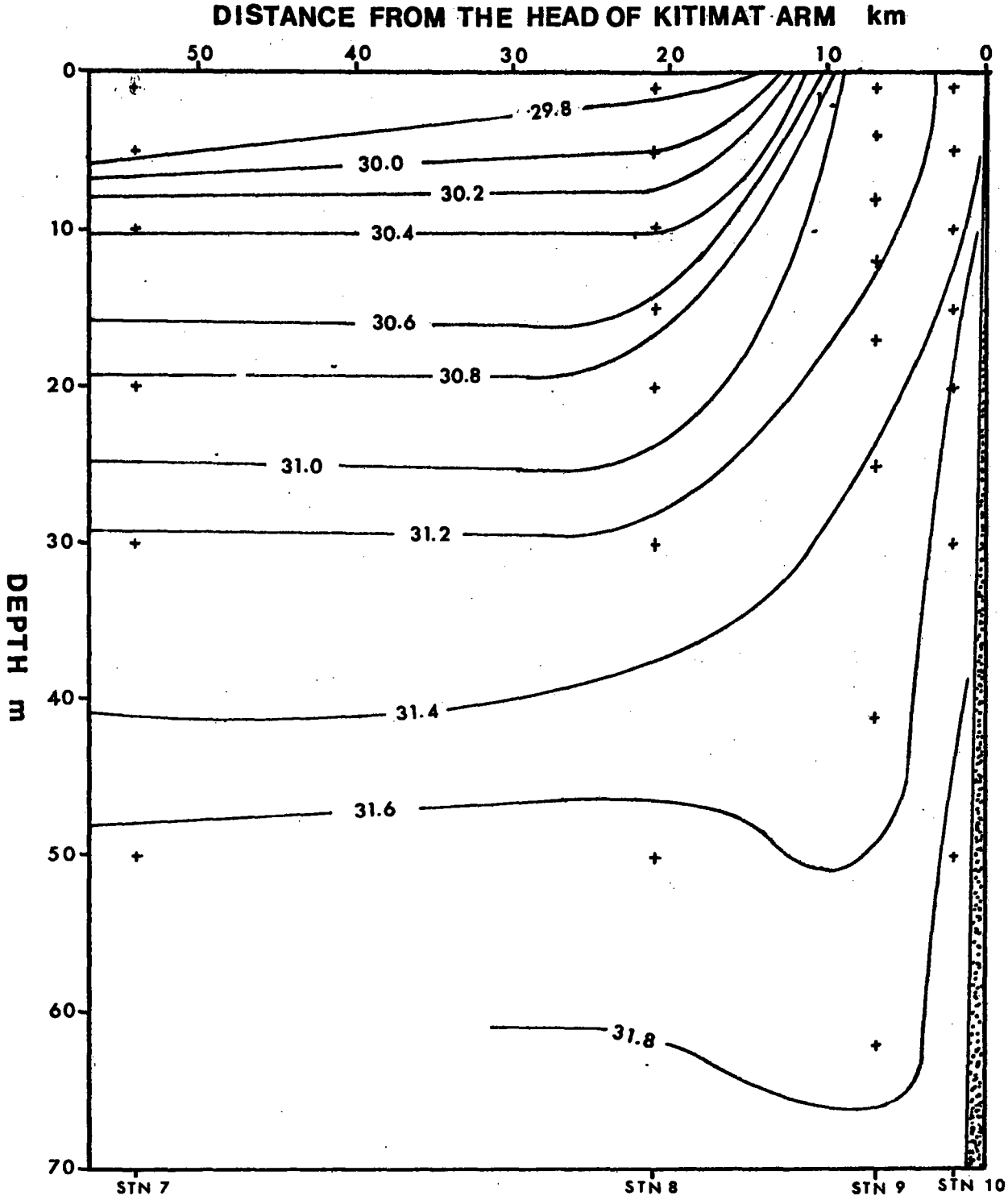

Figure 7. Isohalines, upper 70m in Douglas Channel and Kitimat Arm, February 7-10, 1979.

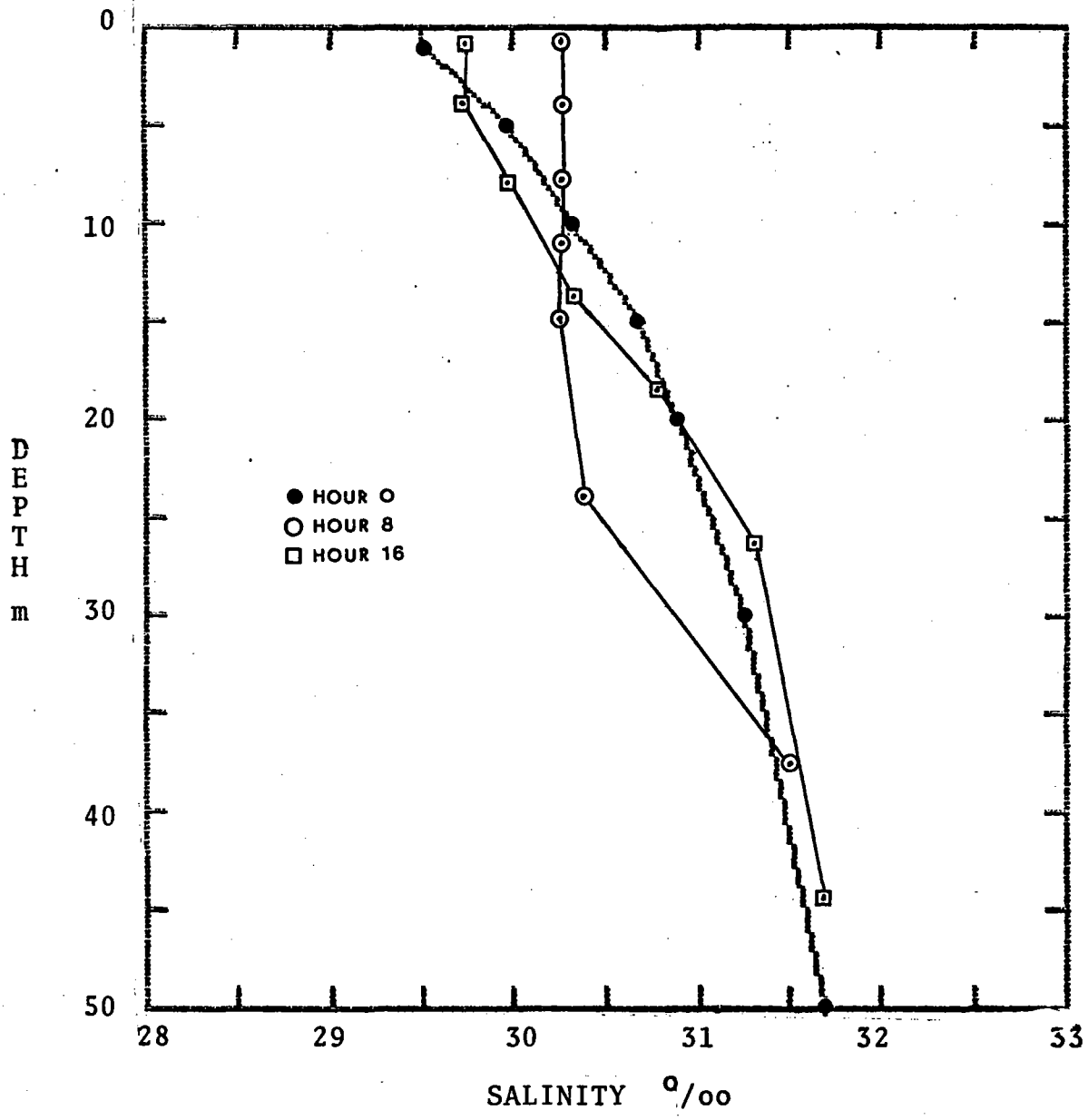

Figure 8. Salinity - depth profiles, upper 50 m, station 8, February 8-9, 1979.

cruise, salinities were higher at 150 m at station 3 than in the deep water at station 5 indicating that an intrusion of higher salinity Hecate Strait water was occurring at that time. By February, the salinity at 400 m at station 5 had decreased to 32.85 ppt indicating a mixing with less saline water above.

Changes in salinity of the deep water did not occur in unison in all basins. There was a time lag in the salinity changes observed in the deep water inside the sills in Douglas Channel and Devastation Channel relative to the outer basin . Minimum salinities at station 8 and 14 were recorded in June rather than February. Evidently, the higher salinity water invading the outer basin in June had not as yet displaced the water of the inner basin of Douglas Channel.

Salinities in the deep water of the outer basin of Gardner Canal were much lower than in Douglas Channel at an equivalent depth as a result of the shallow sills guarding the approaches through Verney and Ursula Channels. As noted by Webster (1979), Gardner Canal appears to undergo a complete water exchange during the summer. In June, salinities at station 14 were less than 32 ppt throughout the water column. By October, the salinity in the bottom water at station 14 had increased to 32.27 ppt. In February, bottom salinities had decreased again but were still greater than in the previous June.

The exchange of the deeper water in Kildala Arm appears to occur in unison with changes in Douglas Channel despite the presence of a sill between the two channels. The bottom water salinity in Kildala Arm in June was the same as the water at an equivalent depth outside its sill in Kitimat Arm, while in the October and February cruises, the salinity was only slightly less than in Kitimat Arm.

4.2 Temperature

Temperature, like salinity, displays large fluctuations depending on season, depth and distance from Hecate Strait. However, because salinity is

the major determinant of density, temperature is not always characteristic of a water type.

The major variations in temperature occur in the upper 50 m. Below 100 m, temperature variations are very small, and the water column can be considered to be essentially isothermal. The variation in temperature as a function of depth for each cruise is shown in figure 9 for station 9 in Kitimat Arm and in figure 10 for station 3 in Caamano Sound. The highest temperatures were observed in the June cruise in the surface layer as a result of solar heating and the presence of a shallow, stable surface layer formed by freshwater input. Temperatures of 16^{o}C were recorded in Kitimat Arm with a gradual decrease down inlet. The lowest temperatures in June were recorded at station 3 in Caamano Sound (9^{o}C). By October, temperatures had cooled considerably at the surface to values of between 6 - 9^{o}C near the heads of all inlets while temperatures were slightly higher in Caamano Sound (10^{o}C). Horizontal gradients at the surface were at a minimum at this time. In February, further cooling of the surface water had occurred in all inlets and out to Caamano Sound. Temperatures increased down inlet towards the moderating influence of the open sea.

In June, a sharp thermocline coincided with the halocline at all stations. In October, the vertical temperature profiles were often isothermal to a depth well below the halocline or else increased through the halocline. In February, there was a gradual increase in temperature with depth in the upper 50 m at all stations.

The temperature of the deep water of the system was fairly constant between 6.8 and 7.2 ^{o}C, with the temperature being highest in February. Below the halocline, there was a gradual decrease in temperature with depth in June and October and a gradual increase in temperature with depth in February.

In Kitimat Arm and parts of Douglas Channel during the June cruise, a distinct subsurface temperature minimum was observed (figure 9) at a depth of 20 to 40 m. This feature has been noted in many of the large run-off inlets on the B.C. coast and was attributed by Pickard (1961) to

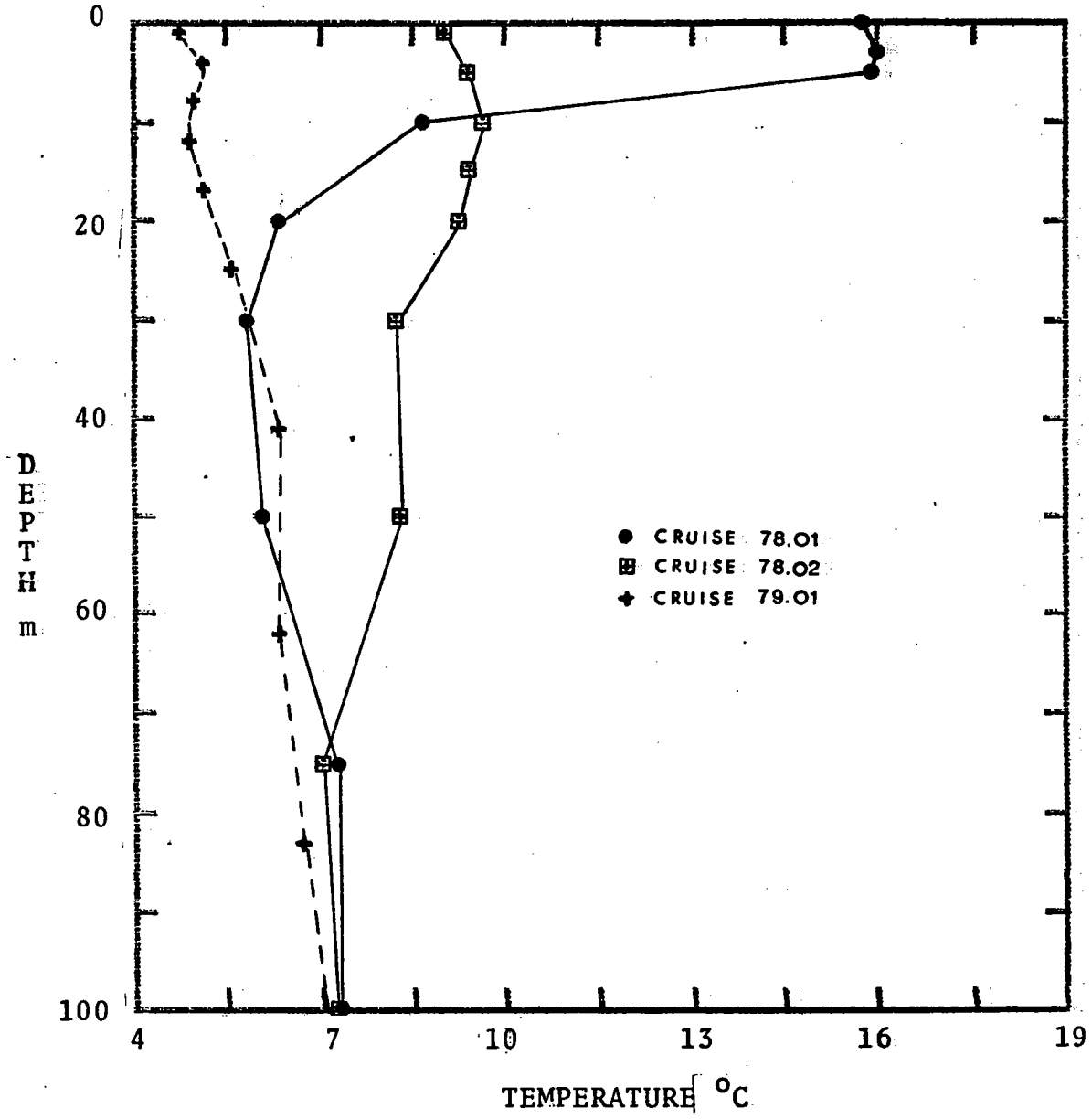

Figure 9. Temperature - depth profiles at Station 9; CRUISES 78.01, 78.02, 79.01

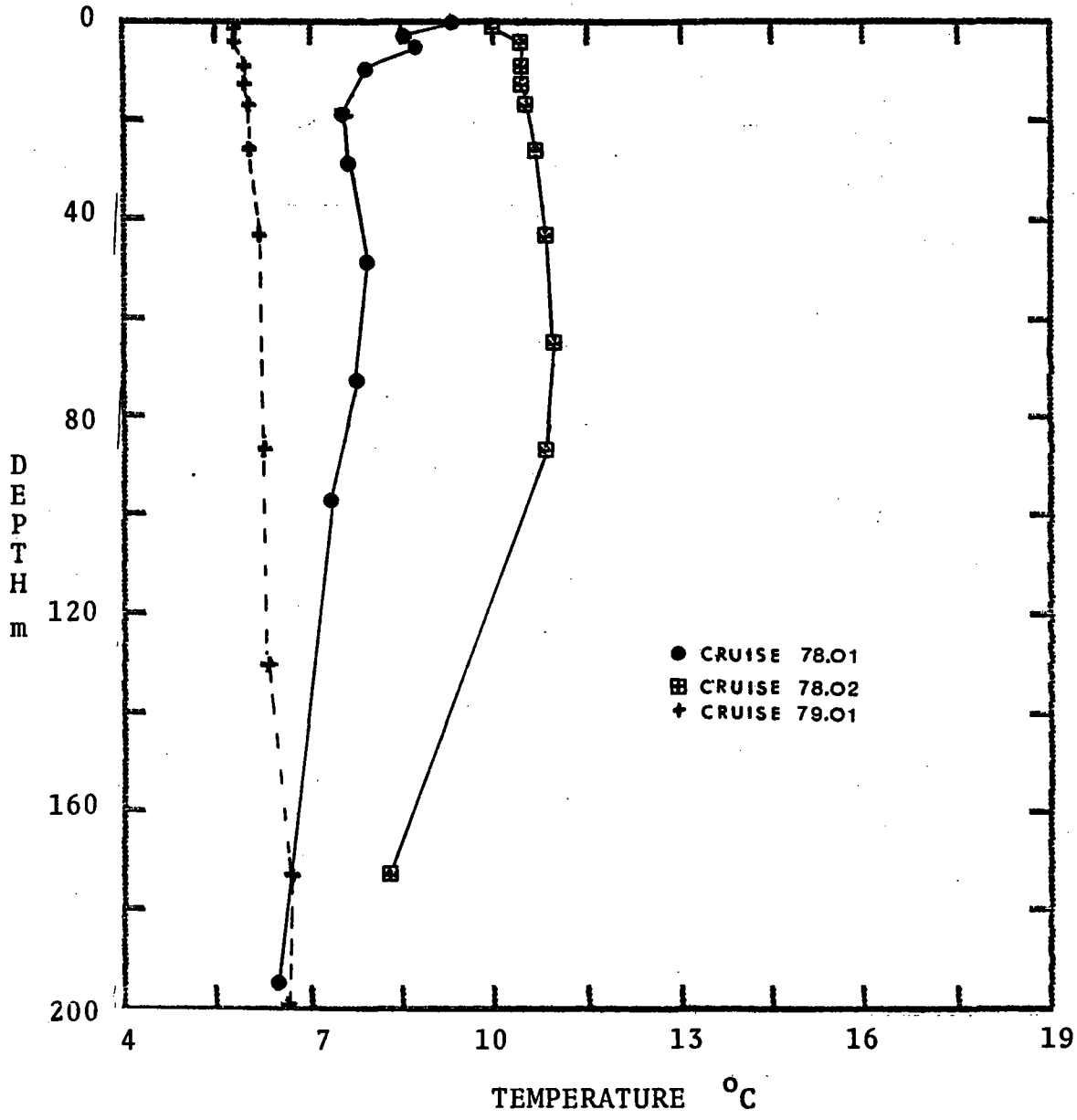

Figure 10. Temperature - depth profiles at Station 3; CRUISES 78.01, 78.02, 79.01

winter cooled water that has been trapped below the surface by the intense stratification that occurs with increased freshwater run-off in the spring. By October, a temperature minimum was no longer evident. Macdonald et al (1978) observed a subsurface temperature maximum during a cruise in February 1977 at a similar depth apparently as a result of an intrusion of warmer Hecate Strait water below the surface. During the October cruise a temperature maximum below the halocline was also evident near the head of the inlets as a result of cooling of the surface layer by cold freshwater input.

4.3 DISSOLVED OXYGEN

For most of the year, dissolved oxygen concentrations decrease with depth at any given location from near saturation levels in the surface layer to values of less than 50% saturation in the deep basins. Oxygen values did not drop below 35% saturation during the three cruises indicating that the bottom water is renewed frequently enough to prevent complete depletion. During the June cruise, values in the surface layer were generally greater than 100% saturation in the inlets, with a value of 154% recorded at station 6. The high saturation levels at this time of the year are likely a result of both in-situ oxygen production associated with a high level of phytoplankton productivity and decreased solubility as a result of warming of the surface layer. In Kitimat Arm during the June cruise, a very pronounced subsurface maxima was observed (figure 11). This feature has been observed in other inlets (Pickard, 1961) and is probably the result of oxygen production by phytoplankton below the halocline. Evidently the phytoplankton are limited to higher salinity water and because of the intense stratification of the water column, oxygen produced by photosynthesis is trapped below the halocline. Supersaturation was observed only in the June cruise.

Oxygen levels in the deep basins showed small seasonal variations. Highest levels occurred in June in all basins with lowest levels in October. The low levels in October correspond to a period with maximum salinity in the deep water. Evidently, the high salinity water entering the system from Hecate Strait during the summer has a lower oxygen content than the

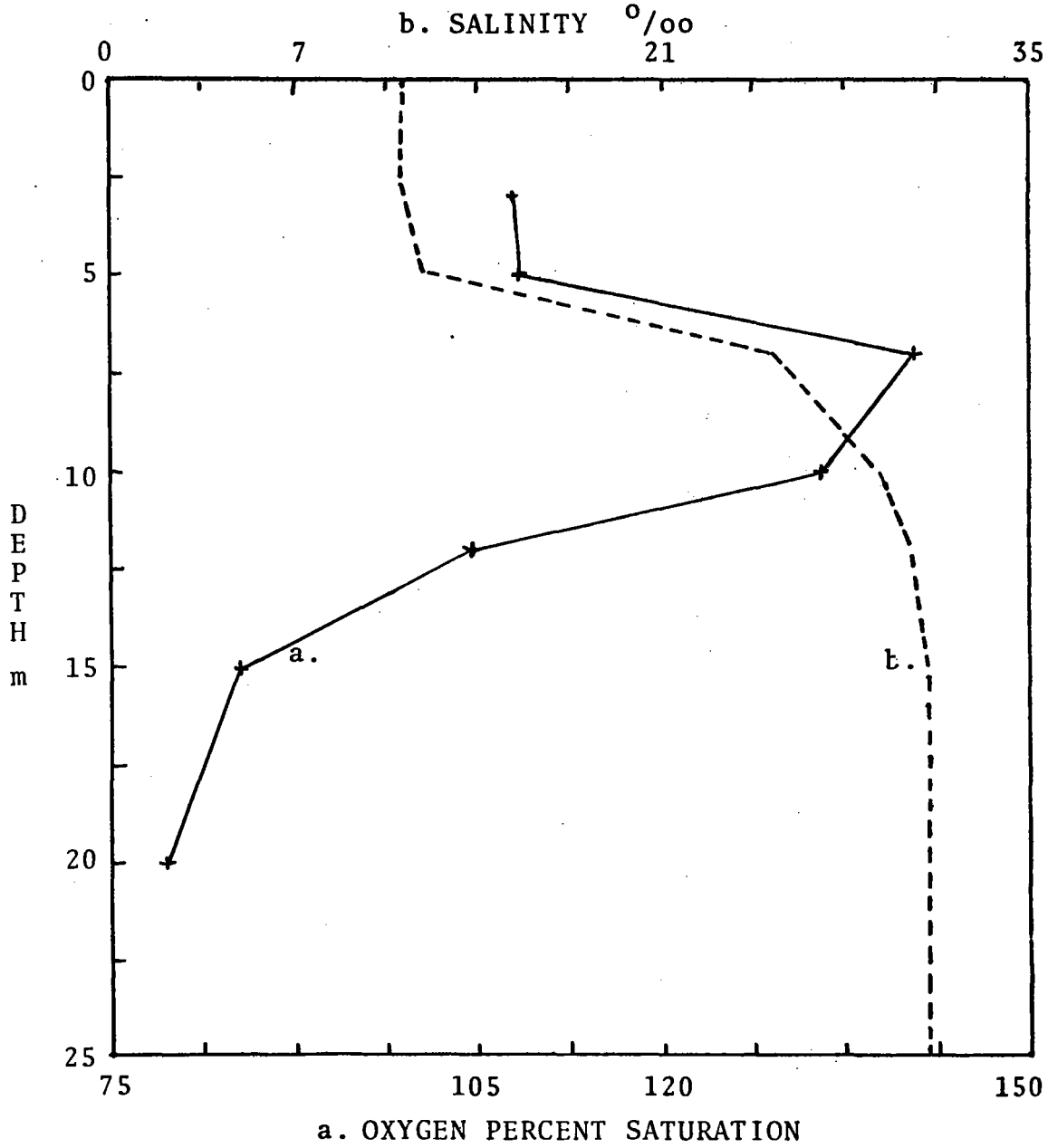

Figure 11. Oxygen maximum, station 12, June 1978

resident inlet water. As the salinity decreases, oxygen concentrations increase probably as a result of downward mixing of lower salinity, higher oxygen content water. The lowest oxygen concentrations observed were in the deep water of Kildala Arm indicating a more restricted water exchange in that basin than elsewhere.

In contrast, the deep water at station 14 in the outer basin of Gardner Canal had higher oxygen levels than at similar depths in Douglas Channel. Oxygen values were above 55% saturation levels during all cruises. The minimum values were in October and the maximum in June when values reached 68% saturation at 200 m. The drop in oxygen concentrations between June and October was concurrent with an increase in salinity and indicated the influx of higher salinity, lower oxygen content water during the summer. The higher oxygen levels at this location relative to Douglas Channel are probably the result of the shallower sills separating this basin from the outer basin water. The increase in oxygen concentrations from October through to June corresponds to a decrease in salinity over the same period and was attributed by Webster (1979) to a gradual diffusion and mixing with surface water.

4.4 REACTIVE NUTRIENTS

Below 50 m, the reactive nutrients; silicate, nitrate and phosphate, closely follow the salinity distribution. In the upper 50 m, however, the distribution of nutrient elements is modified by the effects of primary productivity and freshwater input. The seasonal variations in nutrient distributions areillustrated in plots of each nutrient versus salinity for each cruise (figures 12,13,14). In June (figure 12), phosphate and nitrate were both very low in the low salinity surface layer as a result of utilization by phytoplankton and low levels in the river run-off. It would appear that nitrate is the limiting nutrient to phytoplankton growth, with levels in the surface layer being below detection limits at most stations.

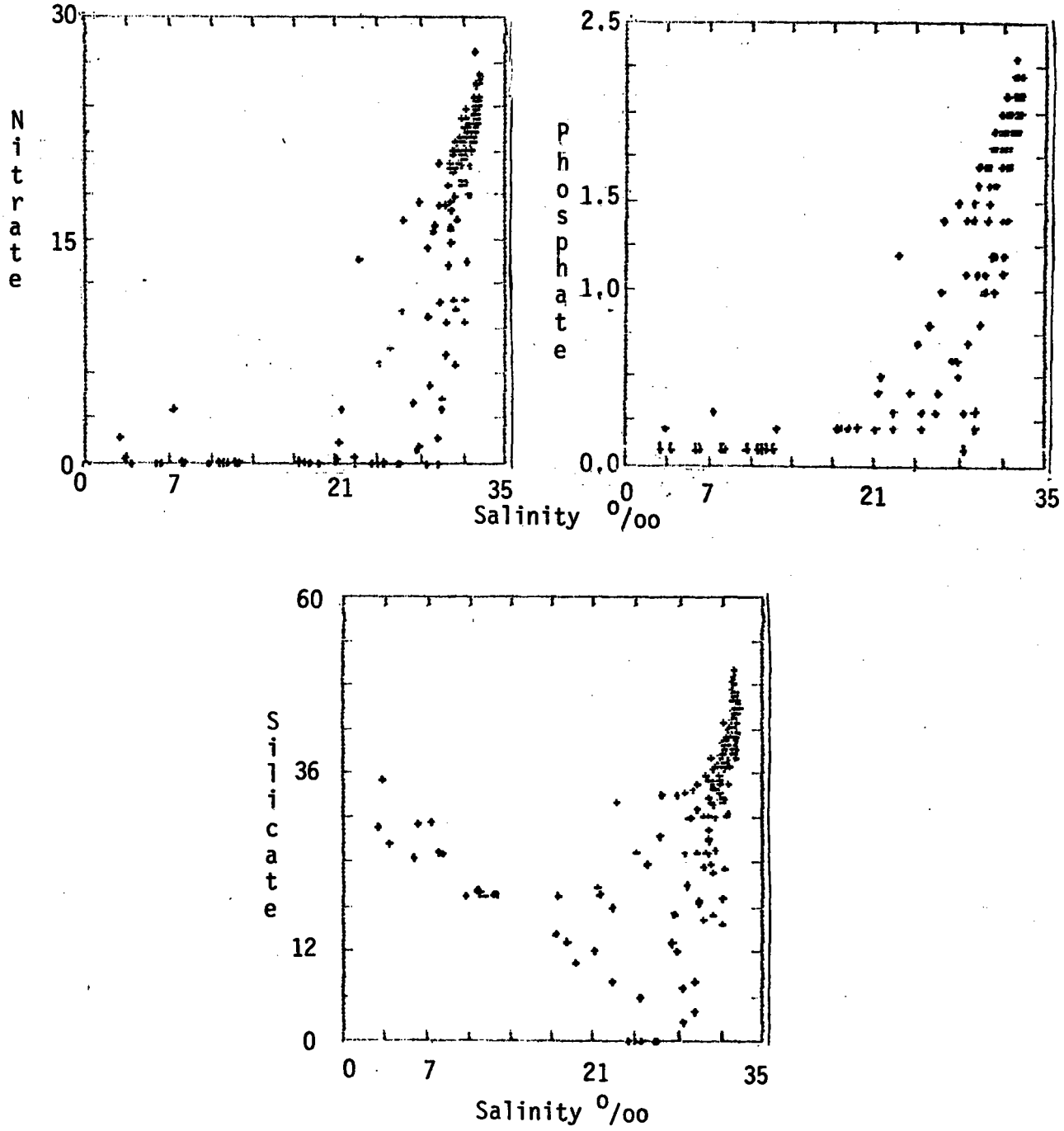

Figure 12. Reactive nutrients vs salinity, all samples, June 1978. Nutrient concentrations are in µg.at N,P or Si/L.

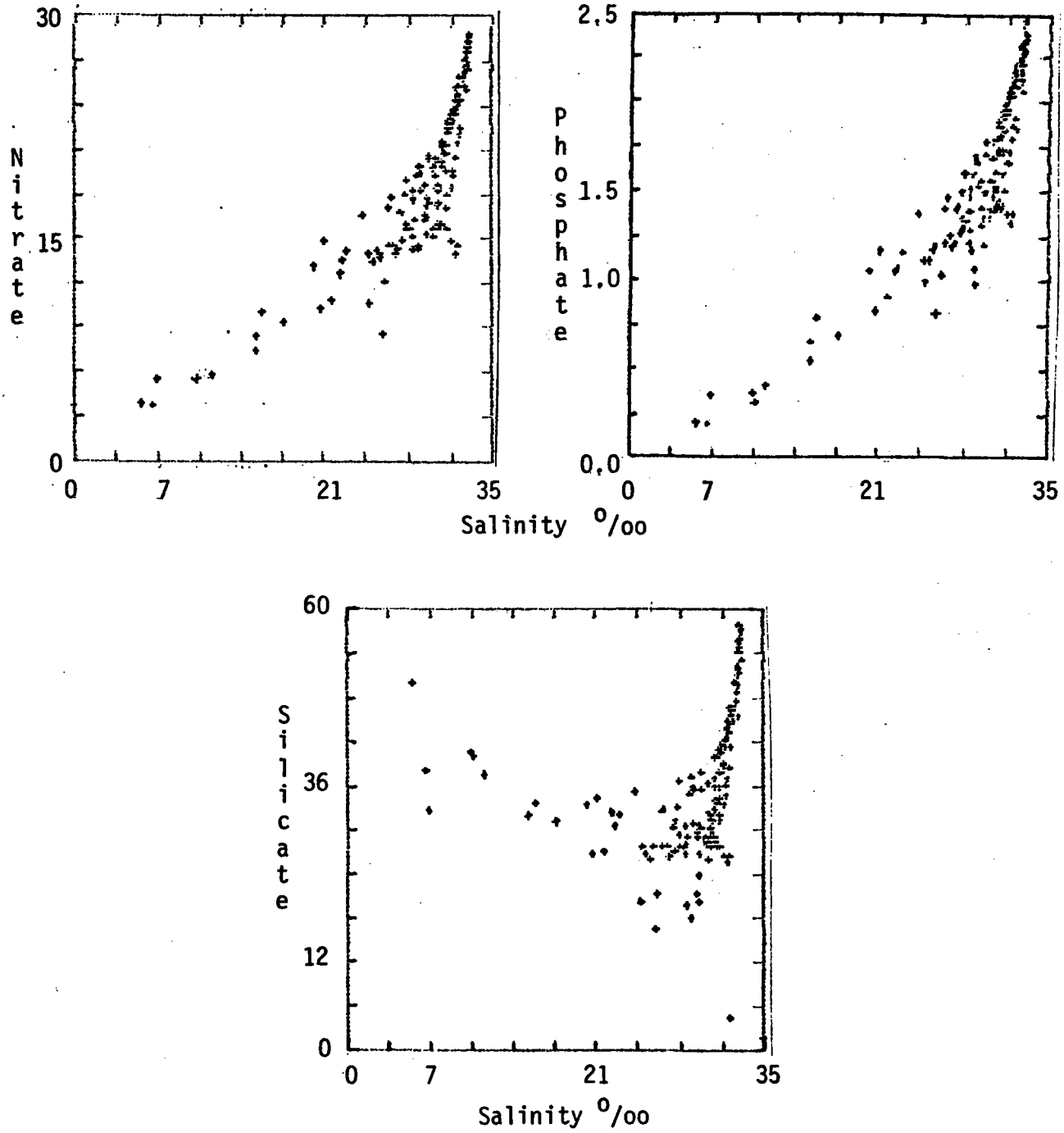

Figure 13. Reactive nutrients vs salinity, all samples, October 1978. Nutrient concentrations are in µg.at N,P or Si/L.

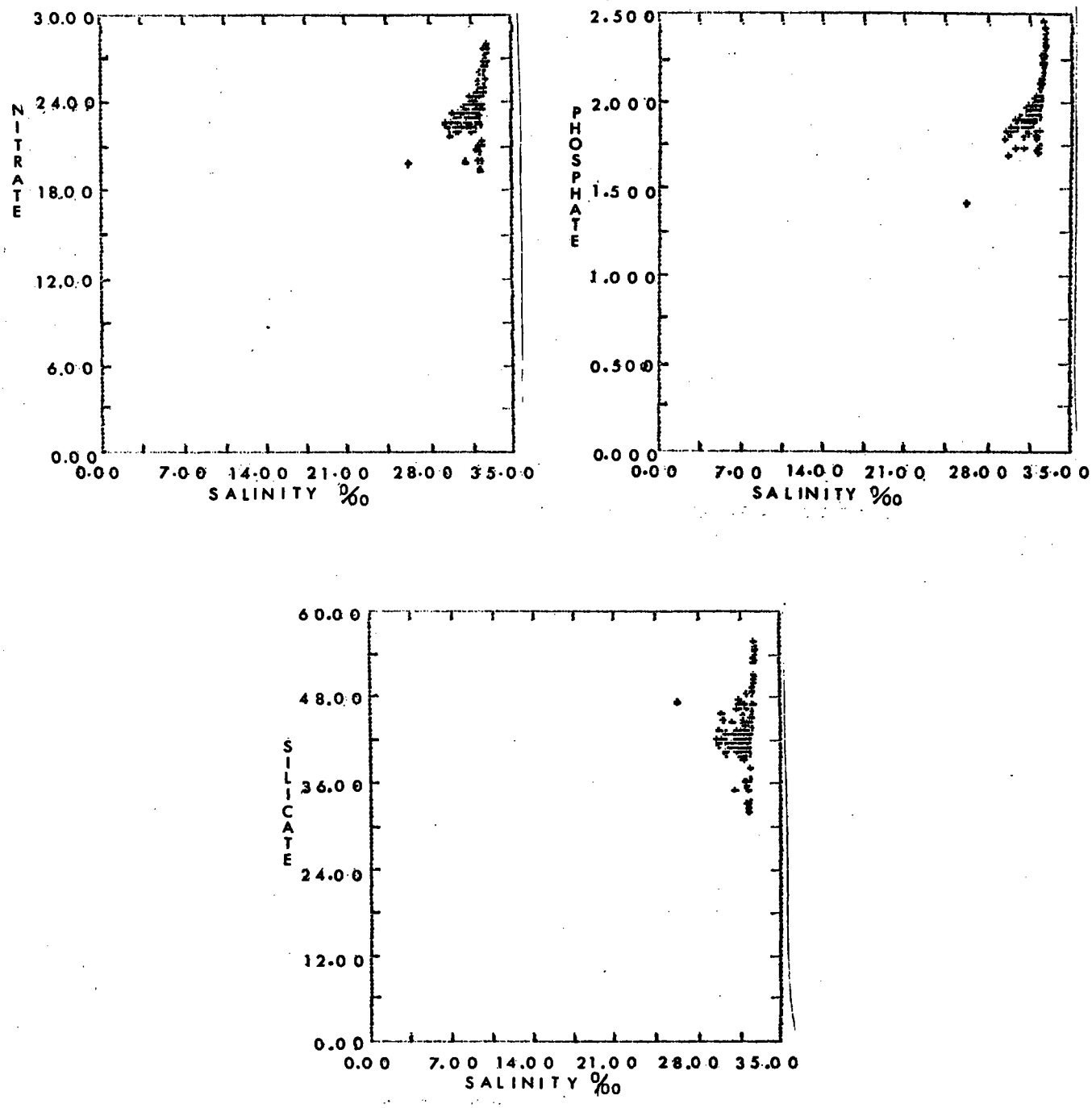

Figure 14. Reactive nutrients vs salinity, all samples, February, 1978. Nutrient concentrations are in µg.at N,P or Si/L.

Silicate shows a similar distribution with the exception that river run-off is high in silicate. Silicate concentrations, therefore, increased with decreasing salinity in the surface layer.

Below the halocline, there was a sharp increase in all nutrient concentrations as a function of depth with values of 28 µg.at N/ℓ NO_3, 50 - 60 µg.at Si/ℓ SiO_3 and 2.4 µg.at P/ℓ PO_4 occurring in the bottom waters of all basins.

At stations with an oxygen maxima below the halocline, however, nutrient concentrations also remained low supporting the premise that the oxygen maximum is the result of in-situ oxygen production. There was a silicate minimum at the depth of the oxygen maximum in Kitimat Arm as a result of the replenishment of silicate in the overlying surface layer with freshwater run-off (figure 15).

In October, the general characteristics of the salinity distribution were the same as in June but with a much reduced level of productivity in the surface water. As a result, nutrient levels in the surface water were higher (Figure13). Nitrate and phosphate increased with depth at all stations and in a linear fashion with increasing salinity in the surface layer. Maximum surface values were recorded at station 3 in Caamano Sound. Surface silicate values, on the other hand, increased with decreasing salinity with maximum values at the heads of all inlets as a result of high levels in river run-off. A subsurface minimum just below the halocline was still evident at stations in Kildala and Kitimat Arm, probably a remnant of high spring and summer productivity.

In February, surface concentrations of all nutrients increased to their maximum levels and horizontal and vertical gradients were greatly reduced (figure 14). In the surface layer, all three nutrients were lowest in Caamano Sound. A subsurface minima was present at some stations near the mouth of Douglas Channel and out towards Caamano Sound, reflecting the lower values in Caamano Sound relative to the inlets at this time of the year.

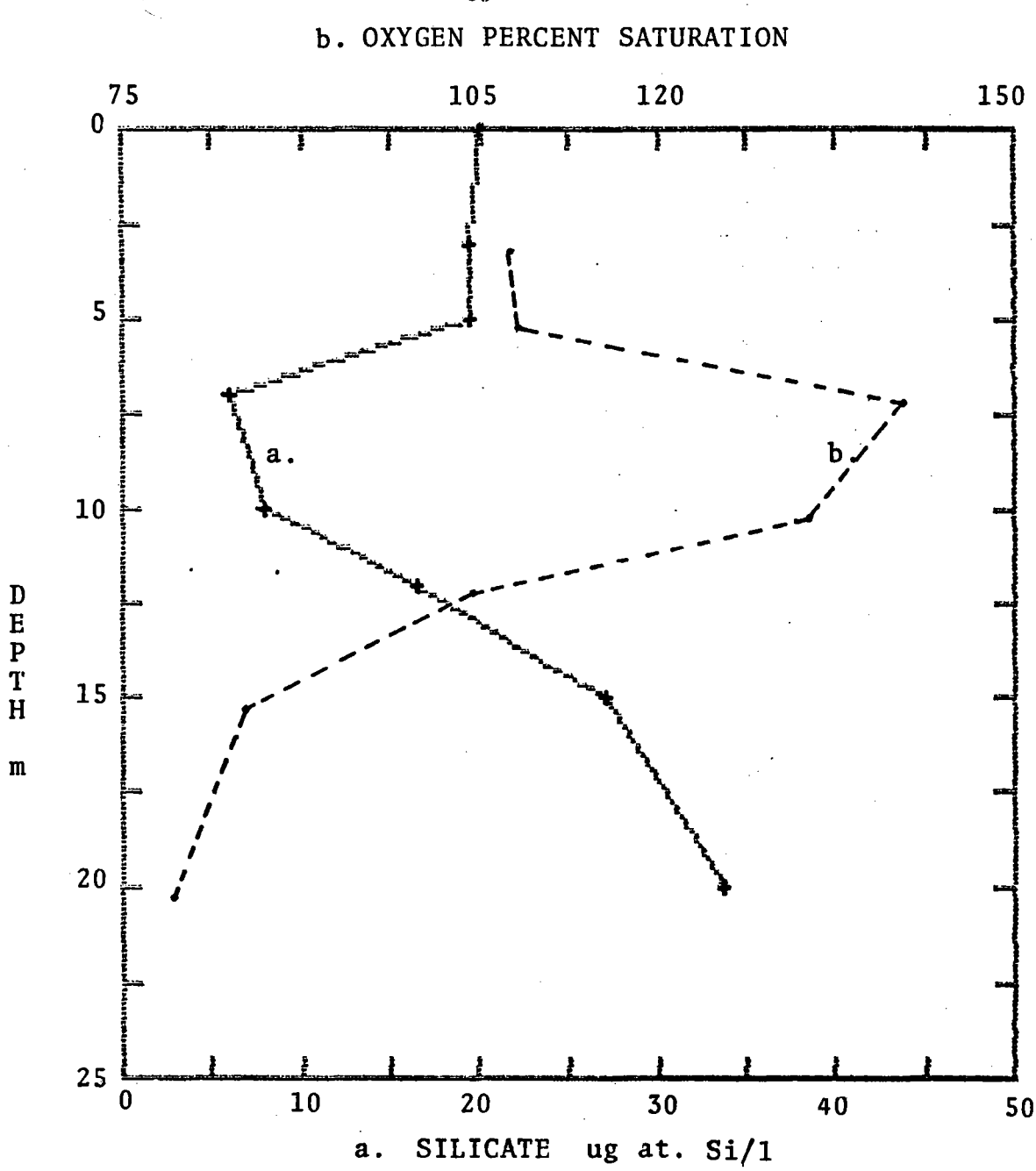

Figure 15. Silicate minimum, station 12, June 1978

Thus, nutrients in the surface water appear to go through an annual cycle, reaching maximum values in late winter and early spring. They are rapidly depleted in the spring and early summer as a result of increased freshwater input (for phosphate and nitrate), an intense stratification of the water column and increased phytoplankton productivity. As productivity declines, nutrients are gradually replenished by a combination of river input (for silicate), entrainment of high nutrient content subsurface water and wind and tidal induced vertical mixing. Freshwater run-off is a source of silicate but is evidently lower than the inlet waters in phosphate and nitrate. The deep water of the inner basins act as a nutrient reservoir with high concentrations of all nutrients.

Variations in the concentrations of nutrients in the deep water correspond directly with changes in the salinity and dissolved oxygen levels. The highest levels were found in October coinciding with maximum salinity and lowest dissolved oxygen. Lowest values were in June corresponding to the highest oxygen levels for the deep water probably as a result of some mixing with water at a shallower depth.

During periods of low productivity large variations in nutrient concentrations can occur in the surface layer over the period of tidal cycle as a result of vertical mixing and advective transport as illustrated by the data at station 8 during cruise 78-02. Silicate concentrations decreased from 53 to 33 µg at. Si/ℓ, over a 20 hour period at the surface while phosphate increased from .25 to .85 µg at. P/ℓ and nitrate from 3.9 to 10.8 µg at. N/ℓ over the same time period.

4.5 SUSPENDED PARTICULATE MATERIAL

Suspended particulate material (SPM) was determined on cruises 78-01 and 78-02 by filtration. Samples were taken at all hydrocarbon sampling depths. For the last half of cruise 78-02 and for cruise 79-01, samples were collected at all hydrocast depths for Coulter Counter Analysis. The latter data provide a measure of SPM on a volume rather than a weight basis. Comparison of data obtained by the two techniques for cruise 78-02 indicates a poor agreement with a correlation co-efficient of 0.59. It

is not, therefore, possible to compare results from all cruises. Certain trends are evident, however, on the basis of data from individual cruises and some conclusions can be made about seasonal distribution..

The main sources of SPM in the water column are: 1) particulates of terrestrial origin, primarily inorganic in nature, carried into the surface layer with river run-off, 2) particulates of biogenic origin both living and detrital, and 3) particulates from the resuspension of bottom sediments as a result of slumping, submarine slides and strong bottom currents. In inlets with a large freshwater input such as Douglas Channel and Gardner Canal, particulates associated with river run-off are the major source (Pickard, 1961). During cruises 78-01 and 78-02, river run-off was at near maximum levels and SPM concentrations were highest in the surface layer of the three inlets. Concentrations were in the range 1.5 - 3 ppm with a decrease in the surface layer down inlet. There was a sharp decrease through the halocline as well, with concentrations decreasing gradually with depth in the subsurface water. If river run-off were the only source of SPM then a non-conservative mixing curve would be expected as a result of the settling out of SPM on mixing with saline inlet water. This appears to be the case in October during cruise 78-02 (figure16b). A plot of SPM vs salinity for cruise 78-01 (figure16a) however, indicates that other sources of SPM are important. High SPM concentrations at high salinities during this cruise are likely the result of the high productivity in the near surface water remote from river input or just below the halocline.

In February, as a result of low river run-off and productivity, SPM concentrations were lower and in the range 0.08 to 0.4 ppmV. As for salinity, vertical and horizontal gradients were small (figure 16c)

5. SUMMARY

For most of the year, the study area has the characteristics of a highly stratified fjord typical of many inlets on the B.C. coast and described in detail by Pickard (1961). The size and geographical complexity of the system results in large gradations in observed properties depending on season and location.

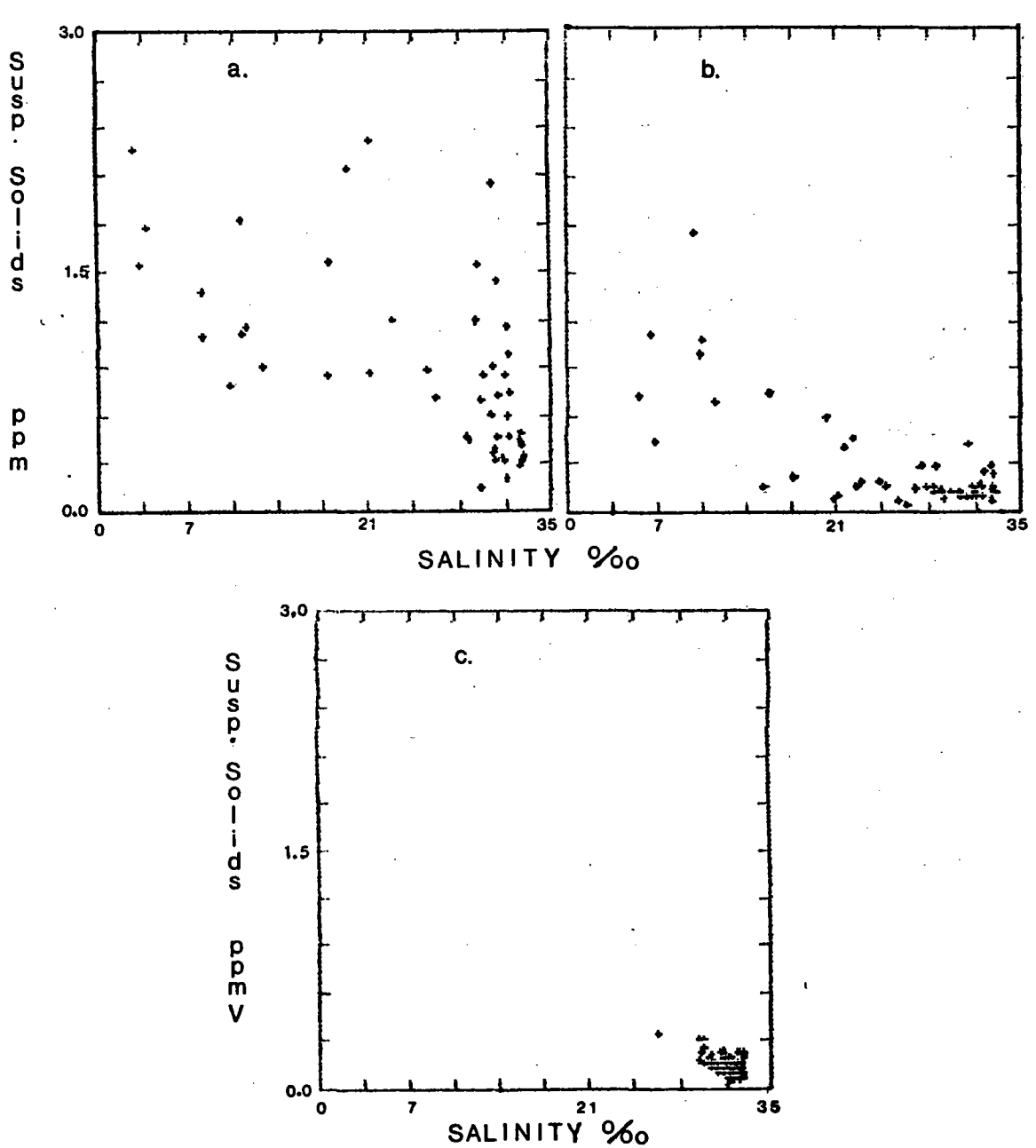

Figure 16. Suspended solids vs salinity: a. Cruise 78-01; b. Cruise 78-02; c. Cruise 79-01.

The surface layer, whose lower limit is defined by the depth of the halocline, is the most variable and directly influenced by the input of freshwater. During periods of high run-off, the surface layer is well defined with a thickness of 3 - 10 m. Salinities are low at the head of all inlets and increase towards Hecate Strait. Dissolved oxygen concentrations are at or slightly above saturation levels except in periods of high productivity when oxygen levels of over 150% saturation can occur. As a result of river input silicate concentrations may be as high at 60 - 70 µg.at Si/ℓ at the heads of the main inlets and decrease in concentration down inlet to values of 20 - 30 µg.at. Si/ℓ in Caamano Sound. Phosphate and nitrate have the opposite tendency, with levels of 0.2 - 0.4 µg.at P/ℓ and 2 - 5 µg.at N/ℓ at the heads of the inlets increasing to values of 1.5 µg.at P/ℓ and 15-20 µg.at N/ℓ at the mouth. During periods of high productivity, these levels are reduced, and in the case of nitrate, may drop below detection limits. Suspended particulate material concentrations are highest at the heads of the main inlets with levels of 1-3 ppm by weight. Concentrations decrease through the halocline and with increasing salinity in the surface layer. Periods of high productivity however, can result in high concentrations of several ppm at surface and near surface depths at locations remote from river input. As the level of freshwater input decreases, the definition of the surface layer becomes less distinct. Under suitable conditions of wind and tide, vertical mixing can increase the depth of the surface layer to over 50 m. Salinities increase and may reach 30-31 ppt at the heads of the inlets. Dissolved oxygen concentrations are below saturation and nutrient concentrations much higher with levels decreasing towards Hecate Strait. Maximum surface values observed were 35 - 42 µg.at Si/ℓ silicate, 20 - 25 µg.at N/ℓ nitrate and 1.6 - 1.9 µg.at P/ℓ phosphate. Suspended particulates decrease as well, with maximum levels of 0.4 ppmV. Surface temperatures in the inlets generally reflect atmospheric conditions, reaching levels of 15 - 20^{o}C in the summer and dropping to near freezing during very cold winter conditions. The seasonal temperature range decreases seaward reaching oceanic values in the southern channels.

The subsurface water from the surface layer to approximately 150 m derives mainly from water drawn into the system from Hecate Strait as a result of the predominantly estuarine circulation. Its characteristics are

therefore determined mainly by seasonal fluctuations occurring in the water outside the study area with some modifications as a result of processes occurring within the system. A decrease in salinity towards the heads of all inlets results from mixing with the surface layer. The effect of primary productivity results in depleted nutrient levels in the spring and summer just below the halocline and supersaturated oxygen concentrations at the same depth. The latter feature is in contrast to the general tendency for all parameters to either increase (salinity, nutrients) or decrease (oxygen, temperature, suspended particulates) in a gradual fashion with depth through this layer.

The deep water of the basins inside Caamano Sound below sill depth differs from the overlying water in that exchange with water outside the system is restricted and occurs mainly in late spring and summer with the appearance of high salinity water in Hecate Strait. Seasonal changes in water properties are slight. Nutrient and salinity values are at maximum levels in this water type while oxygen concentrations are at a minimum. Oxygen concentrations however did not drop below 35% saturation, indicating relatively frequent deep water exchanges. Suspended particulate material concentrations may also increase in the near bottom water as a result of re-suspension of surface sediments or bottom turbidity currents.

The Devastation Channel - Gardner Canal basin has unique properties in this study area, determined primarily by the shallow sills through Devastation Channel, Ursula Channel and Verney Passage. Dissolved oxygen concentrations are higher and salinity and nutrient values lower than at an equivalent depth in Douglas Channel. Gardner Canal appears to undergo a complete water exchange each summer.

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Appendix A

HYDROCAST DATA SUMMARY

Notes:

1. SiO_2, NO_3 and PO4 are expressed in µg.at. Si,N or P/ℓ

2. Time: the time at which the messenger was dropped to trip the water bottles.

Cruise: 78.01 Area: MacKay Reach
Station: 1
Vessel: Sea Lion
Latitude: 53 19.2 N
Longitude: 129 1.0 W
Date: 21- 6-78
Time: 2000 Time zone: Z+7
Depth to bottom: 485. m
Wind speed: 12.0 Kts Wind dir: 260 deg
Barometer: 30.03 in
Air temp: 12.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.	12.00	26.056	19.69			.30	0.0	0.0	.72	17.1
3.	11.88	26.212	19.84	8.68	135.	.40	0.0	0.0		
5.	9.90	27.900	21.47	7.98	120.	.50	12.1	1.0	3.06	57.5
10.	8.54	30.227	23.48	6.05	90.	1.40	25.4	13.2		
20.	7.42	31.430	24.58	5.02	73.	1.90	37.7	20.6	.21	
30.	7.26	31.737	24.84	4.86	71.	1.80	37.5	20.7		
50.	7.33	31.943	24.99	4.74	69.	2.00	39.9	22.2		
75.	7.28	32.363	25.33	4.33	63.	2.10	43.2	23.6		
100.	7.29	32.544	25.47	4.29	63.	2.00	41.2	23.0		
200.	7.22	32.766	25.66	4.21	62.	2.00	39.3	23.5	.41	54.3
300.	7.13	32.828	25.72			2.10	41.3	24.6		
425.	7.00	32.925	25.81	3.77	55.	2.20	45.2	26.1		

Cruise: 78.01 Area: Whale Channel
Station: 2
Vessel: Sea Lion
Latitude: 53 12.0 N
Longitude: 129 7.0 W
Date: 22- 6-78
Time: 0245 Time zone: Z+7
Depth to bottom: 590. m
Wind speed: 1.0 Kts Wind dir: 170 deg
Barometer: 30.03 in
Air temp: 11.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.	12.70	24.006	17.99			.40	0.0	0.0		6.2
3.	12.75	24.545	18.40	8.58	135.	0.00	0.0	0.0		
5.	12.58	24.994	18.77	8.44	133.	.30	0.0	.1		79.3
10.	10.86	27.272	20.83	5.78	89.	.60	13.2	4.1		
20.	8.17	30.454	23.71	5.43	80.	1.50	27.4	14.8		16.4
30.	7.56	31.258	24.43			1.80	33.3	19.1		
50.	7.42	31.975	25.01	4.97	73.	1.80	34.5	20.1		
75.	7.42	32.204	25.19	4.72	69.	1.90	37.0	21.2		
100.	7.32	32.457	25.40	4.38	64.	2.00	42.4	22.9		
200.	7.18	32.813	25.70	4.14	61.	2.10	41.8	24.0		
300.	7.03	32.912	25.80	3.87	57.	2.20	45.3	25.8		30.6
450.	6.99	32.941	25.82	3.78	55.	2.20	46.7	26.3		

Cruise: 78.01 Area: CAAMANO SOUND
Station: 3
Vessel: Sea Lion
Latitude: 52 54.0 N
Longitude: 129 17.0 W
Date: 22- 6-78
Time: 1045 Time zone: Z+7
Depth to bottom: 250. m
Wind speed: 6.0 Kts Wind dir: 0 deg
Barometer: 30.08 in
Air temp: 10.0 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.	9.30	30.086	23.26			1.10	23.5	9.5		11.5
3.	8.59	30.676	23.82	6.51	97.	1.20	23.6	10.9		
5.	8.70	30.784	23.89	6.53	98.	1.20	22.5	10.3		7.2
10.	7.88	30.947	24.14	5.77	85.	1.60	30.0	16.3		
19.	7.49	31.493	24.62	5.27	77.	1.80	32.5	18.9		13.1
29.	7.58	31.670	24.75	5.20	76.	1.70	32.5	18.9		
49.	7.91	32.018	24.97	5.04	75.	1.70	30.7	18.0		
73.	7.73			4.53		1.80	25.7	20.6		
97.	7.32	32.592	25.51	4.24	62.	2.00	39.6	23.2		
195.	6.50			3.17		2.40	54.0	29.7		36.5

Cruise: 78.01 Area: Nepean Sound
Station: 4
Vessel: Sea Lion
Latitude: 53 11.2 N
Longitude: 129 39.2 W
Date: 22- 6-78
Time: 2000 Time zone: Z+7
Depth to bottom: 198. m
Wind speed: 10.0 Kts Wind dir: 330 deg
Barometer: 30.04 in
Air temp: 13.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.	10.50	29.820	22.86			.80	18.9	3.6	.85	23.4
3.	10.56	29.799	22.83	7.61	118.	.80	18.5	4.3		
5.	9.13	30.758	23.81	7.32	111.	1.00	17.2	6.5	.47	12.6
10.	8.97	31.485	24.40	6.43	97.	1.10	15.9	9.5		
20.	8.80	31.558	24.48	6.13	92.	1.20	19.2	10.9	1.17	7.0
30.	8.48	31.762	24.69	5.79	87.	1.40	23.0	13.5		
50.	7.78	31.935	24.93	5.14	76.	1.70	30.2	18.0		
75.	7.38	32.278	25.25	4.59	67.	1.90	36.9	21.0		
100.	7.36	32.334	25.30	4.57	67.	1.90	38.6	21.8		
150.	7.17	32.707	25.62	4.13	60.	2.10	41.5	23.8	.32	15.3

Cruise: 78.02 Area: Caamano Sound
Station: 3
Vessel: Sea Lion
Latitude: 52 54.0 N
Longitude: 129 17.0 W
Date: 21-10-78
Time: 1100 Time zone: Z+7
Depth to bottom: 250. m
Wind speed: 12.0 Kts Wind dir: 155 deg
Barometer: 30.23 in
Air temp: 8.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	10.03	27.496	21.13	5.72	86.	1.28	27.2	14.8	.28	11.8
4.	10.46	28.302	21.69	5.71	87.	1.29	27.0	15.1	.17	11.0
9.	10.45	30.482	23.38	5.26	82.	1.40	28.0	16.1		
13.	10.46	30.758	23.60	5.14	80.	1.42	28.4	16.1		
17.	10.56	30.952	23.73	4.58	72.	1.40	28.0	15.9		
26.	10.64	31.215	23.92	5.15	81.	1.42	28.0	15.7		
43.	10.81	31.502	24.11	5.11	81.	1.38	26.8	14.9	.16	28.4
65.	11.01	31.925	24.41	5.05	80.	1.33	25.9	14.0		
87.	10.85	32.085	24.56	4.81	76.	1.37	26.8	14.5		
173.	8.25	32.828	25.56	2.79	42.	2.06	45.7	25.1	.24	8.0

Cruise: 78.02 Area: Nepean Sound
Station: 4
Vessel: Sea Lion
Latitude: 53 11.3 N
Longitude: 129 39.2 W
Date: 21-10-78
Time: 1815 Time zone: Z+7
Depth to bottom: 200. m
Wind speed: 25.0 Kts Wind dir: 180 deg
Barometer: 30.15 in
Air temp: 9.0 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	10.45	30.093	23.08	6.03	93.	1.35	28.8	15.1		4.9
5.	10.46	30.092	23.08	5.84	90.	1.35	28.1	15.2		
9.	10.48	30.094	23.08	6.02	93.	1.35	28.1	15.2		
14.	10.55	30.409	23.31	5.49	85.	1.39	28.6	15.7		9.9
19.	10.52	30.503	23.39	5.60	87.	1.39	29.2	15.9		
28.	10.45	30.601	23.47	5.38	84.	1.42	29.4	16.0		
47.	10.25	31.234	24.00	5.21	81.	1.51	32.1	17.3		7.2
70.	9.75	31.685	24.43	4.53	70.	1.66	36.2	19.3		
94.	8.96	32.119	24.90	4.19	64.	1.85	41.4	22.2		13.0
141.	7.84	32.682	25.50	3.53	52.	2.14	48.8	26.1		

Cruise: 78.02 Area: Squally Channel
Station: 5
Vessel: Sea Lion
Latitude: 53 13.1 N
Longitude: 129 25.0 W
Date: 21-10-78
Time: 2245 Time zone: Z+7
Depth to bottom: 510. m
Wind speed: .0 kts Wind dir: 180 deg
Barometer: 30.08 in
Air temp: 7.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	10.13	26.873	20.63	6.16	93.	1.20	26.3	14.0	.15	11.8
4.	10.10	26.880	20.64	6.13	92.	1.21	26.4	14.0		
9.	10.12	27.158	20.86	6.14	93.	1.23	27.0	14.2		
13.	10.64	28.266	21.63	5.90	91.	1.23	27.0	14.2	.48	22.4
17.	10.49	29.513	22.62	5.45	84.	1.35	27.0	15.3		
26.	10.44	30.034	23.04	5.60	87.	1.40	29.1	15.7		
43.	10.36	30.783	23.63	5.29	82.	1.45	29.2	16.1		
65.	9.74	31.459	24.26	4.78	74.	1.66	33.5	18.6		
87.	9.23	31.801	24.61	4.28	65.	1.79	37.1	20.6		
173.	7.93	32.769	25.56	3.76	56.	2.12	47.7	25.3	.29	13.4
260.	7.39	32.934	25.76	3.34	49.	2.23	52.0	27.0		
347.	6.97	33.038	25.90	3.19	47.	2.34	53.2	28.3		
412.	6.87	33.096	25.96	3.30	48.	2.39	56.2	28.6		

Cruise: 78.02 Area: Douglas Channel
Station: 6
Vessel: Sea Lion
Latitude: 53 25.0 N
Longitude: 129 12.3 W
Date: 22-10-78
Time: 0615 Time zone: Z+7
Depth to bottom: 420. m
Wind speed: 10.0 kts Wind dir: 320 deg
Barometer: 30.00 in
Air temp: 6.1 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	9.28	20.864	16.09	6.81	97.	.84	27.1	10.3	.09	13.1
5.	9.47	21.781	16.78	6.51	94.	.91	27.3	11.0	.41	21.3
10.	9.27	27.216	21.03	5.25	78.	1.40	30.2	17.0		
15.	9.27	28.356	21.92	4.90	73.	1.47	30.5	17.8		
20.	9.21	29.088	22.49	4.76	71.	1.54	31.0	18.5		
30.	9.78	30.495	23.50	4.92	75.	1.53	30.4	17.6		
50.	8.67	31.089	24.14	4.25	64.	1.84	38.1	21.5	.16	13.4
75.	8.35	31.623	24.60	3.98	59.	1.95	42.0	23.1		
100.	8.70	32.138	24.95	4.16	63.	1.91	41.3	22.6		
200.	7.29	32.779	25.66	3.37	49.	2.25	51.0	27.2	.07	10.4
300.	6.93	32.955	25.84	3.19	46.	2.34	54.2	28.0		
400.	6.82	33.071	25.95	3.00	44.	2.47	61.0	28.4		

Cruise: 78.01 Area: Kitimat Arm
Station: 9
Vessel: Sea Lion
Latitude: 53 55.8 N
Longitude: 128 41.9 W
Date: 24- 6-78
Time: 1930 Time zone: Z+7
Depth to bottom: 230. m
Wind speed: 15.0 Kts Wind dir: 200 deg
Barometer: 30.00 in
Air temp: 14.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol PAH ppm	PAH ng/l
0.	15.80	8.076	5.24			.10	25.3	.1	1.38	44.2
3.	15.98	8.054	5.19	6.98	106.	.10	25.5	0.0	1.11	
5.	15.89	8.182	5.30	7.07	107.	.10	25.3	0.0		32.7
10.	8.66	28.311	21.97	8.59	126.	.10	2.7	0.0		
20.	6.32	30.491	23.98	6.18	87.	1.60	28.6	20.0	.36	
30.	5.83	30.868	24.34	5.80	81.	1.80	34.9	21.8		
50.	6.02	31.364	24.71	5.80	82.	1.80	35.1	21.7		
75.	7.25	32.314	25.30	4.08	60.	2.10	44.4	24.0		
100.	7.30	32.438	25.39	3.86	57.	2.20	47.5	24.8		
150.	7.24	32.537	25.47	3.53	52.	2.30	48.3	25.6	.28	
200.	7.30	32.586	25.50	3.72	55.	2.20	49.3	24.6		9.3

Cruise: 78.01 Area: Kitimat Arm
Station: 10
Vessel: Sea Lion
Latitude: 53 59.0 N
Longitude: 128 40.8 W
Date: 25- 6-78
Time: 1430 Time zone: Z+7
Depth to bottom: 130. m
Wind speed: 18.0 Kts Wind dir: 180 deg
Barometer: 30.18 in
Air temp: 13.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol PAH ppm	PAH ng/l
0.	13.50	3.409	2.01			.20	35.2	.3	1.54	271.6
3.	14.88	6.072	3.85	7.05	104.	.10	29.1	0.0		
5.	11.94	21.186	15.95	8.01	121.	.20	12.1	.3	.87	149.0
10.	7.60	29.317	22.90	7.90	114.	.20	4.3	1.7		
20.	6.05	30.627	24.12	5.52	78.	1.80	32.1	21.2	.31	70.2
30.	5.71	30.787	24.29	5.99	84.	1.80	34.2	21.2		
50.	6.48	31.310	24.61	5.11	73.	2.00	38.3	23.2	.32	170.4
75.	7.25	32.390	25.36	3.75	55.	2.20	47.4	24.6		
100.	7.26	32.485	25.43	3.62	53.	2.30	50.0	25.5		

Cruise: 78.01 Area: Kildala Arm
Station: 11
Vessel: Sea Lion
Latitude: 53 50.3 N
Longitude: 128 35.5 W
Date: 25- 6-78
Time: 2100 Time zone: Z+7
Depth to bottom: 220. m
Wind speed: 14.0 kts Wind dir: 310 deg
Barometer: 30.22 in
Air temp: 14.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.	14.50	3.793	2.16			.10	26.8	0.0	1.79	8.8
3.	15.12	5.736	3.56	7.26	107.	.10	24.7	0.0		
5.	15.62	10.122	6.83	7.37	113.	.10	19.6	0.0	.79	11.1
10.	8.74	28.405	22.03	9.20	136.	.10	2.5	0.0		
20.	6.37	30.387	23.90	6.10	86.	1.50	25.3	17.5	2.06	36.2
30.	5.78	30.910	24.38	5.87	82.	1.80	25.8	21.3		
50.	6.54	31.621	24.85	4.87	70.	2.00	38.9	23.9	.47	25.5
75.	7.27	32.389	25.35	4.00	59.	2.10	45.8	24.0		
100.	7.30	32.474	25.42	3.92	57.	2.20	46.7	24.2		
150.	7.29	32.525	25.46	4.03	59.	2.10	46.2	23.5		
200.	7.31	32.550	25.47	3.97	58.	2.30	46.6	24.1		

Cruise: 78.01 Area: Douglas Channel
Station: 12
Vessel: Sea Lion
Latitude: 53 49.7 N
Longitude: 128 48.3 W
Date: 26- 6-78
Time: 0815 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 7.0 kts Wind dir: 190 deg
Barometer: 30.25 in
Air temp: 12.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.	14.70	11.163	7.79			.10	20.2	0.0	1.12	
3.	14.61	11.547	8.10	7.15	108.	.10	19.6	0.0		
5.	14.53	11.919	8.40	7.18	108.	.10	19.4	0.0		16.7
7.	10.88	24.953	19.03	9.28	141.	.20	6.0	0.0		
10.	7.89	29.441	22.96	9.14	133.	.30	8.0	0.0	1.55	
12.	7.24	30.051	23.52	7.26	105.	1.00	16.5	7.2		
15.	6.71	30.465	23.92	6.00	86.	1.60	26.9	17.0		
20.	6.29	30.788	24.22	5.63	80.	1.90	33.8	21.0	.73	

Cruise: 78.01 Area: Devastation Channel
Station: 13
Vessel: Sea Lion
Latitude: 53 42.3 N
Longitude: 128 48.5 W
Date: 26- 6-78
Time: 1015 Time zone: Z+7
Depth to bottom: 310. m
Wind speed: 8.0 Kts Wind dir: 190 deg
Barometer: 30.26 in
Air temp: 13.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
0.		12.555				.10	19.9	.1		10.7
3.	13.61	12.689	9.14	7.65	114.	.20	19.7	0.0	.91	
5.	12.89	18.794	13.95	8.01	122.	.20	13.2	0.0		10.1
7.	9.55	26.379	20.34	6.89	102.	1.00	27.6	10.2		
10.	8.36	29.247	22.74	5.71	84.	1.50	33.6	16.0	1.22	13.0
12.	8.09	29.641	23.09	5.56	81.	1.60	34.4	17.3		
15.	7.77	30.274	23.63	5.36	78.	1.70	35.8	18.7	.62	
20.	7.44	30.743	24.04	5.23	76.	1.80	36.7	20.0		
30.	7.11	31.108	24.37	5.18	75.	1.90	37.3	21.1		
50.	6.93	31.663	24.83	5.15	74.	1.90	36.6	21.2	.99	
100.	7.29	32.515	25.45	3.97	58.	2.20	46.3	24.1		
200.	7.28	32.630	25.54	4.28	63.	2.00	40.3	23.0		
275.	7.29	32.674	25.57	4.28	63.	2.00	40.2	23.2		

Cruise: 78.01 Area: Gardner Canal - Allan Reach
Station: 14
Vessel: Sea Lion
Latitude: 53 25.1 N
Longitude: 128 32.2 W
Date: 26- 6-78
Time: 1700 Time zone: Z+7
Depth to bottom: 230. m
Wind speed: 2.0 Kts Wind dir: 120 deg
Barometer: 30.22 in
Air temp: 16.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	12.93	2.950	1.74			.10	28.7	1.7	2.27	36.8
3.	10.79	7.287	5.36	8.04	109.	.30	29.5	3.6		
5.	9.47	22.964	17.69	6.74	98.	1.20	32.0	13.7	1.21	27.6
7.	7.84	26.604	20.75	6.41	92.	1.40	32.9	16.3		
10.	7.32	27.804	21.75	6.30	90.	1.50	33.1	17.4		
20.	6.79	30.388	23.85	5.73	82.	1.70	35.2	20.2	.91	
30.	6.56	31.067	24.41	5.47	78.	1.90	36.9	22.0		
50.	6.66	31.414	24.67	5.14	74.	1.90	38.5	22.6		
75.	6.80	31.672	24.85	4.94	71.	2.00	39.0	22.4		
100.	6.87	31.750	24.90	4.91	71.	2.00	39.3	22.6	.75	24.4
150.	6.95	31.883	25.00	4.75	69.	2.00	40.3	22.8		
200.	6.99	31.897	25.00	4.72	68.	2.00	41.0	23.0		

Cruise: 78.01 Area: Verney Passage
Station: 15
Vessel: Sea Lion
Latitude: 53 28.0 N
Longitude: 129 4.2 W
Date: 27- 6-78
Time: 0845 Time zone: Z+7
Depth to bottom: 210. m
Wind speed: 15.0 kts Wind dir: 160 deg
Barometer: 30.15 in
Air temp: 13.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	11.16	21.379	16.22			.40	20.7	1.3	2.32	11.6
3.	10.23	24.744	18.97	7.09	106.	.70	25.6	6.6		
5.	8.66	28.501	22.12	6.00	88.	1.40	33.2	14.6	.46	
10.	7.75	30.676	23.94	5.03	74.	1.80	38.0	19.7		
20.	7.41	31.531	24.66	4.72	69.	1.90	40.2	21.6	.60	22.7
30.	7.34	31.786	24.87	4.63	68.	2.00	40.8	22.2		
50.	7.28	32.062	25.09	4.56	67.	2.00	40.9	22.5		
75.	7.27	32.450	25.40	4.35	64.	2.00	41.3	23.0		
100.	7.30	32.613	25.52	4.31	63.	2.00	39.7	22.9	.45	33.0
140.	7.32	32.695	25.59	4.20	62.	2.00	40.3	23.3		
190.	7.16	32.799	25.69	4.08	60.	2.10	42.5	24.5		

Cruise: 78.01 Area: Ursula Channel
Station: 16
Vessel: Sea Lion
Latitude: 53 26.0 N
Longitude: 129 55.5 W
Date: 27- 6-78
Time: 1230 Time zone: Z+7
Depth to bottom: 420. m
Wind speed: 2.0 kts Wind dir: 60 deg
Barometer: 30.14 in
Air temp: 17.0 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	13.30	18.083	13.34			.20	19.4	.2	1.58	3.7
3.	11.69	22.615	17.09	8.28	126.	.30	17.9	.5		
5.	11.50					.60	14.6	1.8	1.16	
10.	8.71	30.434	23.62	5.57	83.	1.60	32.7	15.9		
20.	7.75	31.312	24.44	4.90	72.	1.90	38.3	20.1	.85	15.9
30.	7.55	31.619	24.71	4.70	69.	2.00	40.3	21.2		
50.	7.40	32.026	25.05	4.47	65.	2.00	42.1	22.4		
75.	7.27	32.314	25.29	4.33	63.	2.10	42.8	23.3		
100.	7.27	32.488	25.43	4.22	62.	2.10	43.6	23.7		
200.	7.13	32.858	25.74	3.95	58.	2.10	43.0	24.7		
300.	6.97	32.953	25.84	3.70	54.	2.20	46.0	26.1	.35	18.5
330.	6.99	32.957	25.84	3.73	54.	2.20	45.8	26.2		

Cruise: 78.02 Area: Mackay Reach
Station: 1
Vessel: Sea Lion
Latitude: 53 19.2 N
Longitude: 129 1.0 W
Date: 20-10-78
Time: 2100 Time zone: Z+7
Depth to bottom: 500. m
Wind speed: 8.0 kts Wind dir: 140 deg
Barometer: 30.18 in
Air temp: 7.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	9.94	25.786	19.82	5.84	87.	1.20	27.8	13.9	.08	
5.	9.93	25.745	19.79	5.85	87.	1.20	27.9	13.8		7.6
10.	10.01	26.775	20.57	5.61	84.	1.26	28.0	14.5		
15.	10.13	28.193	21.66	5.32	81.	1.34	28.0	15.7		12.0
20.	10.18	29.437	22.62	5.13	79.	1.41	29.0	16.4		
30.	9.21	30.848	23.87	4.40	67.	1.71	34.3	19.9		
50.	8.39	31.226	24.28	3.99	59.	1.93	40.3	22.7	.77	3.6
75.	8.10	31.906	24.86	3.66	54.	2.09	45.1	25.2		
100.	7.88	32.233	25.15	3.51	52.	2.14	46.6	25.9		
200.	7.48	32.820	25.66	3.40	50.	2.21	49.8	26.5		19.0
300.	6.95	33.004	25.88	3.19	47.	2.34	54.3	28.2		
400.	6.84	33.072	25.95	3.06	45.	2.39	57.5	28.8		
450.	6.76	33.106	25.98	3.08	45.	2.40	57.8	29.0		

Cruise: 78.02 Area: Whale Channel
Station: 2
Vessel: Sea Lion
Latitude: 53 12.0 N
Longitude: 129 7.0 W
Date: 21-10-78
Time: 0503 Time zone: Z+7
Depth to bottom: 540. m
Wind speed: 3.0 kts Wind dir: 90 deg
Barometer: 30.32 in
Air temp: 6.5 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	9.74	25.212	19.40	6.67	99.	1.13	27.0	13.5		7.8
5.	9.93	26.356	20.26	5.88	88.	1.23	27.8	14.6	.04	3.9
10.	9.85	27.822	21.41	5.50	83.	1.35	29.4	16.0		
14.	9.98	28.599	22.00	5.34	81.	1.39	29.2	16.4		
19.	9.86	29.516	22.73	5.30	81.	1.50	30.7	17.4		
28.	9.98	30.393	23.39	5.03	77.	1.51	30.1	17.4		
47.	9.84	31.237	24.07	4.74	73.	1.60	31.1	18.2	.17	7.2
70.	9.47	31.656	24.45	4.69	72.	1.72	34.8	19.7		
94.	8.96	32.005	24.81	4.27	65.	1.86	38.8	21.6		
187.	7.71	32.783	25.60	3.76	56.	2.17	48.9	26.1	.08	7.5
281.	7.13	32.959	25.82	3.61	53.	2.29	52.2	27.7		
376.	6.82	33.076	25.95	3.40	49.	2.36	55.8	28.8		
470.	6.81	33.113	25.98	3.34	49.	2.40	57.2	28.9		

Cruise: 78.02 Area: Caamano Sound
Station: 3
Vessel: Sea Lion
Latitude: 52 54.0 N
Longitude: 129 17.0 W
Date: 21-10-78
Time: 1100 Time zone: Z+7
Depth to bottom: 250. m
Wind speed: 12.0 Kts Wind dir: 155 deg
Barometer: 30.23 in
Air temp: 8.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	10.03	27.496	21.13	5.72	86.	1.28	27.2	14.8	.28	11.8
4.	10.46	28.302	21.69	5.71	87.	1.29	27.0	15.1	.17	11.0
9.	10.45	30.482	23.38	5.26	82.	1.40	28.0	16.1		
13.	10.46	30.758	23.60	5.14	80.	1.42	28.4	16.1		
17.	10.56	30.952	23.73	4.58	72.	1.40	28.0	15.9		
26.	10.64	31.215	23.92	5.15	81.	1.42	28.0	15.7		
43.	10.81	31.502	24.11	5.11	81.	1.38	26.8	14.9	.16	28.4
65.	11.01	31.925	24.41	5.05	80.	1.33	25.9	14.0		
87.	10.85	32.085	24.56	4.81	76.	1.37	26.8	14.5		
173.	8.25	32.828	25.56	2.79	42.	2.06	45.7	25.1	.24	8.0

Cruise: 78.02 Area: Nepean Sound
Station: 4
Vessel: Sea Lion
Latitude: 53 11.3 N
Longitude: 129 39.2 W
Date: 21-10-78
Time: 1815 Time zone: Z+7
Depth to bottom: 200. m
Wind speed: 25.0 Kts Wind dir: 180 deg
Barometer: 30.15 in
Air temp: 9.0 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	10.45	30.093	23.08	6.03	93.	1.35	28.8	15.1		4.9
5.	10.46	30.092	23.08	5.84	90.	1.35	28.1	15.2		
9.	10.48	30.094	23.08	6.02	93.	1.35	28.1	15.2		
14.	10.55	30.409	23.31	5.49	85.	1.39	28.6	15.7		9.9
19.	10.52	30.503	23.39	5.60	87.	1.39	29.2	15.9		
28.	10.45	30.601	23.47	5.38	84.	1.42	29.4	16.0		
47.	10.25	31.234	24.00	5.21	81.	1.51	32.1	17.3		7.2
70.	9.75	31.685	24.43	4.53	70.	1.66	36.2	19.3		
94.	8.96	32.119	24.90	4.19	64.	1.85	41.4	22.2		13.0
141.	7.84	32.682	25.50	3.53	52.	2.14	48.8	26.1		

Cruise: 78.02 Area: Squally Channel
Station: 5
Vessel: Sea Lion
Latitude: 53 13.1 N
Longitude: 129 25.0 W
Date: 21-10-78
Time: 2245 Time zone: Z+7
Depth to bottom: 510. m
Wind speed: .0 kts Wind dir: 180 deg
Barometer: 30.08 in
Air temp: 7.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	10.13	26.873	20.63	6.16	93.	1.20	26.3	14.0	.15	11.8
4.	10.10	26.880	20.64	6.13	92.	1.21	26.4	14.0		
9.	10.12	27.158	20.86	6.14	93.	1.23	27.0	14.2		
13.	10.64	28.266	21.63	5.90	91.	1.23	27.0	14.2	.48	22.4
17.	10.49	29.513	22.62	5.45	84.	1.35	27.0	15.3		
26.	10.44	30.034	23.04	5.60	87.	1.40	29.1	15.7		
43.	10.36	30.783	23.63	5.29	82.	1.45	29.2	16.1		
65.	9.74	31.459	24.26	4.78	74.	1.66	33.5	18.6		
87.	9.23	31.801	24.61	4.28	65.	1.79	37.1	20.6		
173.	7.93	32.769	25.56	3.76	56.	2.12	47.7	25.3	.29	13.4
260.	7.39	32.934	25.76	3.34	49.	2.23	52.0	27.0		
347.	6.97	33.038	25.90	3.19	47.	2.34	53.2	28.3		
412.	6.87	33.096	25.96	3.30	48.	2.39	56.2	28.6		

Cruise: 78.02 Area: Douglas Channel
Station: 6
Vessel: Sea Lion
Latitude: 53 25.0 N
Longitude: 129 12.3 W
Date: 22-10-78
Time: 0615 Time zone: Z+7
Depth to bottom: 420. m
Wind speed: 10.0 kts Wind dir: 320 deg
Barometer: 30.00 in
Air temp: 6.1 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	9.28	20.864	16.09	6.81	97.	.84	27.1	10.3	.09	13.1
5.	9.47	21.781	16.78	6.51	94.	.91	27.3	11.0	.41	21.3
10.	9.27	27.216	21.03	5.25	78.	1.40	30.2	17.0		
15.	9.27	28.356	21.92	4.90	73.	1.47	30.5	17.8		
20.	9.21	29.088	22.49	4.76	71.	1.54	31.0	18.5		
30.	9.78	30.495	23.50	4.92	75.	1.53	30.4	17.6		
50.	8.67	31.089	24.14	4.25	64.	1.84	38.1	21.5	.16	13.4
75.	8.35	31.623	24.60	3.98	59.	1.95	42.0	23.1		
100.	8.70	32.138	24.95	4.16	63.	1.91	41.3	22.6		
200.	7.29	32.779	25.66	3.37	49.	2.25	51.0	27.2	.07	10.4
300.	6.93	32.955	25.84	3.19	46.	2.34	54.2	28.0		
400.	6.82	33.071	25.95	3.00	44.	2.47	61.0	28.4		

Cruise: 78.02 Area: Douglas Channel
Station: 7
Vessel: Sea Lion
Latitude: 53 38.0 N
Longitude: 129 12.0 W
Date: 22-10-78
Time: 1330 Time zone: Z+7
Depth to bottom: 340. m
Wind speed: 14.0 kts Wind dir: 30 deg
Barometer: 29.86 in
Air temp: 5.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	9.25	15.426	11.87	7.13	98.	.55	32.0	7.5	.16	14.9
4.	9.41	17.677	13.60	6.77	95.	.70	31.2	9.3	.22	5.4
8.	9.06	26.512	20.51	5.18	76.	1.41	32.6	17.2		
15.	9.03	27.619	21.38	4.93	73.	1.50	33.4	18.1		
15.	8.88	28.642	22.20	4.73	70.	1.60	35.0	19.3		
22.	8.91	30.420	23.58	4.65	70.	1.61	31.5	18.7		
37.	9.40	30.613	23.65	4.64	70.	1.79	31.3	18.6	.57	10.9
56.	9.32	31.094	24.04	4.44	68.	1.74	34.6	19.6		
74.	8.28	31.331	24.38	4.08	61.	1.93	40.4	22.6		
149.	7.79	32.554	25.41	3.56	53.	2.18	46.7	25.8		6.3
224.	6.99			3.27		2.23	50.1	26.7		

Cruise: 78.02 Area: Douglas Channel
Station: 8
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 22-10-78
Time: 2145 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 4.0 kts Wind dir: 5 deg
Barometer: 29.68 in
Air temp: 6.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.85	5.390	4.08	7.71	98.	.21	50.2	3.9	.74	200.4
5.	9.50	25.573	19.72	5.35	79.	1.18	26.2	14.1		16.5
10.	9.20	28.292	21.88	4.89	73.	1.39	28.2	17.7		
15.	8.81	29.088	22.55	4.61	68.	1.67	36.0	20.0		
20.	8.74	29.776	23.10	4.48	67.	1.71	35.8	20.4		
30.	8.77	30.445	23.62	4.44	66.	1.69	32.1	20.3		
50.	8.37	31.113	24.20	4.20	63.	1.85	36.0	20.8		13.6
75.	7.50	31.660	24.75	4.03	59.	2.06	41.5	23.8		
100.	7.53	32.187	25.16	3.63	53.	2.15	45.8	25.4		
200.	7.13	32.753	25.66	3.39	50.	2.27	50.0	26.9		5.3
300.	6.91	32.953	25.84	2.98	43.	2.47	55.7	28.0		

Cruise: 78.02 Area: DOUGLAS CHANNEL
Station: 81
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 23-10-78
Time: 0145 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 15.0 Kts Wind dir: 280 deg
Barometer: 29.70 in
Air temp: 5.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.74	5.315	4.03			.25	53.2	4.4		155.4
5.	9.85	21.729	16.68			.94	24.9	9.9		18.7
10.	9.23	27.830	21.51			1.42	29.2	17.4		
15.	8.82	29.116	22.57			1.66	34.8	19.7		7.8
20.	8.80	29.536	22.90			1.69	35.2	20.0		
30.	8.71	30.293	23.51			1.74	33.0	20.1		
50.	8.48	31.071	24.15			1.87	35.1	21.1		6.5
75.	7.53	31.547	24.66			2.04	40.1	23.3		
100.	7.48	32.064	25.07			2.14	41.9	24.8		
200.	7.16	32.730	25.64			2.27	49.0	26.5	.15	7.1
300.	6.91	32.944	25.84			2.52	56.2	27.7		

Cruise: 78.02 Area: Douglas Channel
Station: 82
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 23-10-78
Time: 0515 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 10.0 Kts Wind dir: 220 deg
Barometer: 29.73 in
Air temp: 9.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	9.14	7.409	5.63			.26	47.2	4.6		103.5
5.	9.42	19.848	15.28			.91	30.4	11.3		6.7
10.	9.46	26.542	20.48			1.27	26.7	15.5		
15.	9.20	28.356	21.93			1.42	29.0	17.9		4.7
20.	8.93	29.352	22.74			1.55	30.0	19.1		
30.	8.78	30.191	23.42			1.72	34.2	20.4		
50.	8.49	30.997	24.09			1.83	35.3	21.5		6.3
75.	7.51	31.588	24.69			2.05	40.7	23.7		
100.	7.54	32.096	25.09			2.14	44.6	25.2		
200.	7.13	32.730	25.64			2.29	49.7	27.0		5.0
300.	6.90	32.913	25.81			2.47	55.0	28.1		

Cruise: 78.02 Area: Douglas Channel
Station: 83
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 23-10-78
Time: 0915 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 18.0 Kts Wind dir: 220 deg
Barometer: 29.78 in
Air temp: 9.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	9.45	9.628	7.33			.31	40.7	5.1		125.8
5.	9.50	22.927	17.66			1.12	29.9	13.3		5.6
10.	9.35	27.056	20.89			1.34	27.4	16.2		
15.	8.96	28.885	22.37			1.59	32.0	19.2		12.1
20.	8.76	29.588	22.95			1.71	35.0	20.1		
30.	8.72	30.174	23.41			1.84	34.8	21.3		
49.	8.50	30.975	24.07			1.84	34.8	21.3		7.4
74.	7.58	31.510	24.62			2.04	40.5	23.3		
98.	7.55	32.023	25.03			2.15	44.6	24.8		
196.	7.16	32.714	25.62			2.27	48.4	26.4		1148.8
295.	6.92	32.930	25.83			2.42	53.0	27.8		

Cruise: 78.02 Area: Douglas Channel
Station: 84
Vessel: SEa Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 23-10-78
Time: 1300 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 21.0 Kts Wind dir: 230 deg
Barometer: 29.91 in
Air temp: 11.2 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	9.05	15.812	12.19			.73	34.5	10.3	.61	49.8
4.	9.15	15.927	12.27			.74	34.1	10.1	.82	44.6
9.	9.50	26.432	20.38			1.26	26.0	14.9		
13.	9.47	27.981	21.59			1.27	24.0	15.4	.10	7.9
18.	8.89	28.856	22.36			1.64	37.9	19.7		
26.	8.74	29.753	23.08			1.71	35.2	20.5		
44.	8.79	30.587	23.73			1.69	31.7	20.1	.09	8.9
66.	8.10	31.187	24.30			1.91	37.0	22.3		
88.	7.47	31.626	24.73			2.08	41.3	23.6		
175.	7.23	32.605	25.53			2.26	48.0	26.4		
262.	6.99	32.843	25.75			2.35	50.1	27.1		

Cruise: 78.02 Area: Douglas Channel
Station: 85
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 23-10-78
Time: 1700 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 13.0 Kts Wind dir: 225 deg
Barometer: 29.97 in
Air temp: 8.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	9.21	17.894	13.79			.81	33.3	10.8		35.7
5.	9.22	17.919	13.81			.82	33.3	10.8		30.6
10.	9.51	26.029	20.07			1.22	26.3	14.6		
15.	9.43	27.854	21.50			1.26	24.0	15.5		8.4
20.	8.89	28.864	22.37			1.62	34.4	19.6		
30.	8.80	30.036	23.29			1.74	36.1	20.5		
50.	8.67	30.811	23.92			1.75	32.8	20.6		
75.	7.93	31.426	24.51			1.96	39.2			
100.	7.51	31.957	24.98			2.12	43.4	24.5		
200.	7.18	32.688	25.60			2.25	48.5	26.5		
300.	6.95	32.855	25.76			2.36	52.1	27.6		

Cruise: 78.02 Area: Douglas Channel
Station: 86
Vessel: SEa Lion
Latitude: 53 50.0 N
Longitude: 128 48.3 W
Date: 23-10-78
Time: 2100 Time zone: Z+7
Depth to bottom: 350. m
Wind speed: 20.0 Kts Wind dir: 230 deg
Barometer: 30.03 in
Air temp: 6.5 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	8.73	16.073	12.43			.81	33.9	10.8	.37	20.3
5.	9.16	18.634	14.37			.85	31.3	10.8	.45	41.2
9.	9.57	25.135	19.37			1.18	25.9	13.7		
14.	9.36	28.278	21.84			1.34	25.3	16.3	.08	6.6
18.	8.90	28.901	22.39			1.64	33.7	19.6		
28.	8.74	30.050	23.31			1.76	35.7	20.4		
46.	8.76	30.762	23.87			1.76	32.8	20.4	.08	4.3
69.	8.00	31.421	24.49			1.99	39.2	22.8		
92.	7.52	31.896	24.93			2.12	43.4	24.3		
184.	7.18	32.682	25.60			2.26	48.0	26.3		
276.	6.96	32.920	25.81			2.41	52.4	27.5		

Cruise: 78.02 Area: Kitimat Arm
Station: 9
Vessel: Sea Lion
Latitude: 53 55.3 N
Longitude: 128 41.9 W
Date: 23-10-78
Time: 2345 Time zone: Z+7
Depth to bottom: 230. m
Wind speed: 18.0 kts Wind dir: 220 deg
Barometer: 30.10 in
Air temp: 6.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	9.04	10.371	7.95	7.58	100.	.37	40.4	5.4	1.01	316.0
5.	9.41	11.483	8.78	7.35	99.	.41	37.8	5.9	.70	130.8
10.	9.65	24.936	19.20	5.75	85.	1.00	20.2	10.6		
15.	9.40	28.500	22.01	5.34	80.	1.18	19.8	14.3	.29	27.6
20.	9.24	29.340	22.69	5.35	80.	1.31	21.3	16.7		
30.	8.23	30.225	23.52	4.87	72.	1.48	26.0	18.6		
50.	8.31	30.926	24.06	4.31	64.	1.80	33.8	20.9	.44	
75.	7.00	31.481	24.68	4.40	64.	2.03	39.1	23.2		
100.	7.18	32.077	25.12	3.88	57.	2.15	43.5	24.3		
200.	7.18	32.744	25.64	3.33	49.	2.31	47.8	26.3	.09	26.9

Cruise: 78.02 Area: Kitimat Arm
Station: 10
Vessel: Sea Lion
Latitude: 53 59.0 N
Longitude: 128 40.8 W
Date: 24-10-78
Time: 0430 Time zone: Z+7
Depth to bottom: 120. m
Wind speed: 10.0 kts Wind dir: 220 deg
Barometer: 30.23 in
Air temp: 4.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	6.99	0.000	-.03	8.33	98.	1.23	64.4	3.6	3.05	347.6
5.	9.25	10.418	7.97	7.52	100.	.32	40.1	5.2	1.09	188.7
10.	9.76	26.120	20.10	5.51	82.	1.04	21.4	12.1		
15.	9.29	28.851	22.30	5.46	82.	1.08	18.0	14.3	.15	63.2
20.	8.85	29.515	22.88	5.16	77.	1.21	20.1	16.5		
30.	8.36	30.217	23.50	4.71	70.	1.56	28.4	19.3		
50.	7.71	30.794	24.04	4.57	67.	1.73	33.0	21.3	.11	9.8
75.	6.83	31.391	24.63	4.65	67.	1.96	38.1	23.1		
100.	7.12	32.040	25.10	3.97	58.	2.13	43.6	24.0		

Cruise: 78.02 Area: Kildala Arm
Station: 11
Vessel: Sea Lion
Latitude: 53 50.3 N
Longitude: 128 35.5 W
Date: 24-10-78
Time: 0845 Time zone: Z+7
Depth to bottom: 220. m
Wind speed: 10.0 kts Wind dir: 80 deg
Barometer: 30.31 in
Air temp: 4.3 deg C
Sea state: 1

Depth m	T deg C	S ppt	sisma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	6.44	6.517	5.00	8.05	102.	.20	38.3	3.7	1.13	12.1
5.	9.40	15.410	11.84	6.98	96.	.66	32.2	8.4		49.2
10.	10.24	25.813	19.79	6.06	91.	.82	16.4	8.6		
15.	9.27	28.941	22.37	5.47	82.	.99	17.9	14.5	.70	5.0
20.	8.81	29.584	22.94	4.66	69.	1.35	23.9	17.8		
30.	8.39	30.132	23.43	4.92	73.	1.56	28.4	19.8		
50.	7.92	30.796	24.01	4.30	63.	1.81	34.2	21.8		
75.	7.07	31.447	24.64	4.35	63.	2.04	39.4	23.5	.02	
100.	7.11	31.978	25.05	3.88	56.	2.17	4.6	24.6		11.7
200.	7.02	32.514	25.48	2.41	35.	2.95	57.5	28.3		

Cruise: 78.02 Area: Devastation Channel
Station: 13
Vessel: Sea Lion
Latitude: 53 34.8 N
Longitude: 128 48.5 W
Date: 24-10-78
Time: 1730 Time zone: Z+7
Depth to bottom: 305. m
Wind speed: 2.0 kts Wind dir: 190 deg
Barometer: 30.28 in
Air temp: 8.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sisma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	8.66	13.886	12.29	6.99	95.	.80	34.0	10.1	.75	16.7
5.	9.13	22.339	17.26	6.16	88.	1.06	32.3	12.7	.46	17.9
10.	8.98	24.327	18.82	5.39	78.	1.38	35.4	16.7		
15.	8.91	27.793	21.53	5.02	74.	1.61	37.0	19.1	.17	5.3
20.	8.74	28.909	22.42	4.64	69.	1.70	37.5	19.9		
30.	8.75	30.327	23.53	4.40	66.	1.77	36.6	20.5		
50.	9.13	31.150	24.11	4.38	66.	1.73	34.4	19.7		
75.	8.19	31.558	24.57	3.96	59.	2.00	41.9	23.0		
100.	7.82	31.996	24.97	3.71	55.	2.10	44.4	24.7		
200.	7.13	32.732	25.64	3.24	47.	2.33	51.1	26.9	.15	13.9
275.	6.94	32.855	25.76	3.12	45.	2.45	57.8	27.6		

Cruise: 78.02 Area: Gardner Canal - Allan Re
Station: 14
Vessel: Sea Lion
Latitude: 53 25.1 N
Longitude: 128 32.3 W
Date: 24-10-78
Time: 2300 Time zone: Z+7
Depth to bottom: 240. m
Wind speed: 6.0 kts Wind dir: 190 deg
Barometer: 30.22 in
Air temp: 4.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	7.74	6.900	5.36	7.75	97.	.36	33.0	5.6	.45	4.4
5.	8.86	21.187	16.39	5.70	80.	1.17	34.4	14.8	.10	2.8
10.	8.98	26.548	20.55	4.80	70.	1.47	33.1	17.9		
14.	9.02	28.369	21.96	4.98	74.	1.52	30.6	18.5	.14	3.2
19.	8.86	29.314	22.72	4.73	70.	1.56	29.6	18.8		
29.	8.54	30.189	23.45	4.53	67.	1.69	32.5	20.1		
48.	8.28	30.749	23.93	4.24	63.	1.86	37.3	21.6		
71.	7.98	31.349	24.44	3.91	58.	1.99	40.6	23.0		
95.	7.76	31.801	24.82	4.01	59.	2.06	42.5	23.5		
190.	7.25	32.259	25.25	3.92	57.	2.20	46.7	24.3	.26	4.4

Cruise: 78.02 Area: Verney Passage
Station: 15
Vessel: Sea Lion
Latitude: 53 26.0 N
Longitude: 129 4.2 W
Date: 25-10-78
Time: 0545 Time zone: Z+7
Depth to bottom: 205. m
Wind speed: 3.0 kts Wind dir: 310 deg
Barometer: 30.17 in
Air temp: 5.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	8.80	20.360	15.76	6.45	90.	1.06	33.5	13.2	.60	8.9
5.	9.13	22.951	17.73	6.16	89.	1.16	32.0	14.1	.20	7.4
10.	9.36	27.400	21.16	5.26	78.	1.42	31.1	16.8		
15.	8.87	29.020	22.49	4.71	70.	1.66	35.6	19.5	.09	4.6
19.	8.59	29.806	23.15	4.53	67.	1.77	38.1	20.7		
29.	8.30	30.770	23.94	4.25	63.	1.89	39.8	21.5		
48.	8.19	31.184	24.28	4.11	61.	1.95	40.7	22.3		
72.	7.90	31.826	24.82	3.87	57.	2.05	43.8	23.8		
97.	8.00	32.403	25.26	3.76	56.	2.09	45.1	24.5		
169.	7.35	32.838	25.69	3.34	49.	2.28	51.5	26.7	.16	4.8

Cruise: 78.02 Area: Ursula Channel
Station: 16
Vessel: Sea Lion
Latitude: 53 26.0 N
Longitude: 129 55.5 W
Date: 25-10-78
Time: 0930 Time zone: Z+7
Depth to bottom: 390. m
Wind speed: 8.0 Kts Wind dir: 70 deg
Barometer: 30.15 in
Air temp: 5.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.79	22.536	17.45	6.50	92.	1.08	30.7	13.7	.16	6.4
5.	9.60	24.822	19.12	6.25	92.	1.13	27.9	14.0	.16	7.2
10.	10.01	27.833	21.40	5.53	84.	1.30	27.8	15.7		
15.	9.74	29.697	22.89	4.82	73.	1.50	30.4	17.6		
20.	9.58	30.383	23.45	4.63	70.	1.54	31.5	18.4		
30.	9.01	30.736	23.81	4.36	66.	1.74	36.0	20.3		
50.	8.25	31.304	24.37	3.98	59.	1.94	41.3	22.7		
75.	8.06	31.769	24.76	3.66	54.	2.04	44.0	24.4	.18	
100.	7.86	32.061	25.01	3.46	51.	2.13	46.7	25.4		
200.	7.14	32.868	25.75	3.14	46.	2.30	51.4	27.3		
300.	6.93	33.099	25.96	3.10	45.	2.35	54.9	27.7	.14	23.6
350.	6.86	33.134	25.99	3.00	44.	2.39	56.9	28.0		

Cruise: 78.02 Area: Princess Royal Channel
Station: CTD 1
Vessel: Sea Lion
Latitude: 53 12.0 N
Longitude: 128 44.3 W
Date: 20-10-78
Time: 1830 Time zone: Z+7
Depth to bottom: 520. m
Wind speed: 0.0 Kts Wind dir: 0 deg
Barometer: 30.14 in
Air temp: 6.0 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	10.21	25.894	19.86							
5.	10.35	27.250	20.89							
10.	10.24	27.804	21.34							
15.	10.12	28.379	21.80							
20.	9.82	29.661	22.85							
30.	10.20	30.378	23.34							
49.	9.04	31.121	24.10							
74.	8.13	31.611	24.62							
99.	7.86	31.922	24.90							
295.	6.96	33.007	25.88							
492.	6.79	33.096	25.97							

Cruise: 78.02 Area: Princess Royal Channel
Station: CTD 2
Vessel: Sea Lion
Latitude: 53 18.9 N
Longitude: 128 54.8 W
Date: 21-10-78
Time: 0300 Time zone: Z+7
Depth to bottom: 475. m
Wind speed: 4.0 Kts Wind dir: 175 deg
Barometer: 30.23 in
Air temp: 6.4 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	9.91	25.458	19.57							
5.		26.170								
10.	10.30	27.119	20.80							
15.	10.27	28.544	21.91							
20.	10.16	29.421	22.61							
30.	9.47	30.582	23.62							
50.	8.45	31.216	24.27							
75.	8.06	31.762	24.75							
100.	7.84	32.085	25.04							
200.	7.58	32.771	25.61							
300.	7.16	32.925	25.79							

Cruise: 78.02 Area: Douglas Channel
Station: CTD 6
Vessel: Sea Lion
Latitude: 53 43.9 N
Longitude: 129 2.0 W
Date: 22-10-78
Time: 1930 Time zone: Z+7
Depth to bottom: 360. m
Wind speed: 10.0 Kts Wind dir: 60 deg
Barometer: 29.67 in
Air temp: 4.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.93	11.630	8.95							
4.	9.20	22.615	17.46							
8.	8.94	27.299	21.14							
13.	8.80	28.137	21.81							
17.	8.79	29.436	22.83							
25.	9.15	30.260	23.42							
42.	9.53	30.974	23.91							
62.	8.34	31.409	24.43							
83.	8.04	31.717	24.72							
166.	7.33	32.681	25.57							

Cruise: 78.02 Area: Amos Passage
Station: CTD 7
Vessel: Sea Lion
Latitude: 53 51.4 N
Longitude: 128 41.5 W
Date: 24-10-78
Time: 1115 Time zone: Z+7
Depth to bottom: 170. m
Wind speed: 5.0 Kts Wind dir: 220 deg
Barometer: 30.32 in
Air temp: 4.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.87	11.401	8.77							
5.	9.22	14.493	11.14							
10.	9.63	26.316	20.28							
15.	9.05	28.860	22.34							
20.	8.90	29.579	22.92							
30.	8.70	30.027	23.30							
50.	8.73	30.888	23.97							
75.	7.65	31.506	24.61							
100.	7.35	31.951	25.00							
150.	7.38	32.453	25.39							

Cruise: 78.02 Area: Gardner Canal
Station: CTD 8
Vessel: Sea Lion
Latitude: 53 29.5 N
Longitude: 128 41.0 W
Date: 25-10-78
Time: 0200 Time zone: Z+7
Depth to bottom: 175. m
Wind speed: 10.0 Kts Wind dir: 160 deg
Barometer: 30.20 in
Air temp: 5.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	7.80	7.691	5.97							
5.	8.75	17.668	13.67							
10.	8.90	26.368	20.42							
15.	8.88	28.220	21.87							
20.	8.74	29.415	22.82							
30.	8.50	30.247	23.50							
50.	8.31	30.986	24.11							
75.	8.23	31.532	24.55							
100.	7.82	31.779	24.80							
150.	7.55	31.923	24.95							

Cruise: 78.02 Area: Devastation Channel
Station: CTD 9
Vessel: Sea Lion
Latitude: 53 34.8 N
Longitude: 128 48.5 W
Date: 24-10-78
Time: 2030 Time zone: Z+7
Depth to bottom: 160. m
Wind speed: 8.0 Kts Wind dir: 140 deg
Barometer: 30.24 in
Air temp: 5.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.51	14.209	11.00							
5.	8.95	20.618	15.94							
10.	9.13	23.468	18.13							
15.	9.16	27.398	21.19							
20.	8.80	28.802	22.33							
30.	8.61	29.859	23.18							
50.	8.67	30.847	23.95							
75.	8.54	31.376	24.38							
100.	8.10	31.654	24.66							
140.	7.70	31.842	24.86							

Cruise: 78.02 Area: Verney Passage
Station: CTD 10
Vessel: Sea Lion
Latitude: 53 32.8 N
Longitude: 128 53.5 W
Date: 25-10-78
Time: 0345 Time zone: Z+7
Depth to bottom: 220. m
Wind speed: 0.0 Kts Wind dir: 0 deg
Barometer: 30.21 in
Air temp: 5.0 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	8.58	15.949	12.35							
5.	9.05	22.625	17.49							
10.	9.26	24.444	18.87							
15.	9.02	28.867	22.35							
20.	8.55	30.157	23.43							
30.	8.49	30.682	23.84							
50.	8.80	31.343	24.31							
75.	8.22	31.670	24.66							
100.	7.96	31.828	24.82							
175.	7.74	31.936	24.93							

Cruise: 79.01 Area: Mackay Reach
Station: 1
Vessel: Sea Lion
Latitude: 53 19.2 N
Longitude: 129 1.0 W
Date: 8- 2-79
Time: 0215 Time zone: Z+8
Depth to bottom: 510. m
Wind speed: 15.0 kts Wind dir: 160 deg
Barometer: 29.84 in
Air temp: 1.8 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	5.51	31.104	24.56	6.42	89.	1.89	41.6	23.0	.18	6.0
5.	5.53	31.113	24.57	6.48	90.	1.88	41.7	22.9	.18	6.7
10.	5.55	31.121	24.57	6.51	91.	1.88	41.6	23.2	.22	
15.	5.70	31.130	24.56	6.35	89.	1.90	42.3	23.1	.23	
20.	6.23	31.541	24.82	5.68	81.	1.95	43.6	24.0	.14	
30.	6.54	31.740	24.94	5.34	76.	1.99	44.3	24.4	.19	
50.	6.79	31.985	25.10	4.98	72.	2.00	44.4	24.7		
75.	6.64	32.071	25.19	5.37	77.	1.96	42.5	23.8	.11	
100.	6.66	32.147	25.24	5.25	76.	1.95	42.2	23.6	.13	
150.	6.71	32.311	25.37			1.98	43.0	23.9	.15	
199.	7.02	32.459	25.44	4.57	67.	2.07	45.0	24.7	.15	51.7
300.	7.43	32.719	25.59	3.63	53.	2.23	50.0	26.7	.15	
400.	7.37	32.835	25.69	3.20	47.	2.33	55.1	27.9	.21	
450.	7.38	32.855	25.70			2.37	55.2	28.1	.21	

Cruise: 79.01 Area: Whale Channel
Station: 2
Vessel: Sea Lion
Latitude: 53 11.6 N
Longitude: 129 7.0 W
Date: 8- 2-79
Time: 0645 Time zone: Z+8
Depth to bottom: 560. m
Wind speed: 10.0 kts Wind dir: 20 deg
Barometer: 29.59 in
Air temp: 2.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	5.48	31.289	24.71	6.53	91.	1.94	40.9	22.7	.14	5.6
5.	5.54	31.278	24.70	6.51	91.	1.94	41.2	22.7	.11	4.1
10.	5.63	31.316	24.72	6.51	91.	1.93	41.0	22.7	.13	
15.	5.65	31.366	24.75	6.44	90.	1.93	41.5	22.8	.12	
20.	5.75	31.417	24.78	6.36	89.	1.95	41.7	22.9	.11	
30.	5.94	31.619	24.92	6.07	86.	1.98	43.5	23.2	.15	
50.	6.19	31.915	25.12	5.77	82.	1.97	41.9	23.3	.07	9.5
74.		32.053		5.55		1.97	41.9	23.0	.07	
99.	6.55	32.203	25.30	5.35	77.	1.98	41.6	23.1	.07	
198.	7.13	32.498	25.46	4.44	65.	2.10	45.4	24.8	.07	6.1
297.	7.44	32.720	25.59	3.66	54.	2.24	51.2	26.6	.07	
396.	7.39	32.856	25.70	3.28	48.	2.32	53.4	27.6	.07	
495.	7.39	32.928	25.76	3.22	47.	2.35	55.0	27.7	.11	

Cruise: 79.01 Area: Caamano Sound
Station: 3
Vessel: Sea Lion
Latitude: 52 53.9 N
Longitude: 129 17.0 W
Date: 8- 2-79
Time: 1515 Time zone: Z+8
Depth to bottom: 260. m
Wind speed: 34.0 kts Wind dir: 130 deg
Barometer: 29.38 in
Air temp: 4.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	5.80	31.019	24.46	6.71	94.	1.74	35.1	20.0	.22	11.2
4.	5.81	31.023	24.46	6.76	95.	1.74	35.2	20.1	.17	6.5
9.	5.97	31.780	25.04	6.56	93.	1.82	36.4	20.8	.14	
13.	5.98	32.007	25.22	6.55	93.	1.79	36.3	21.1	.14	
17.	6.02	32.035	25.24	6.55	93.	1.80	35.5	20.8	.14	
26.	6.06	32.091	25.27	6.69	95.	1.73	33.3	20.1	.13	
43.	6.16	32.151	25.31	6.70	95.	1.70	32.2	19.4	.13	3.8
65.		32.165		6.65		1.71	32.5	19.5		
87.	6.23	32.212	25.35	6.50	93.	1.73	33.1	19.5	.08	48.8
130.	6.33	32.239	25.36	6.44	92.	1.73	32.8	19.5	.12	
173.	6.73	32.413	25.44	6.21	90.	1.75	33.7	20.1	.14	
199.	6.60	32.456	25.49	5.70	82.	1.84	38.0	21.4	.14	10.8

Cruise: 79.01 Area: Nepean Sound
Station: 4
Vessel: Sea Lion
Latitude: 53 11.2 N
Longitude: 129 39.2 W
Date: 8- 2-79
Time: 2245 Time zone: Z+8
Depth to bottom: 210. m
Wind speed: 12.0 kts Wind dir: 230 deg
Barometer: 29.62 in
Air temp: 3.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	5.59	31.534	24.89	6.66	93.	1.91	39.7	22.3	.13	
5.	5.58	31.528	24.89	6.64	93.	1.89	39.5	22.3	.12	5.1
10.	5.68	31.503	24.86	6.67	93.	1.89	39.9	22.2	.11	8.7
15.	5.62	31.445	24.82	6.66	93.	1.89	40.0	22.3	.14	
20.	5.67	31.497	24.85	6.65	93.	1.89	40.2	22.2	.12	
30.	5.64	31.508	24.87	6.68	94.	1.87	40.1	22.1	.11	
50.	5.72	31.573	24.91	6.59	92.	1.89	40.0	22.4	.09	
75.	6.28	31.834	25.05	6.23	89.	1.90	39.2	22.2	.07	
100.	6.56	32.149	25.26	5.61	81.	1.94	40.9	22.7	.07	
150.	6.66	32.319	25.38	5.53	80.	1.92	40.1	22.5	.08	

Cruise: 79.01 Area: Squally Channel
Station: 5
Vessel: Sea Lion
Latitude: 53 13.1 N
Longitude: 129 25.2 W
Date: 9- 2-79
Time: 0245 Time zone: Z+8
Depth to bottom: 520. m
Wind speed: 20.0 kts Wind dir: 210 deg
Barometer: 29.66 in
Air temp: 2.2 deg C
Sea state: 4

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	5.33	31.173	24.64	6.78	94.	1.93	40.5	22.4	.16	11.1
5.	5.37	31.171	24.63	6.73	93.	1.91	40.7	22.6	.16	13.1
10.	5.38	31.215	24.66	6.78	94.	1.91	40.6	22.6	.15	
15.	5.44	31.271	24.70	6.69	93.	1.91	40.6	22.6	.15	
20.	5.51	31.287	24.71	6.74	94.	1.92	40.7	22.5	.15	
29.	5.49	31.290	24.71	6.66	93.	1.91	40.5	22.4	.14	
49.	6.11	31.868	25.09	6.07	86.	1.93	39.8	22.5	.08	12.9
73.	6.18	32.085	25.26	6.32	90.	1.83	35.8	21.0	.09	
98.	6.24	32.158	25.31	6.38	91.	1.80	35.0	20.7	.08	
196.	6.52	32.389	25.45	5.83	84.	1.84	36.5	21.2	.12	7.2
293.	7.19	32.727	25.63	4.23	62.	2.18	47.0	25.6	.08	
391.	7.31	32.868	25.72	3.63	53.	2.27	51.0	26.9	.09	
465.	7.38	32.907	25.74	3.34	49.	2.34	53.9	27.5	.20	

Cruise: 79.01 Area: Douglas Channel
Station: 6
Vessel: Sea Lion
Latitude: 53 25.0 N
Longitude: 129 12.4 W
Date: 9- 2-79
Time: 1100 Time zone: Z+8
Depth to bottom: 420. m
Wind speed: 10.0 kts Wind dir: 200 deg
Barometer: 29.67 in
Air temp: -.5 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	4.53	30.358	24.08	6.76	91.	1.91	40.3	22.3	.21	16.3
5.	4.58	30.360	24.07	6.77	92.	1.90	40.6	22.1	.16	18.9
10.	5.07	30.672	24.27	6.67	92.	1.93	41.0	22.5	.16	
15.	5.51	31.145	24.59	6.44	90.	1.97	41.8	23.1	.18	
20.	5.80	31.322	24.70	6.26	88.	1.98	41.8	23.2	.14	
30.	5.82	31.352	24.72	6.23	87.	1.99	41.7	23.3	.10	
50.	6.03	31.566	24.87	5.98	85.	1.98	41.2	23.2	.07	17.1
75.	6.49	31.820	25.01	5.70	82.	1.99	41.5	23.2	.11	
100.	6.56	32.055	25.18	5.54	80.	1.95	40.6	23.3	.10	
150.	6.89	32.354	25.38	5.00	72.	1.99	41.9	23.6	.11	
200.	7.27	32.539	25.47	4.30	63.	2.12	46.2	25.0	.07	11.9
300.	7.37	32.766	25.64	3.47	51.	2.28	50.6	26.9	.13	
375.	7.36	32.841	25.70	3.20	47.	2.40	54.6	27.4	.22	

Cruise: 79.01 Area: Douglas Channel
Station: 7
Vessel: Sea Lion
Latitude: 53 37.8 N
Longitude: 129 11.9 W
Date: 9- 2-79
Time: 1700 Time zone: Z+8
Depth to bottom: 350. m
Wind speed: 13.0 kts Wind dir: 200 deg
Barometer: 29.76 in
Air temp: 1.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	4.22	29.737	23.61	6.88	92.	1.83	41.4	21.7	.26	54.9
5.	4.41	29.799	23.65	6.91	93.	1.82	41.7	21.8	.31	63.9
10.	5.07	30.417	24.07	6.60	90.	1.87	41.5	22.1	.15	
15.	5.20			6.54		1.88	41.5	22.3	.14	
20.	5.42	30.868	24.39	6.35	88.	1.91	41.1	22.4	.11	
30.	5.74	31.280	24.67	6.18	87.	1.93	40.8	22.5	.10	
50.	6.33	31.774	24.99	5.77	82.	1.92	40.6	22.8	.06	7.1
75.	6.78	32.019	25.13	5.37	77.	1.93	40.9	22.7	.06	
100.	6.82	32.246	25.30	5.24	76.	1.95	41.1	22.8	.08	
150.	7.30	32.485	25.42	4.45	65.	2.11	45.5	24.8	.08	
200.	7.26	32.598	25.52	3.66	54.	2.22	49.0	26.1	.07	10.3
300.	7.16	32.776	25.67	2.95	43.	2.46	56.2	27.7	.14	

Cruise: 79.01 Area: Douglas Channel
Station: 8
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.2 W
Date: 9- 2-79
Time: 2230 Time zone: Z+8
Depth to bottom: 340. m
Wind speed: 0.0 kts Wind dir: 0 deg
Barometer: 29.89 in
Air temp: .5 deg C
Sea state: 0

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	4.14	29.516	23.45	6.88	92.	1.84	42.4	22.4	.22	94.0
5.	4.66	29.987	23.77	6.78	92.	1.86	42.3	22.6	.18	73.1
10.	5.09	30.320	23.99	6.59	90.	1.88	42.0	22.9	.14	
15.	5.19	30.681	24.26	6.50	90.	1.91	41.8	23.1	.12	
20.	5.32	30.885	24.41	6.41	89.	1.92	41.7	23.4	.10	
30.	5.61	31.245	24.66	6.13	86.	1.95	41.4	23.3	.20	
50.	6.31	31.707	24.94	5.71	81.	1.96	41.1	23.5	.11	12.7
75.	6.63	31.975	25.11	5.34	77.	1.98	41.1	23.4	.08	
100.	7.00	32.197	25.24	4.91	71.	2.00	42.0	23.7	.07	
150.	7.55	32.453	25.36	4.10	60.	2.11	44.6	25.1	.07	
200.	7.37	32.573	25.48	3.29	48.	2.27	48.5	26.9	.08	15.2
300.	7.18	32.738	25.64	2.72	40.	2.44	53.2	27.7	.11	

Cruise: 79.01 Area: Douglas Channel
Station: 81
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.2 W
Date: 10- 2-79
Time: 0245 Time zone: Z+8
Depth to bottom: 340. m
Wind speed: 12.0 Kts Wind dir: 50 deg
Barometer: 29.90 in
Air temp: -1.0 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	3.74	29.141	23.19			1.80	42.5	21.8	.35	201.0
5.	3.74	29.155	23.20			1.80	42.4	21.7	.25	169.1
10.	4.82	29.937	23.71			1.87	42.1	22.5		
15.	5.10	30.528	24.15			1.93	41.7	22.9		
20.	5.25	31.098	24.59			1.92	41.7	23.3		
29.	5.81	31.361	24.73			1.99	41.3	23.4		
48.	6.28	31.715	24.95			1.98	40.8	23.4	.12	15.8
73.	6.60	31.940	25.09			2.01	41.6	23.8		
98.	6.95	32.142	25.20			2.03	42.3	24.2		
145.	7.45	32.413	25.35			2.10	44.7	25.1		
193.	7.44	32.534	25.44			2.25	47.5	26.5	.13	9.1
290.	7.16	32.729	25.63			2.49	52.7	27.7		

Cruise: 79.01 Area: Douglas Channel
Station: 82
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 0 0.0 W
Date: 10- 2-79
Time: 0815 Time zone: Z+8
Depth to bottom: 340. m
Wind speed: 16.0 Kts Wind dir: 45 deg
Barometer: 29.89 in
Air temp: -2.8 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	1.60	29.762	23.84			1.86	42.5	21.9	.16	73.8
4.	4.21	29.764	23.64			1.83	40.5	21.8	.17	70.3
8.	4.61	29.974	23.76			1.86	41.1	21.9		
13.	5.01	30.356	24.03			1.89	41.2	22.3		
18.	5.23	30.791	24.35			1.94	41.5	22.7		
26.	5.68	31.298	24.70			1.97	41.1	23.0		
44.	6.26	31.683	24.93			1.98	41.0	23.3		
66.	6.50	31.894	25.07			1.99	40.7	23.3		
87.	6.85	32.074	25.16			2.02	41.4	23.7		
131.	7.49	32.418	25.35			2.11	43.4	24.8		
175.	7.47	32.519	25.43			2.22	45.9	26.1	.08	13.1
262.	7.22	32.688	25.59			2.40	50.3	27.5		

Cruise: 79.01 Area: Douglas Channel
Station: 83
Vessel: Sea Lion
Latitude: 53 50.0 N
Longitude: 128 48.2 W
Date: 10- 2-79
Time: 1115 Time zone: Z+8
Depth to bottom: 340. m
Wind speed: 25.0 Kts Wind dir: 40 deg
Barometer: 29.87 in
Air temp: -3.0 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	1.60	29.932	23.97			1.86	42.1	22.4	.17	85.7
4.	4.39	29.933	23.75			1.84	42.0	22.3	.18	111.4
8.	4.43	29.941	23.76			1.84	42.0	22.3		
11.	4.61	30.088	23.85			1.85	41.6	22.4		
15.	4.96	30.628	24.25			1.89	41.3	22.9		
23.	5.36	31.055	24.54			1.93	41.3	22.9		
38.	6.14	31.519	24.81			1.96	41.3	23.4		
57.	6.36	31.818	25.02			1.96	40.8	23.3	.09	16.2
77.	6.60	31.971	25.11			2.00	42.2	24.2		
115.	7.15	32.269	25.28			2.01	43.1	24.6		
153.	7.46	32.440	25.37			2.11	45.8	25.7		
230.	7.27	32.697	25.59			2.36	50.7	27.5	.08	13.9

Cruise: 79.01 Area: Douglas Channel
Station: 84
Vessel: Sea lion
Latitude: 53 50.0 N
Longitude: 128 48.2 W
Date: 10- 2-79
Time: 1630 Time zone: Z+8
Depth to bottom: 340. m
Wind speed: 35.0 Kts Wind dir: 40 deg
Barometer: 29.79 in
Air temp: -5.0 deg C
Sea state: 3

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	4.48	30.323	24.05			1.85	42.4	22.8		23.8
4.	4.66	30.340	24.05			1.86	41.9	22.7		37.0
8.	4.62	30.337	24.05			1.82	41.8	22.8		
11.	4.73	30.368	24.06			1.84	41.7	22.7		
15.	4.79	30.370	24.06			1.83	41.6	22.9		
23.	4.85	30.399	24.08			1.84	41.8	23.0		
38.	5.96	31.497	24.82			1.92	41.4	23.4		
57.	6.32	31.798	25.01			1.92	40.7	23.3		19.5
77.	6.49	31.936	25.10			1.92	40.7	23.6		
115.	7.01	32.230	25.26			1.99	43.3	24.0		
153.	7.52	32.436	25.36			2.08	45.6	25.1		
230.	7.29	32.661	25.56			2.31	50.8	27.4		17.7

Cruise: 79.01 Area: Kitimat Arm
Station: 9
Vessel: Sea Lion
Latitude: 53 55.9 N
Longitude: 128 42.0 W
Date: 11- 2-79
Time: 0700 Time zone: Z+8
Depth to bottom: 220. m
Wind speed: 25.0 kts Wind dir: 0 deg
Barometer: 29.90 in
Air temp: -7.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	4.72	31.116	24.66	6.27	86.	1.88	42.4	23.4		49.5
4.	5.14	31.115	24.61	6.28	87.	1.86	42.4	23.4		43.1
8.	4.95	31.121	24.64	6.26	86.	1.85	42.4	23.3		
12.	4.87	31.177	24.69	6.12	84.	1.87	42.5	23.4		
17.	5.12	31.312	24.77	5.95	82.	1.87	42.2	23.3		
25.	5.60	31.483	24.85	5.73	80.	1.90	42.1	23.8	.03	
41.	6.30	31.636	24.89	5.48	78.	1.90	43.4	23.8		94.9
62.	6.35	31.870	25.07	5.10	73.	1.96	44.1	24.8	.05	
83.	6.71	32.023	25.14	4.47	64.	2.00	44.6	25.5	.16	
124.	7.53	32.476	25.39	3.68	54.	2.02	43.7	25.2	.07	
158.	7.43	32.517	25.43	3.29	48.	2.14	46.9	26.6	.06	

Cruise: 79.01 Area: Kitimat Arm
Station: 10
Vessel: Sea Lion
Latitude: 53 59.1 N
Longitude: 128 40.6 W
Date: 11- 2-79
Time: -999 Time zone: Z+8
Depth to bottom: 100. m
Wind speed: 20.0 kts Wind dir: 0 deg
Barometer: 29.94 in
Air temp: -6.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	5.33	31.233	24.68	6.06	84.	1.87	41.3	23.0	.24	222.2
5.	5.10	31.238	24.71	6.06	84.	1.89	41.8	23.1	.19	338.9
10.	5.47	31.275	24.70	5.92	82.	1.92	41.7	23.1	.18	
15.	5.81	31.592	24.91	5.65	79.	1.92	42.0	23.6	.13	
20.	6.11	31.657	24.93	5.55	79.	1.92	41.8	23.7	.11	
30.	5.94	31.739	25.01	5.51	78.	1.92	41.9	24.0	.12	
50.	6.33	31.828	25.03	5.29	75.	1.96	43.0	24.3	.20	888.3
75.	6.73	32.084	25.19	4.78	69.	1.99	43.5	24.9	.13	
90.	7.06			4.29		2.03	44.5	25.3	.21	

Cruise: 79.01 Area: Kildala Arm
Station: 11
Vessel: Sea Lion
Latitude: 53 50.3 N
Longitude: 128 35.6 W
Date: 11- 2-79
Time: 0345 Time zone: Z+8
Depth to bottom: 205. m
Wind speed: 10.0 kts Wind dir: 310 deg
Barometer: 29.70 in
Air temp: -5.0 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	1.26	26.283	21.07	7.58	92.	1.43	47.3	20.0	.35	16.9
5.	3.83	29.798	23.70	6.86	91.	1.69	43.5	22.2	.17	12.5
10.	4.93	30.341	24.02	6.71	92.	1.74	43.3	22.7	.15	
15.	5.01	31.019	24.55	5.87	81.	1.80	42.9	23.6	.16	
20.	6.17	31.294	24.63	4.92	70.	1.82	42.1	23.9	.09	
30.	5.71	31.541	24.88	5.46	77.	1.86	42.2	24.1	.17	
50.	6.58	31.795	24.98	5.09	73.	1.89	42.9	24.6	.16	15.1
75.	7.30	32.179	25.18	3.78	55.	2.01	44.6	26.1		
100.	7.36	32.350	25.31	4.02	59.	2.03	45.3	24.7	.17	22.9
175.	7.37	32.498	25.42	3.02	44.	2.24	49.4	27.7	.22	

Cruise: 79.01 Area: Gardner Canal
Station: 14
Vessel: Sea Lion
Latitude: 53 27.5 N
Longitude: 128 36.8 W
Date: 12- 2-79
Time: 1215 Time zone: Z+8
Depth to bottom: 240. m
Wind speed: 15.0 kts Wind dir: 160 deg
Barometer: 29.77 in
Air temp: -6.5 deg C
Sea state: 1

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp ppm	Sol PAH ng/l
1.	4.29	29.408	23.35	6.11	82.	1.79		22.7	.31	6.0
5.	5.37	29.397	23.23	6.15	84.	1.79		22.5	.18	6.8
10.	5.29	29.975	23.70	5.79	80.	1.82		23.2	.18	
15.	5.87	29.968	23.63	5.74	80.	1.83	45.8	23.3	.16	
20.	5.86	30.060	23.70	5.91	82.	1.84	44.9	23.2	.16	
30.	5.85	30.780	24.27	5.56	78.	1.87	44.7	23.7	.14	
50.	6.87	31.651	24.83	5.07	73.	1.89	45.5	24.2	.14	15.1
75.	6.99	31.725	24.87	4.97	72.	1.97	45.0	24.4	.13	
100.	6.90	31.772	24.92	4.88	71.	1.99	44.1	24.4		
150.	7.31	31.868	24.94	4.65	68.	2.00	44.2	24.4		
200.	7.31	31.936	24.99	4.57	67.	2.03	43.9	24.5	.15	36.0

Cruise: 79.01 Area: Verney Passage
Station: 15
Vessel: Sea Lion
Latitude: 53 28.0 N
Longitude: 129 4.2 W
Date: 12- 2-79
Time: 1945 Time zone: Z+8
Depth to bottom: 205. m
Wind speed: 30.0 Kts Wind dir: 10 deg
Barometer: 29.42 in
Air temp: -8.3 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.	4.44	30.127	23.90	6.36	86.	1.84	42.6	22.8	.20	16.1
5.	4.94	30.445	24.10	6.13	84.	1.85	42.9	23.2	.17	9.5
10.	5.45	30.912	24.42	5.89	82.	1.88	43.1	23.4	.17	
15.	5.63	31.225	24.64	5.67	79.	1.91	43.6	23.7	.15	
20.	5.71	31.287	24.68			1.92	43.2	23.9	.15	
29.	5.81	31.344	24.72	5.98	84.	1.92	43.0	23.8	.19	
49.	6.25	31.560	24.83	5.51	78.	1.94	43.1	23.9	.17	
73.	6.55	31.798	24.98	5.36	77.	1.95	43.1	24.6	.12	
98.	6.61	32.062	25.18	5.42	78.	1.94	42.7	23.8	.11	37.8
149.	6.99	32.311	25.33	4.87	71.	2.01	44.7	24.5	.23	

Cruise: 79.01 Area: Ursula Channel
Station: 16
Vessel: Sea Lion
Latitude: 53 25.9 N
Longitude: 128 55.5 W
Date: 13- 2-79
Time: 0115 Time zone: Z+8
Depth to bottom: 430. m
Wind speed: 20.0 Kts Wind dir: 330 deg
Barometer: 29.30 in
Air temp: -9.0 deg C
Sea state: 2

Depth m	T deg C	S ppt	sigma-t	O2 ml/l	O2 sat %	PO4	SiO3	NO3	Susp Sol ppm	PAH ng/l
1.		31.226		5.82		1.92	46.5	23.8	.19	6.4
5.	5.27	31.243	24.70	5.82	81.	1.92	46.5	23.8	.20	7.2
10.	5.59	31.293	24.70	5.77	81.	1.94	47.2	24.0	.17	
15.	5.21	31.367	24.80	5.83	81.	1.98	47.6	24.5	.11	
20.	5.99	31.561	24.87	5.66	80.	1.97	47.3	24.1	.10	
30.	6.17	31.811	25.04	5.15	73.	2.00	47.1	24.5	.11	
50.	6.83	31.983	25.09	4.90	71.	2.04	48.6	25.2	.09	
75.	6.76	32.093	25.19	5.01	72.	2.01	46.5	24.5	.09	
100.	6.88	32.184	25.24	4.95	72.	2.00	43.9	24.5	.07	
200.	7.49	32.479	25.39	3.89	57.	2.14	47.1	26.1	.12	26.3
300.	7.29	32.675	25.57	3.44	50.	2.24	50.7	26.4	.15	
400.	7.42	32.757	25.62	3.21	47.	2.29	53.7	27.3	.16	

Appendix B

CTD PROFILES

CRUISE 78.01

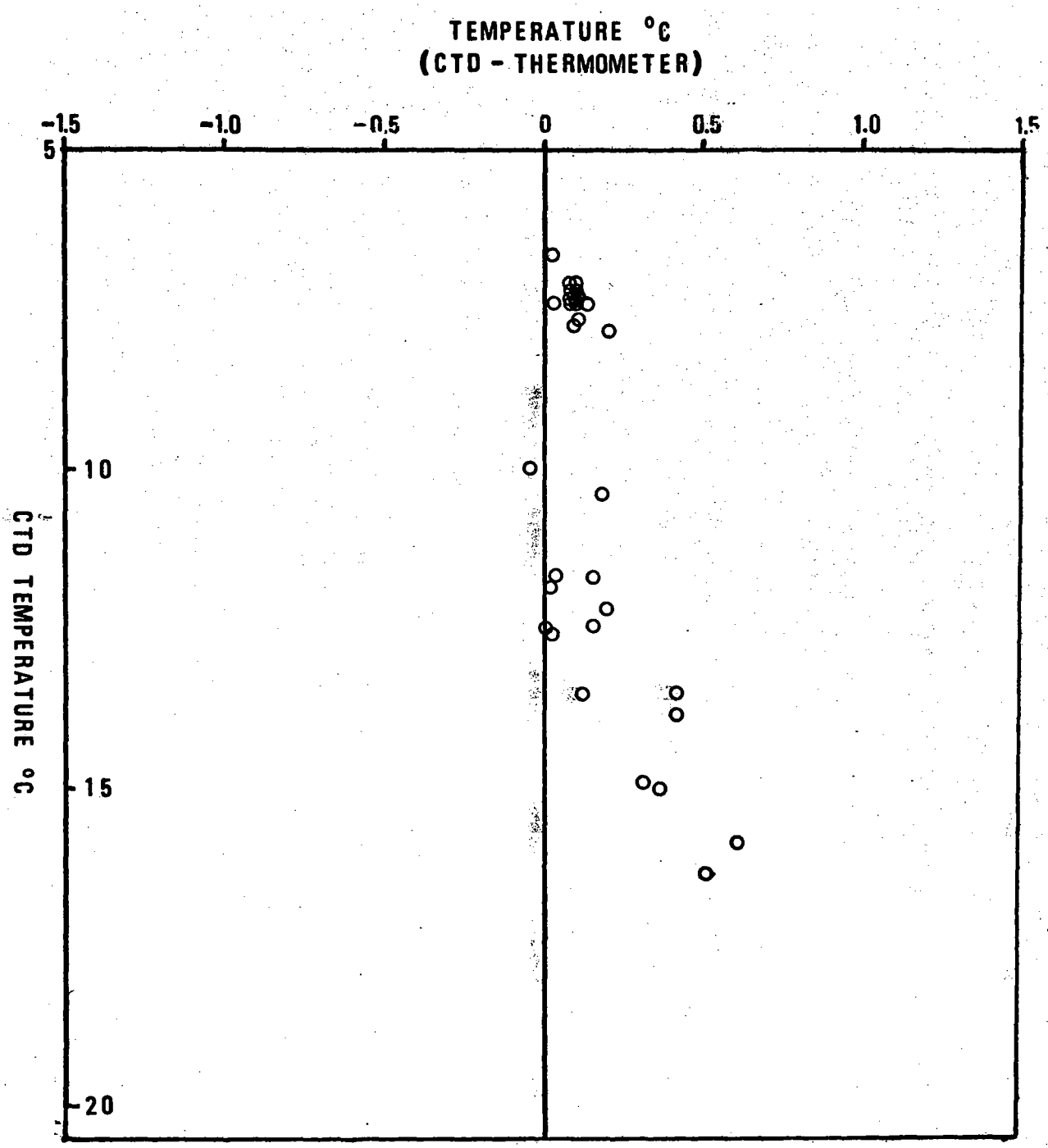


Figure 17. Temperature difference, CTD vs thermometer, June 1978

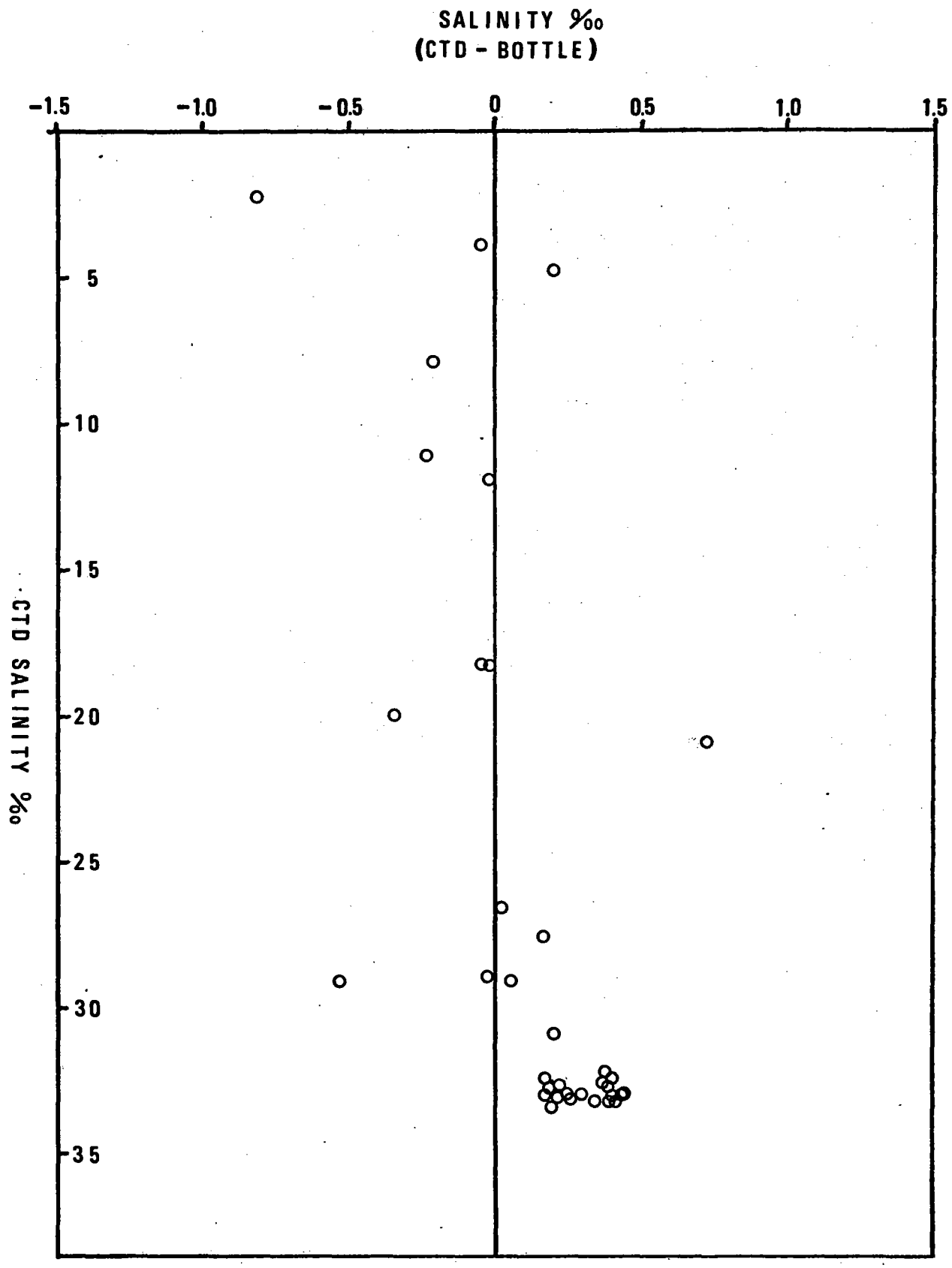
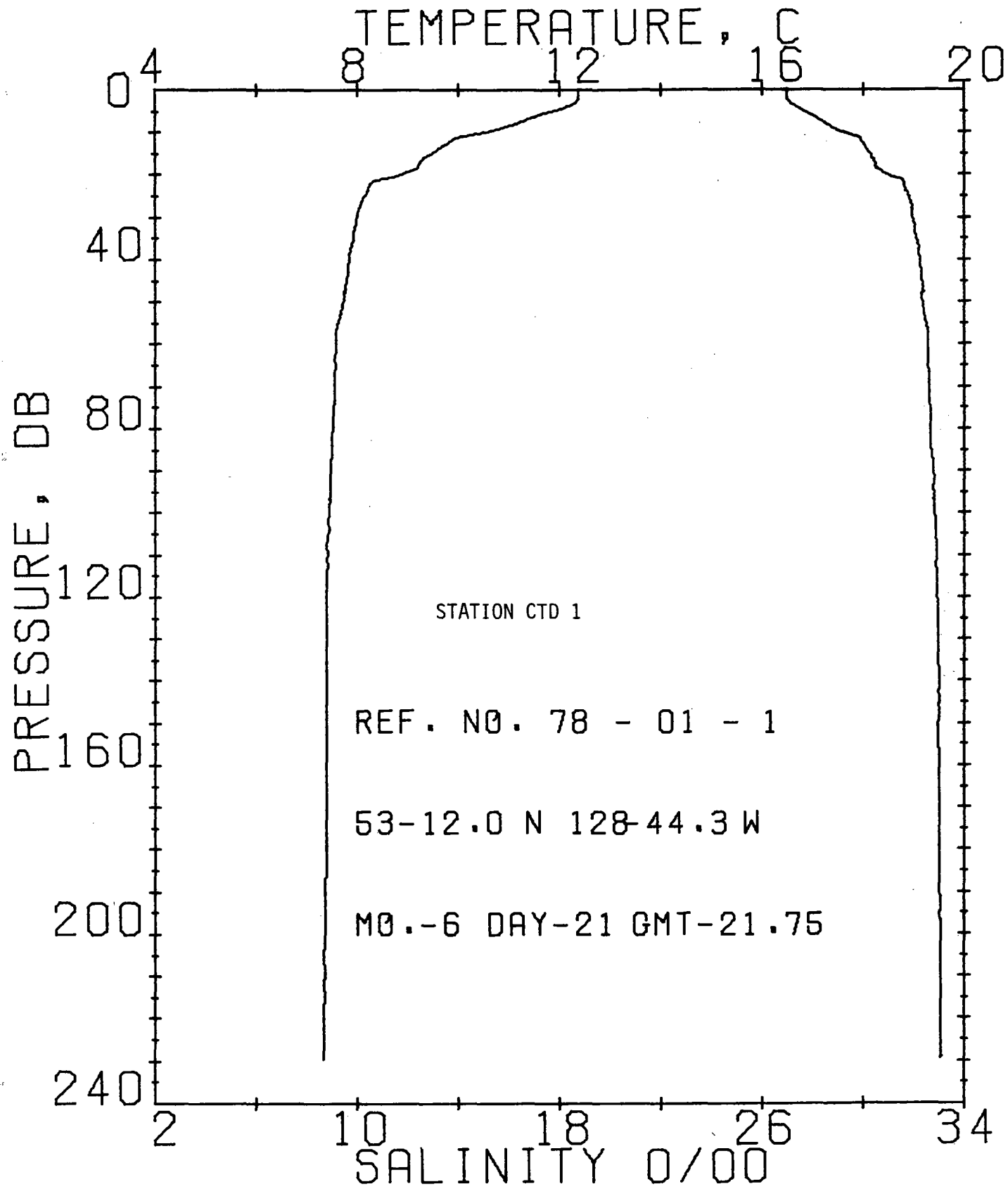
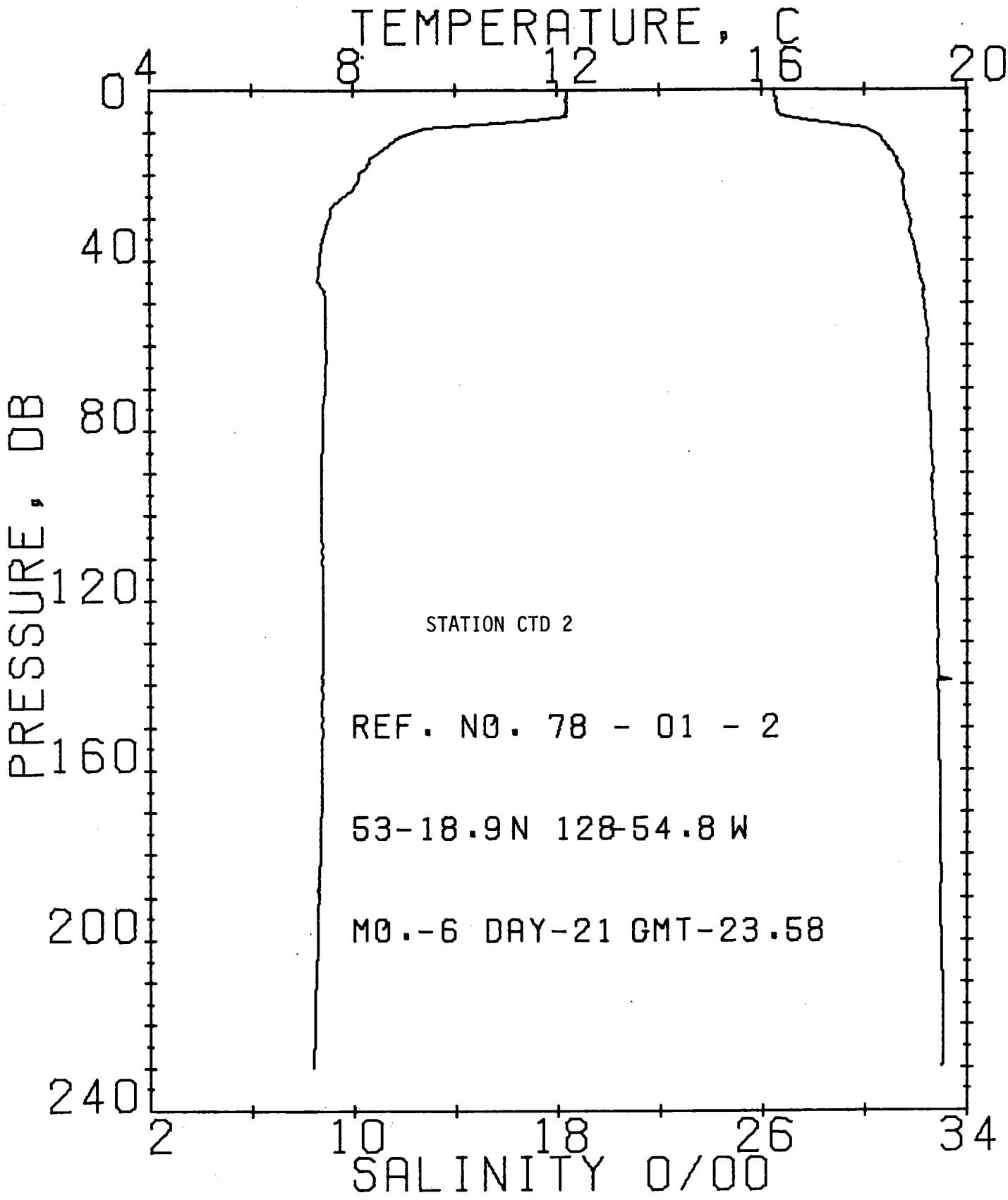
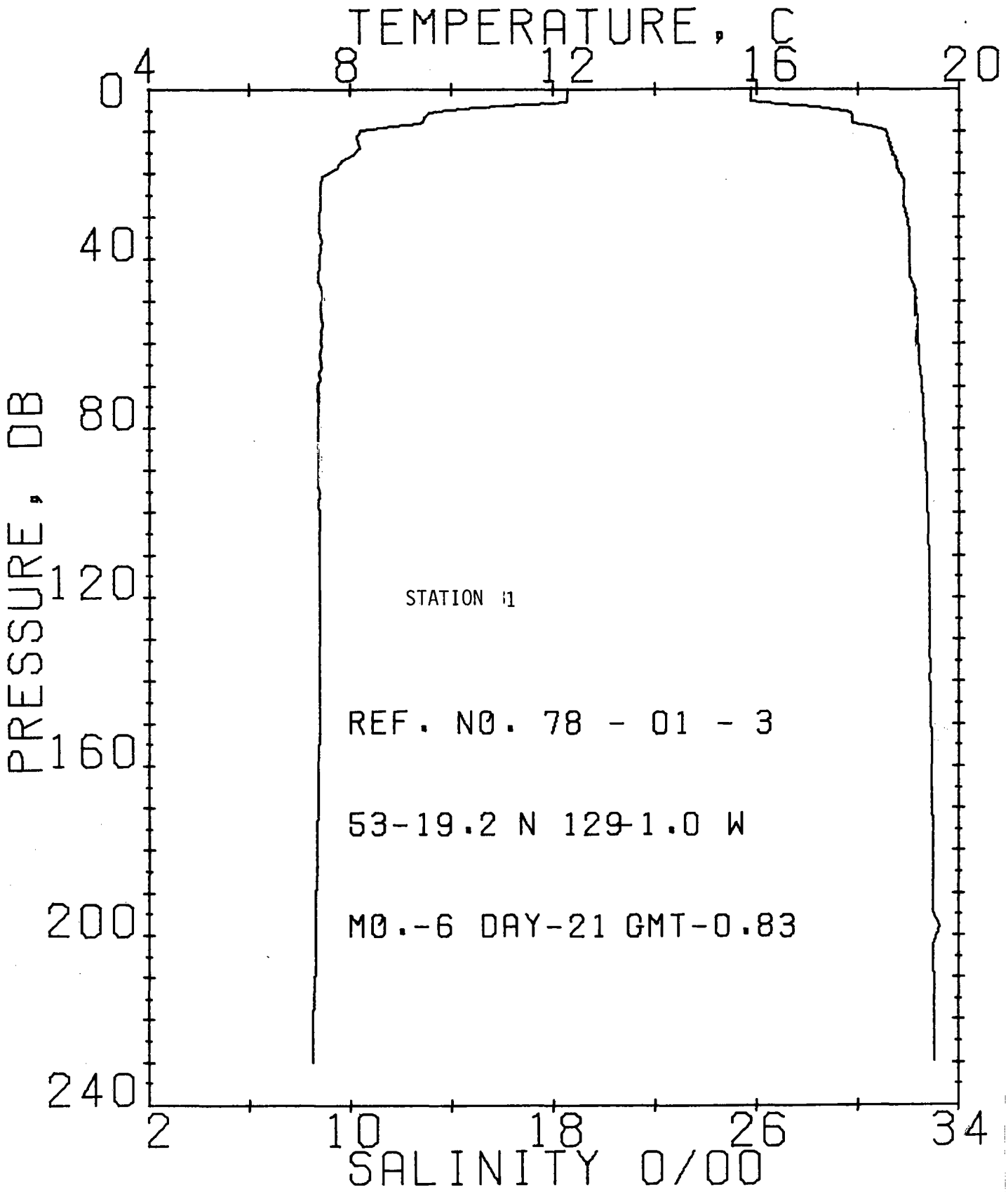
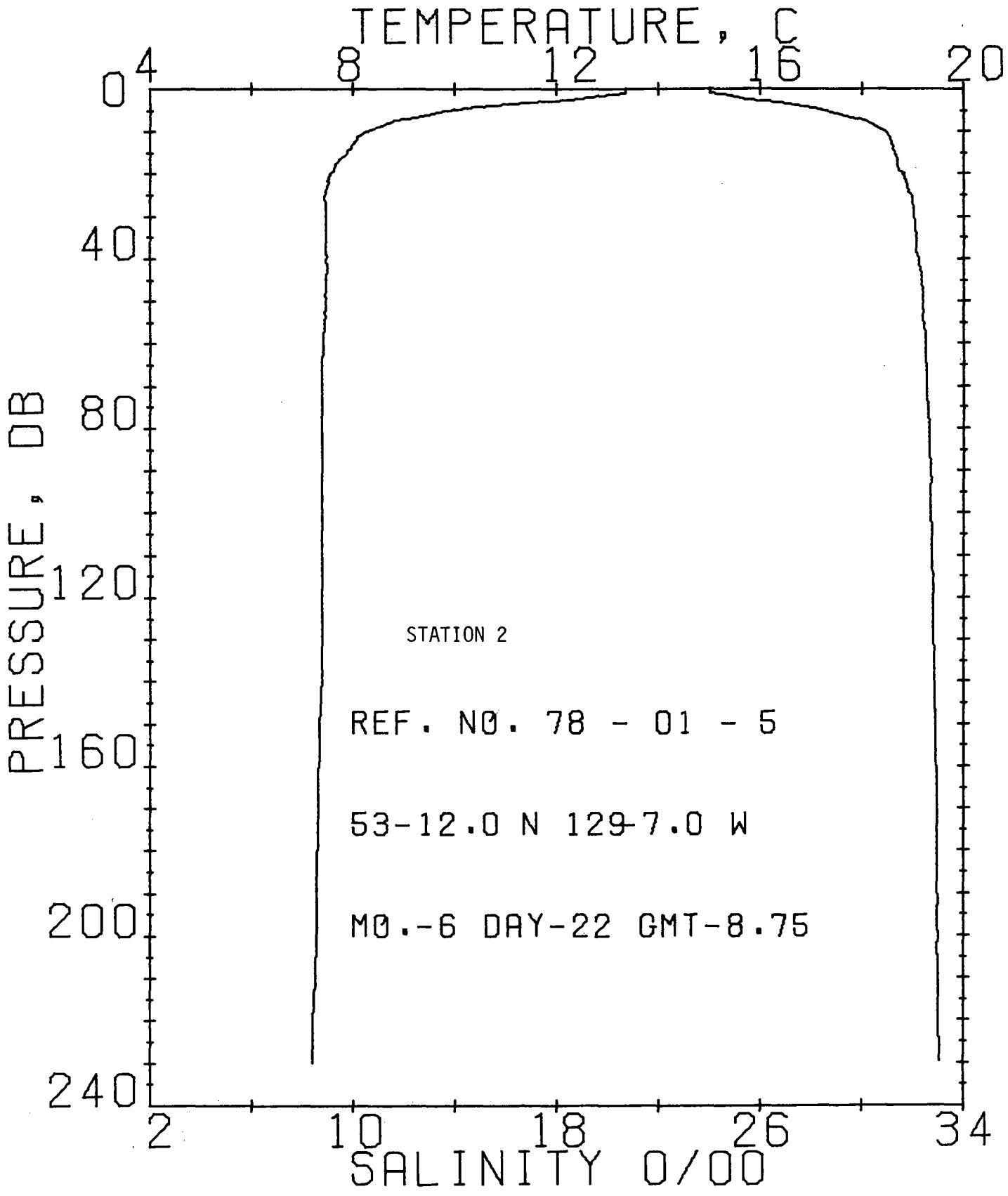


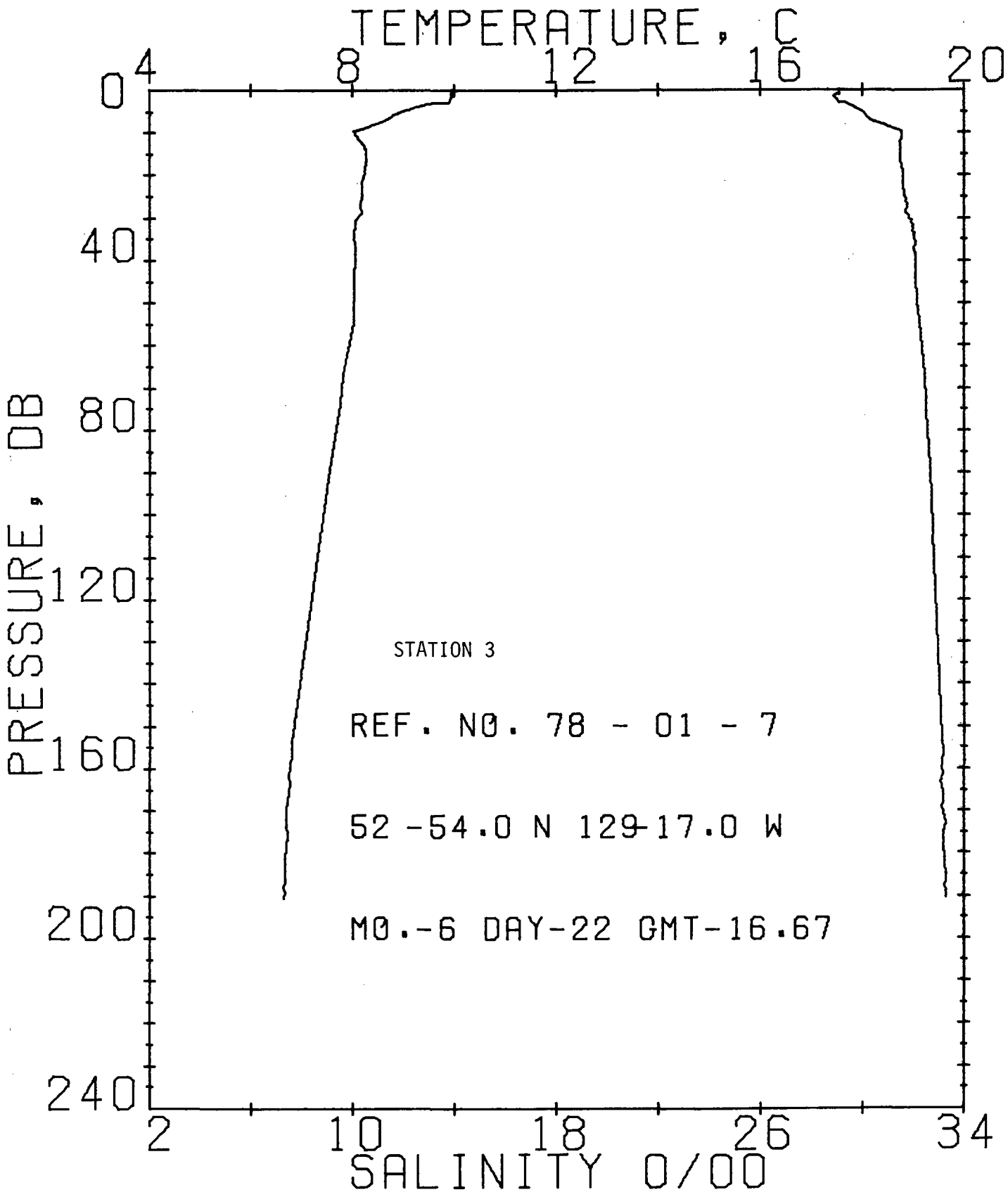
Figure 18. Salinity difference, CTD vs bottles, June 1978.

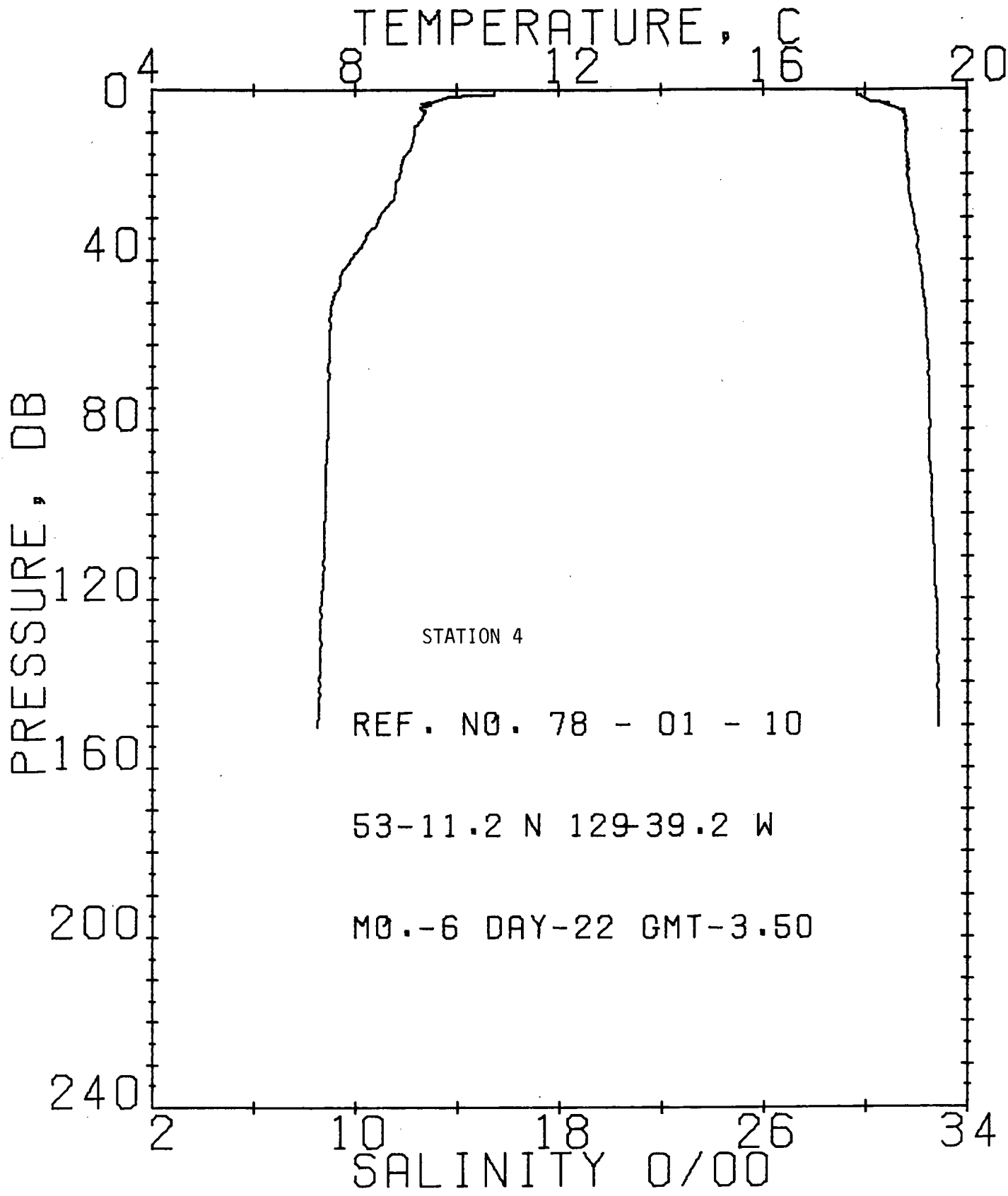

TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION CTD 1
REF. NO. 78 - 01 - 1
53-12.0 N 128-44.3 W
MO.-6 DAY-21 GMT-21.75
2
10
18
26
34
SALINITY O/OO

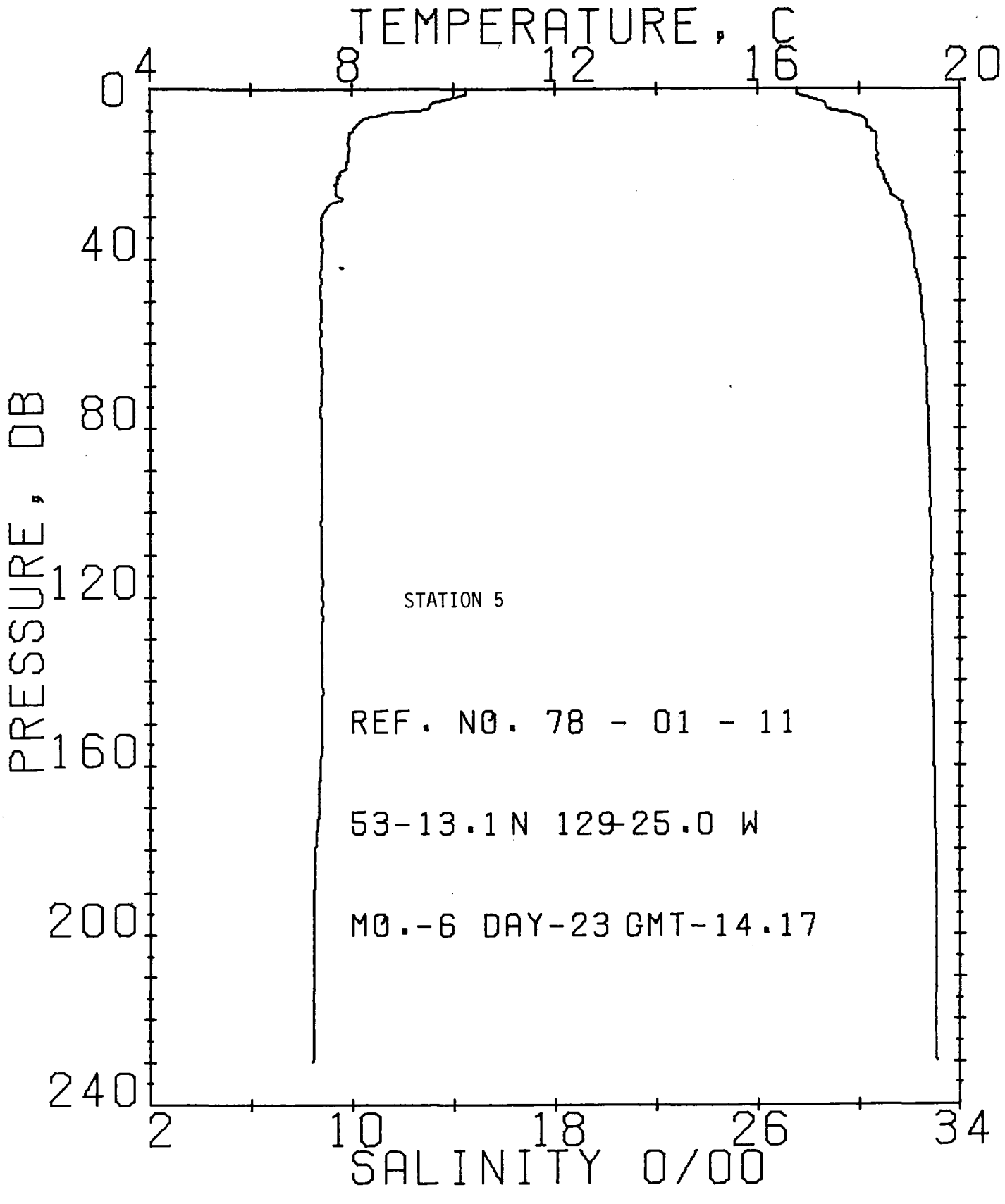

TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION CTD 2
REF. NO. 78 - 01 - 2
53-18.9N 128-54.8 W
MO.-6 DAY-21 GMT-23.58
2
10
18
26
34
SALINITY O/OO

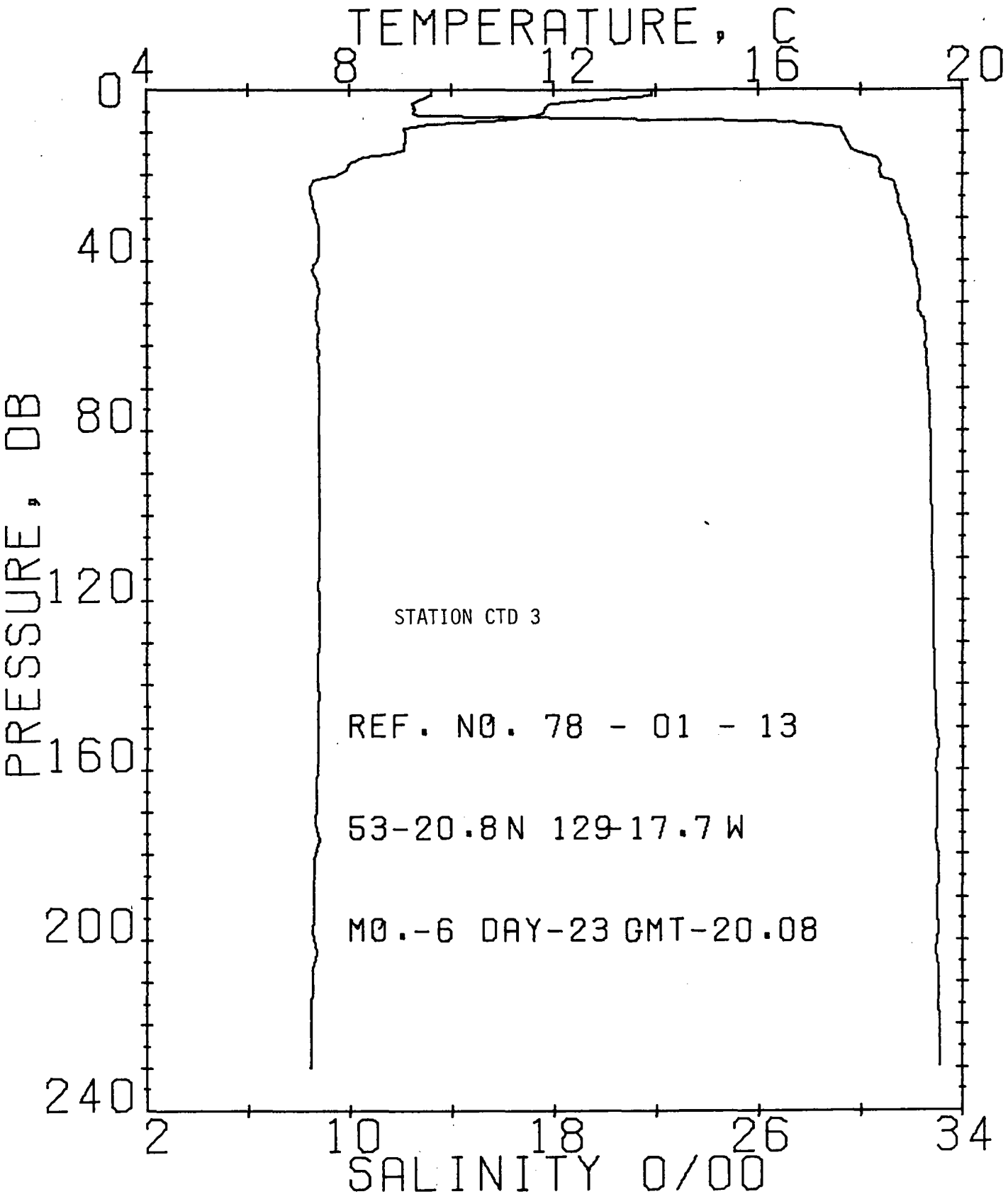

TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION #1
REF. NO. 78 - 01 - 3
53-19.2 N 129-1.0 W
MO.-6 DAY-21 GMT-0.83
2
10
18
26
34
SALINITY O/OO

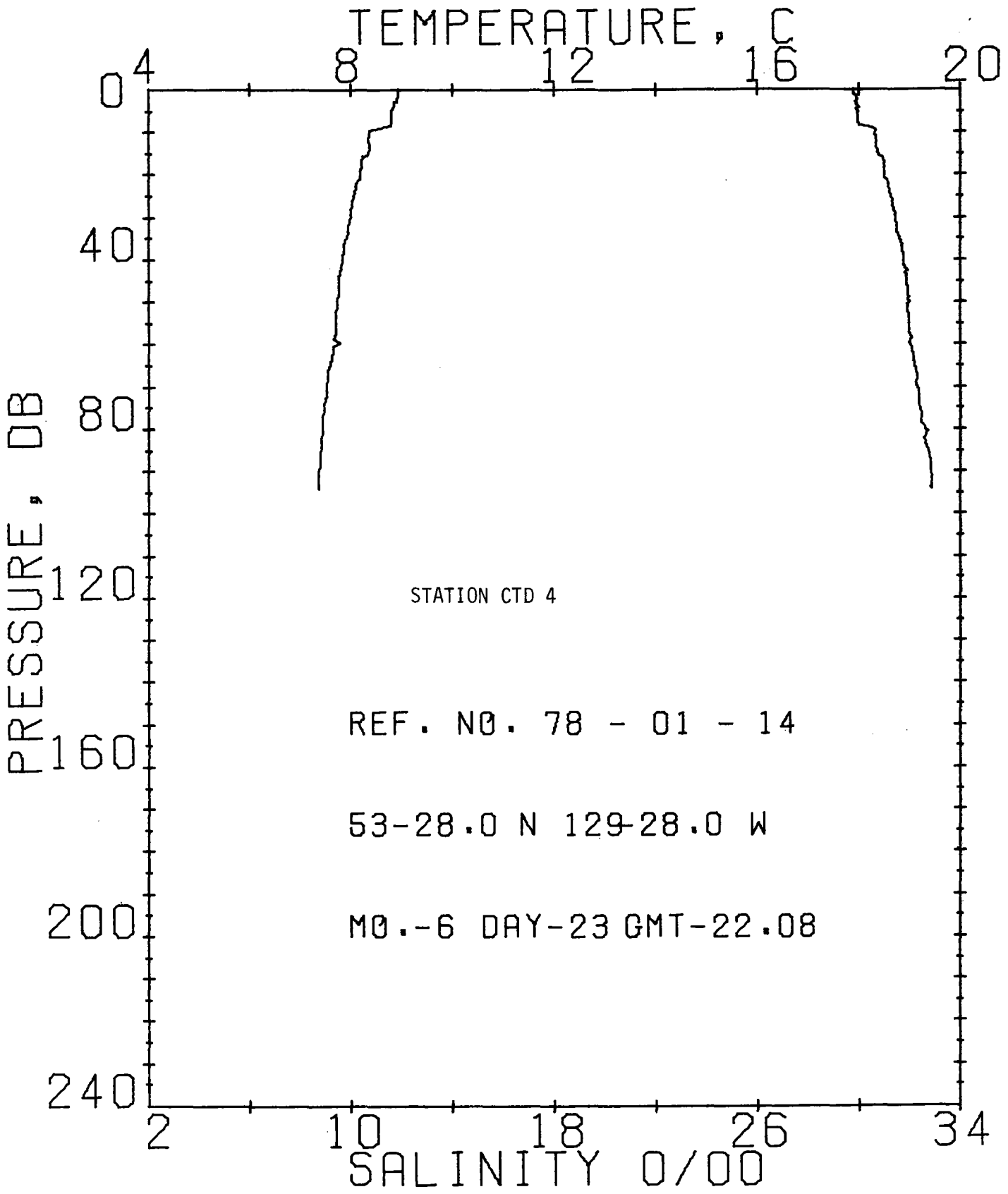

TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION 2
REF. NO. 78 - 01 - 5
53-12.0 N 129-7.0 W
MO.-6 DAY-22 GMT-8.75
2
10
18
26
34
SALINITY O/OO


TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION 3
REF. NO. 78 - 01 - 7
52 -54.0 N 129-17.0 W
MO.-6 DAY-22 GMT-16.67
2
10
18
26
34
SALINITY O/OO


TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION 4
REF. NO. 78 - 01 - 10
53-11.2 N 129-39.2 W
MO.-6 DAY-22 GMT-3.50
2
10
18
26
34
SALINITY O/OO


TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION 5
REF. NO. 78 - 01 - 11
53-13.1 N 129-25.0 W
MO.-6 DAY-23 GMT-14.17
2
10
18
26
34
SALINITY O/OO


TEMPERATURE, C
0
4
8
12
16
20
40
80
120
160
200
240
PRESSURE, DB
STATION CTD 3
REF. NO. 78 - 01 - 13
53-20.8N 129-17.7 W
MO.-6 DAY-23 GMT-20.08
2
10
18
26
34
SALINITY O/OO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STATION CTD 4
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53-28.0 N 129-28.0 W
MO.-6 DAY-23 GMT-22.08
2
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34
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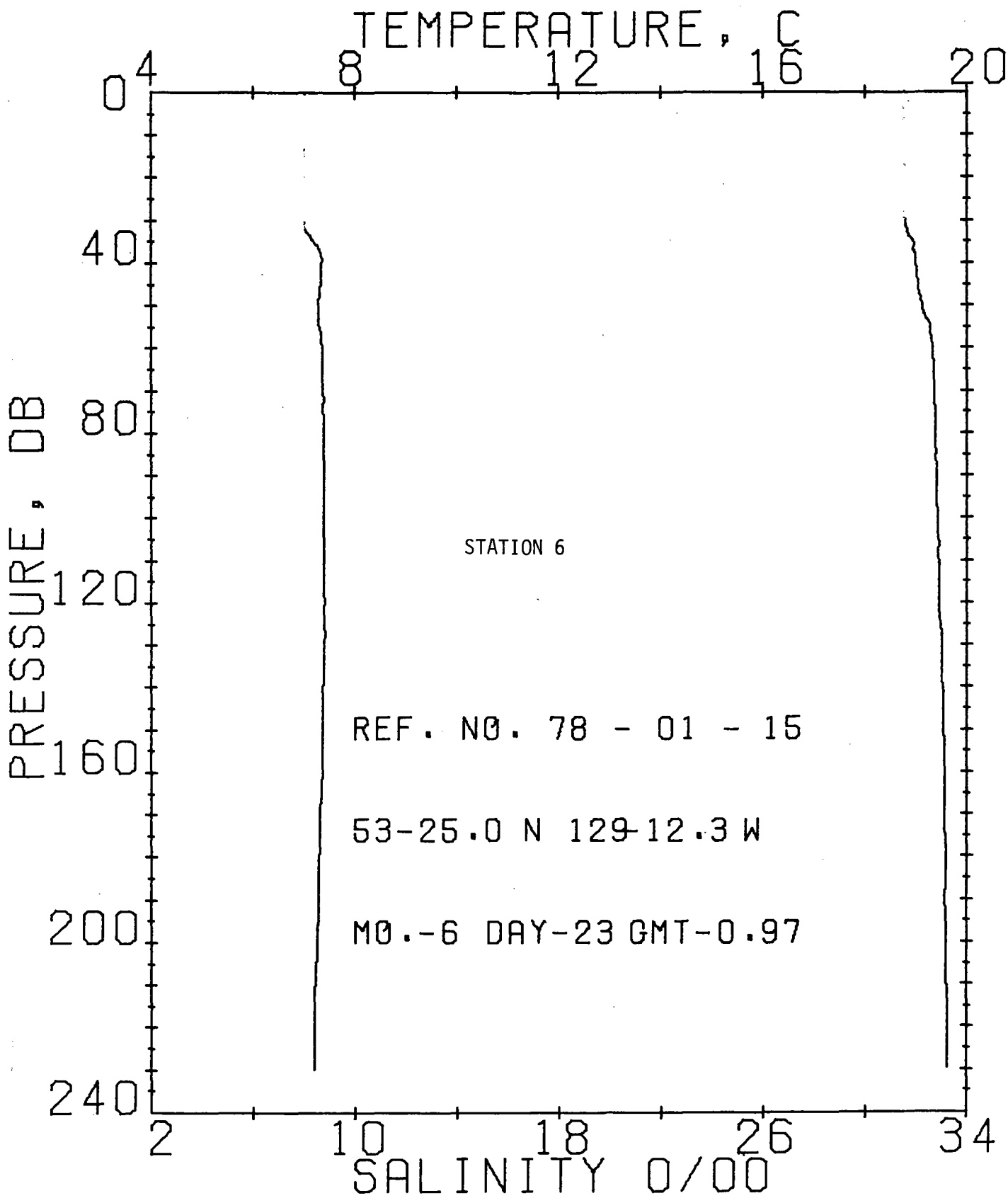
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STATION 6
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MO.-6 DAY-23 GMT-0.97
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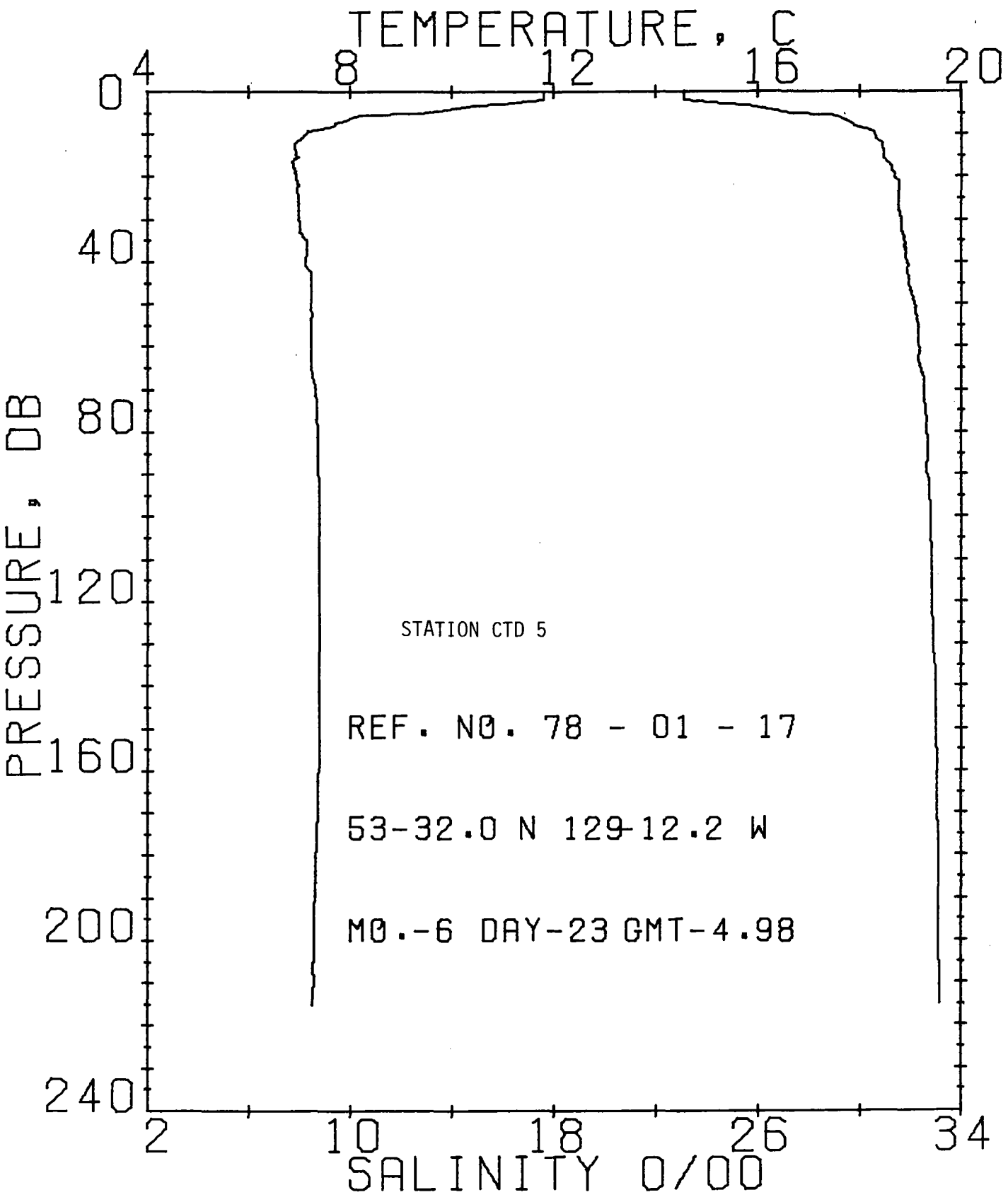
SALINITY O/OO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STATION CTD 5
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MO.-6 DAY-23 GMT-4.98
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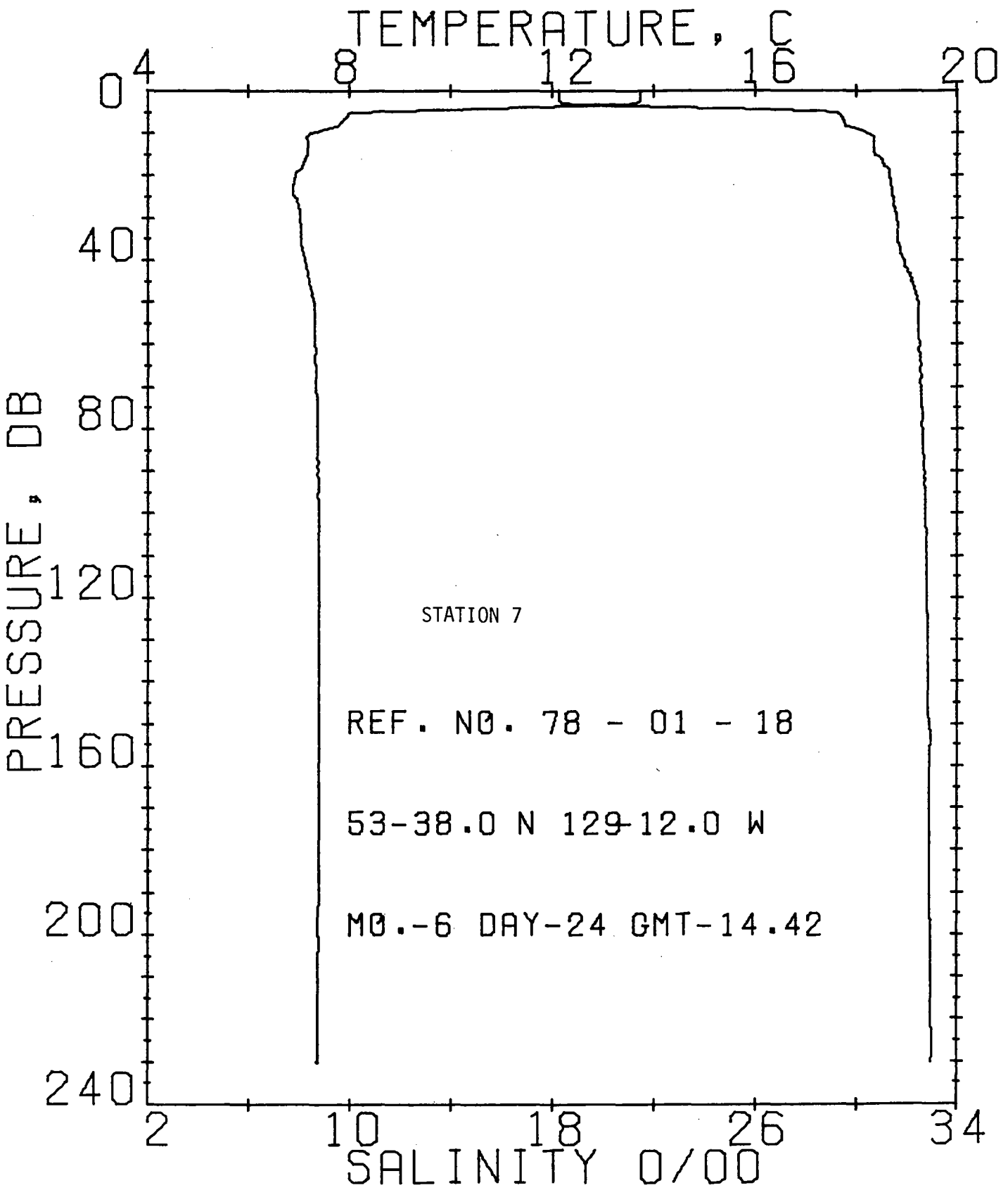
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PRESSURE, DB
STATION 7
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MO.-6 DAY-24 GMT-14.42
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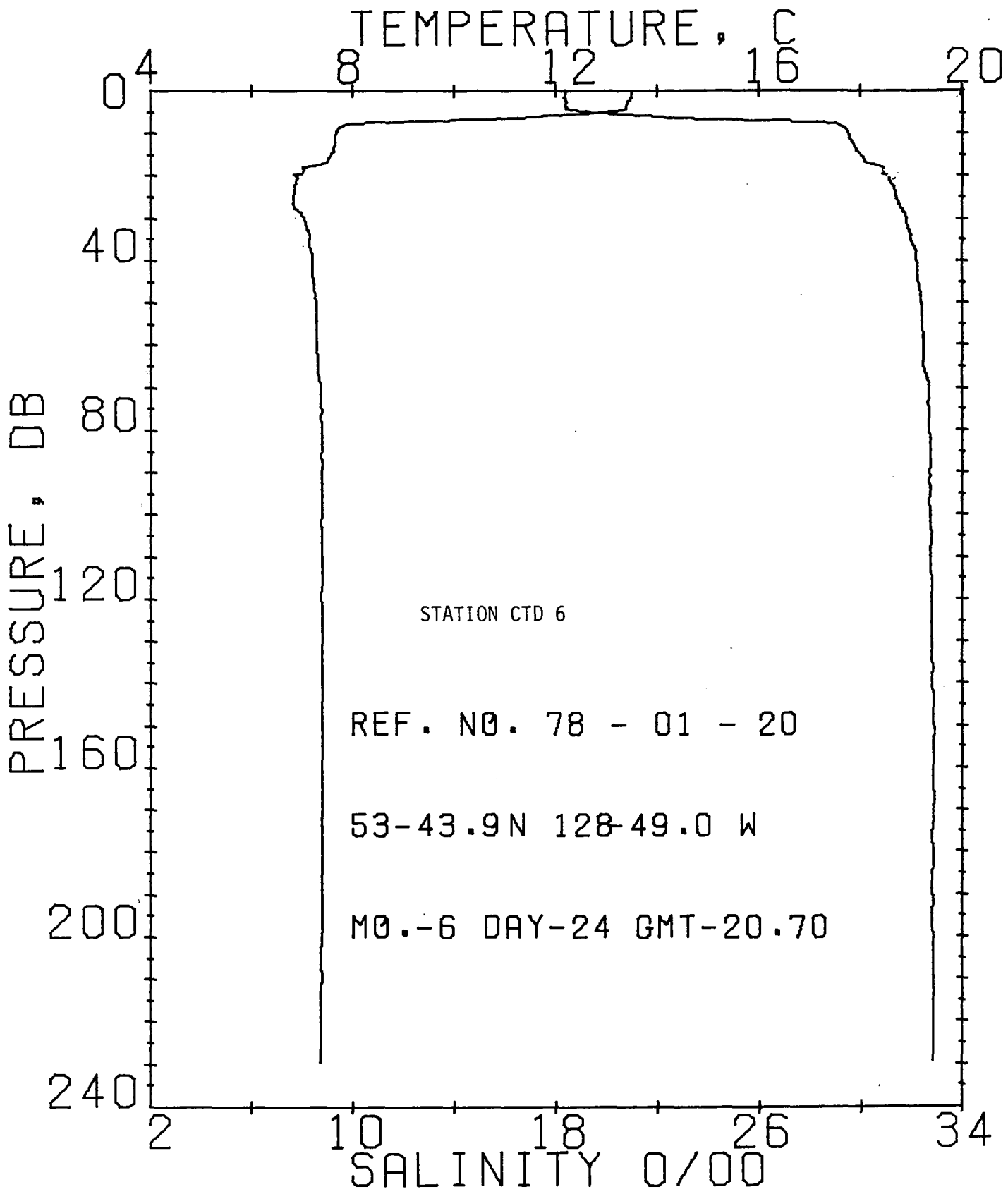
34
SALINITY O/OO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PRESSURE, DB
STATION CTD 6
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MO.-6 DAY-24 GMT-20.70
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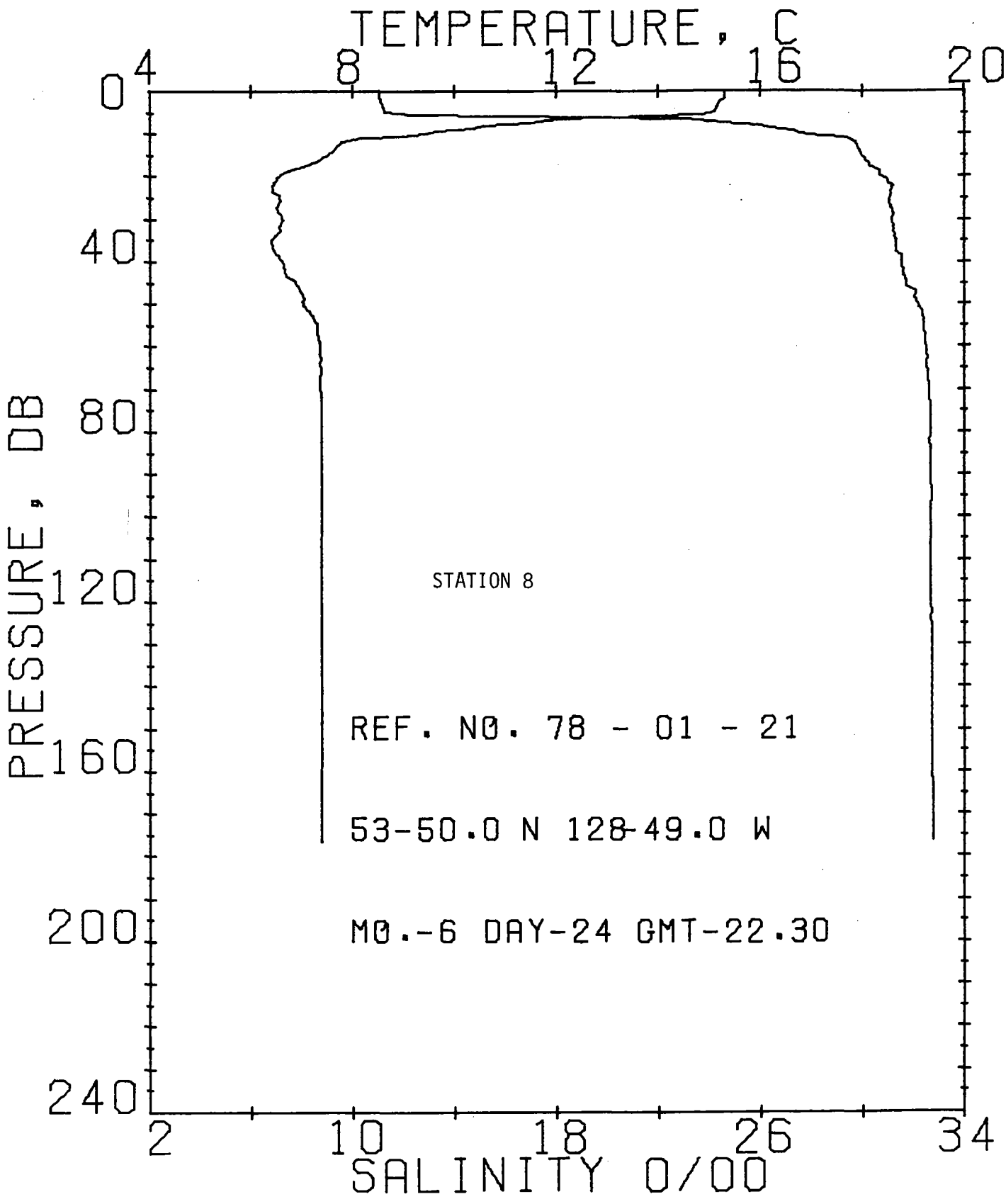
SALINITY O/OO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STATION 8
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MO.-6 DAY-24 GMT-22.30
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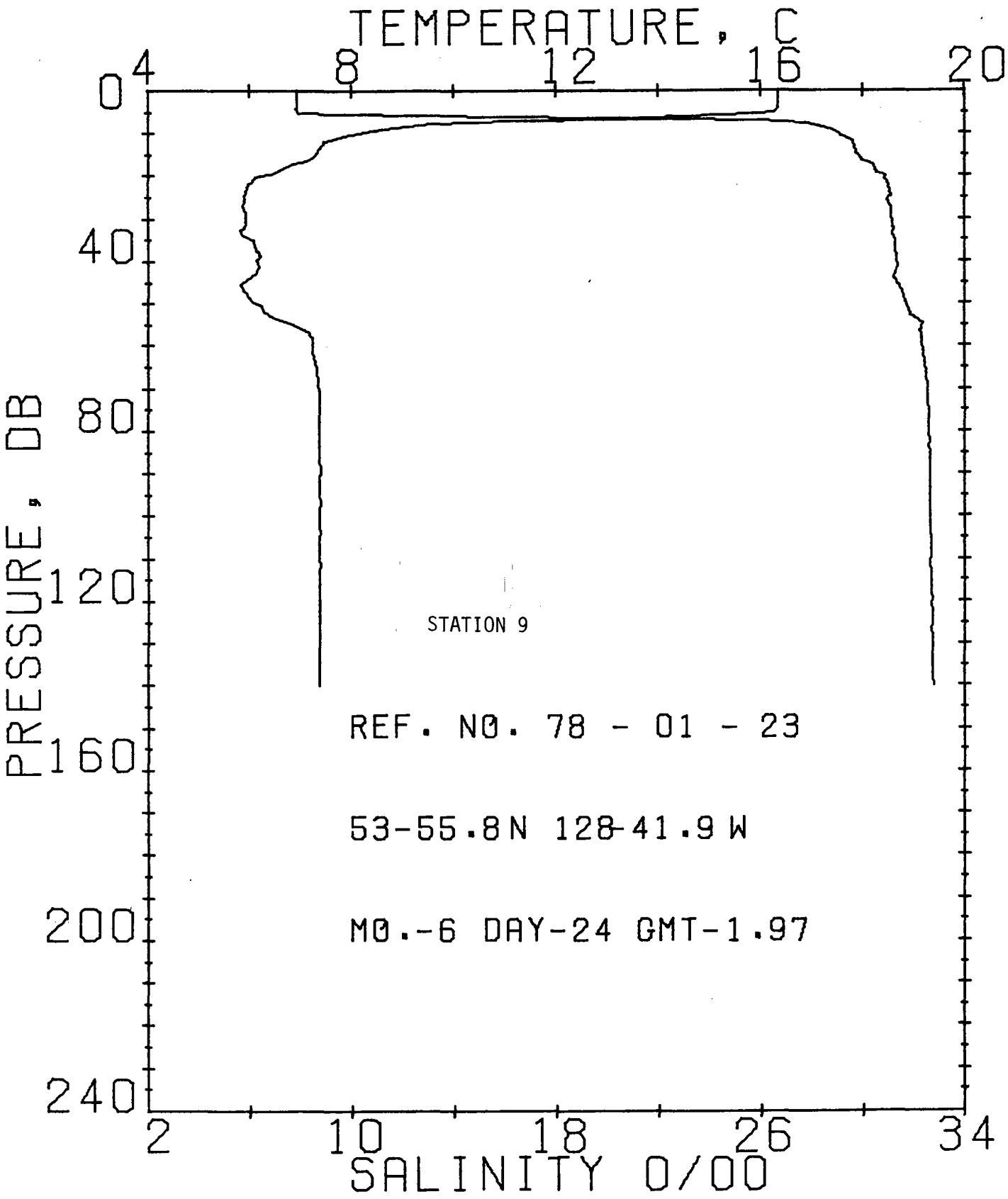
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PRESSURE, DB
STATION 9
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MO.-6 DAY-24 GMT-1.97
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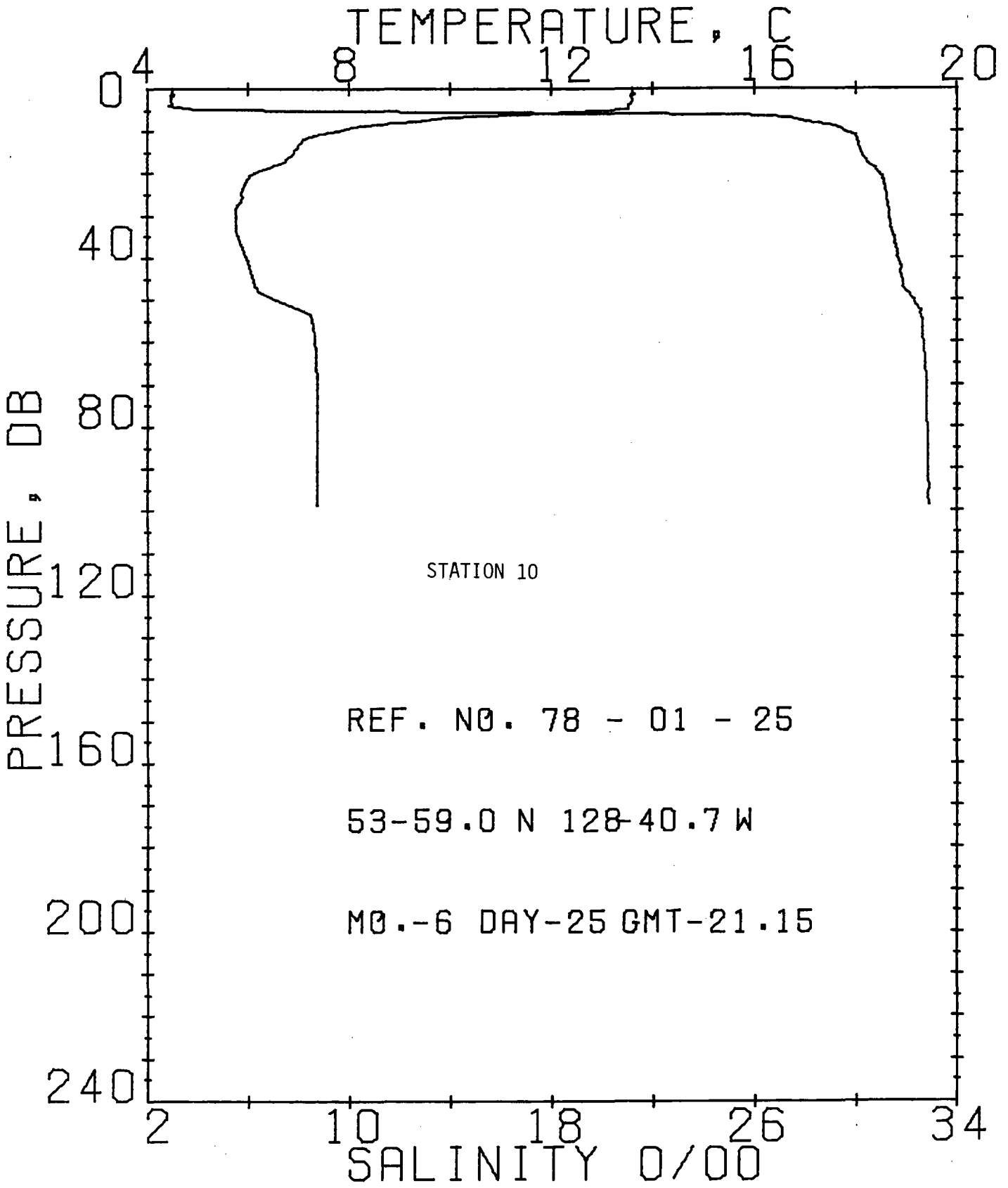
34
SALINITY O/OO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PRESSURE, DB
STATION 10
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MO.-6 DAY-25 GMT-21.15
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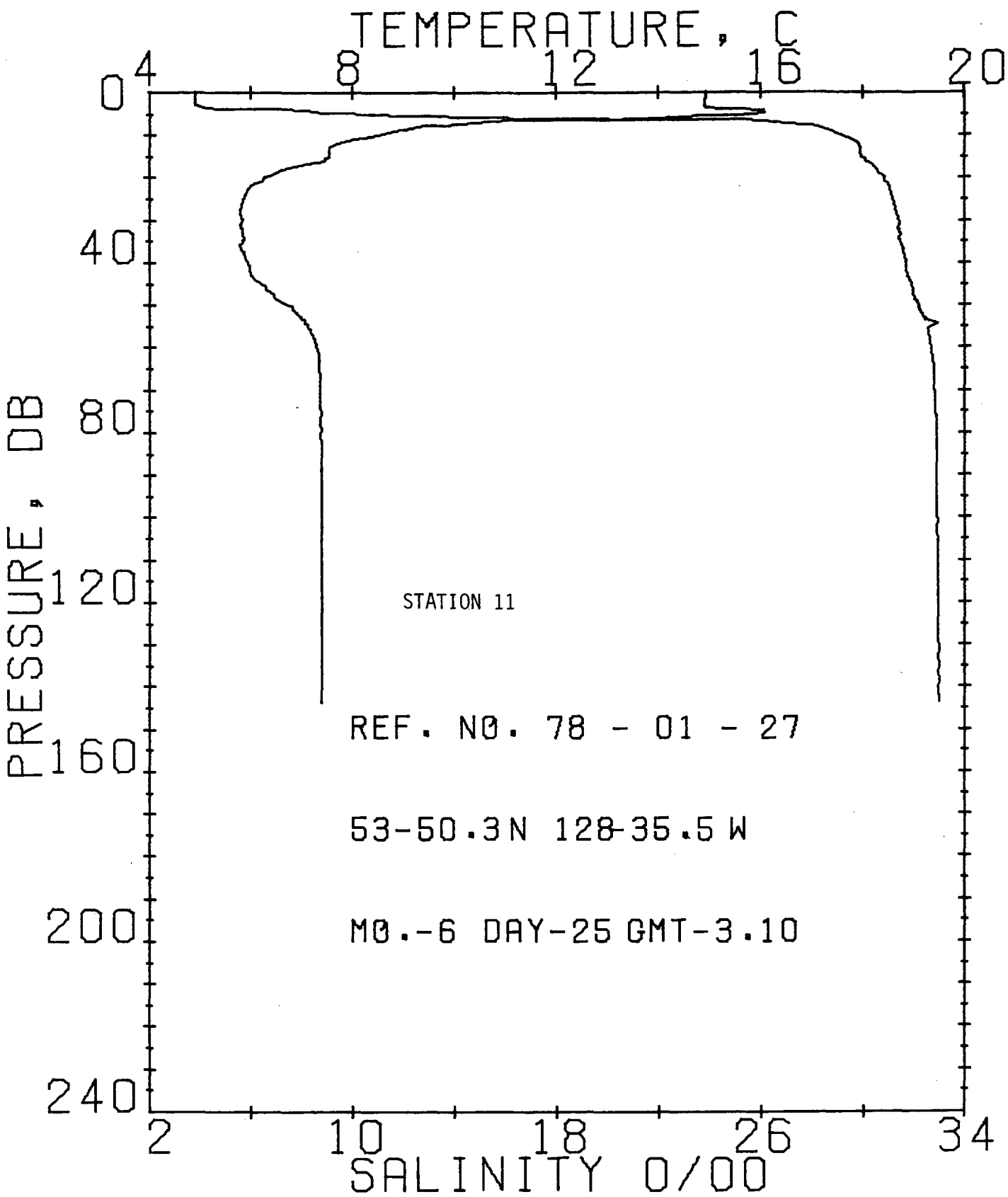
SALINITY O/OO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PRESSURE, DB
STATION 11
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MO.-6 DAY-25 GMT-3.10
2
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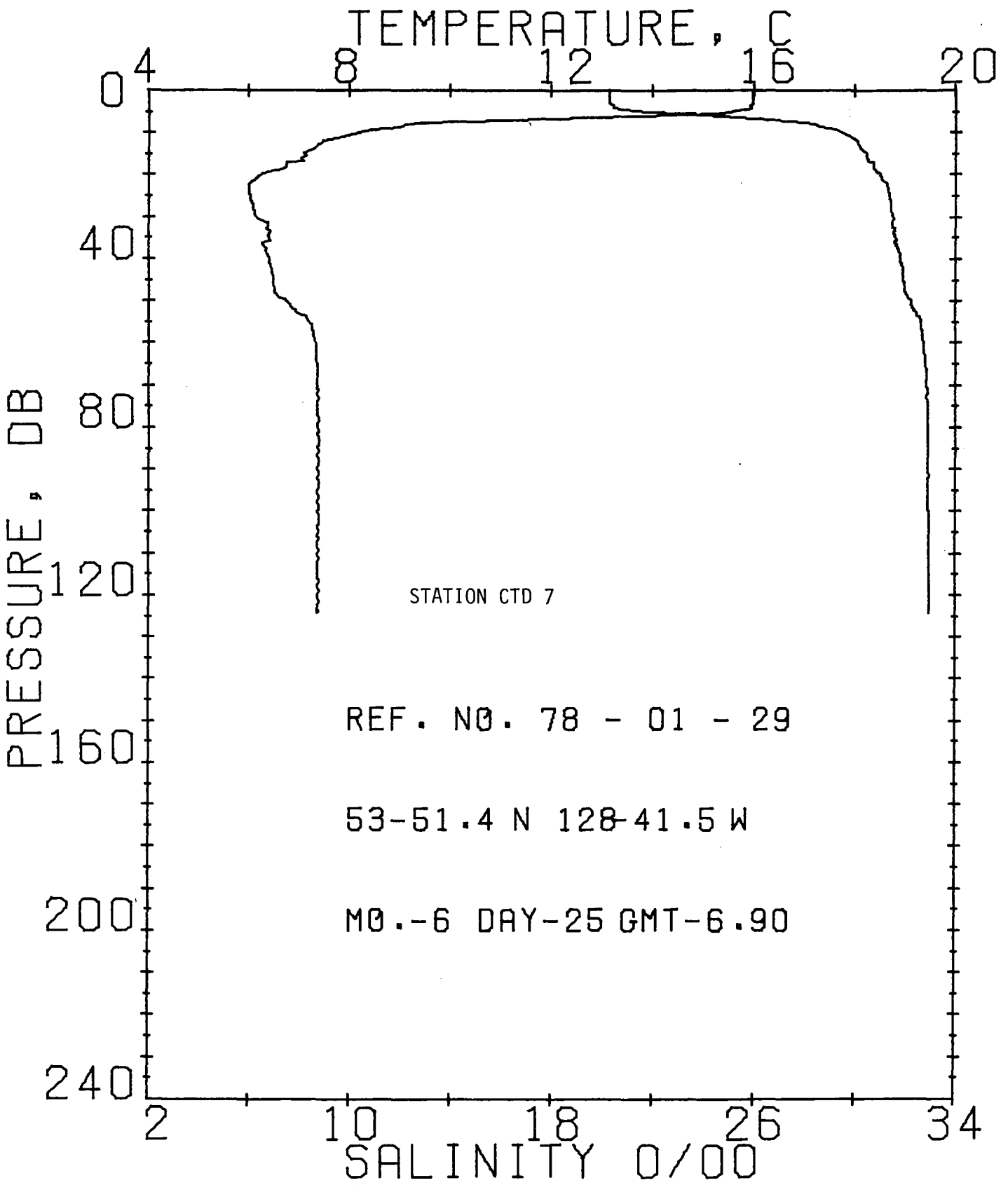
34
SALINITY O/OO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PRESSURE, DB
STATION CTD 7
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MO.-6 DAY-25 GMT-6.90
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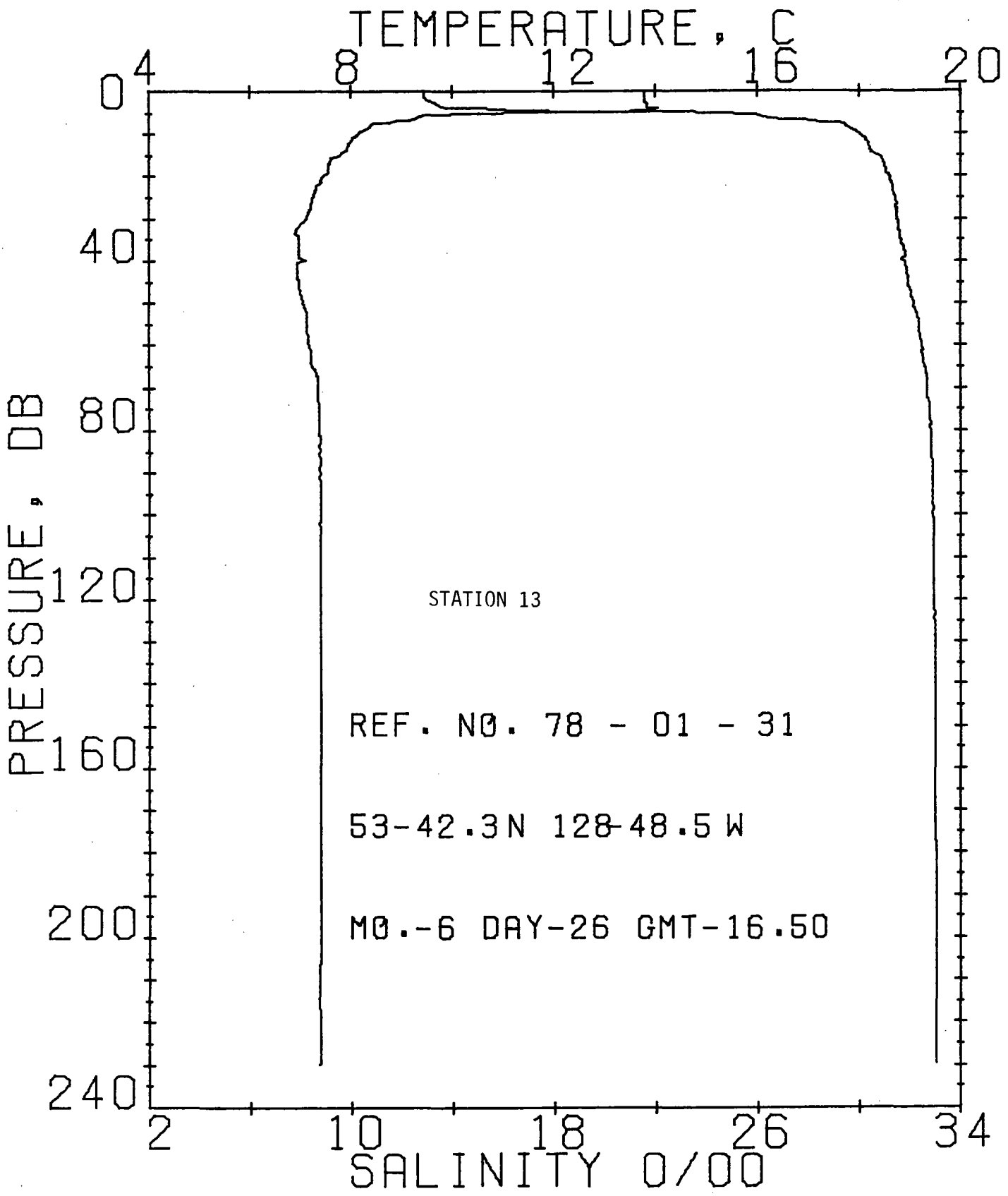
SALINITY O/OO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PRESSURE, DB
STATION 13
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MO.-6 DAY-26 GMT-16.50
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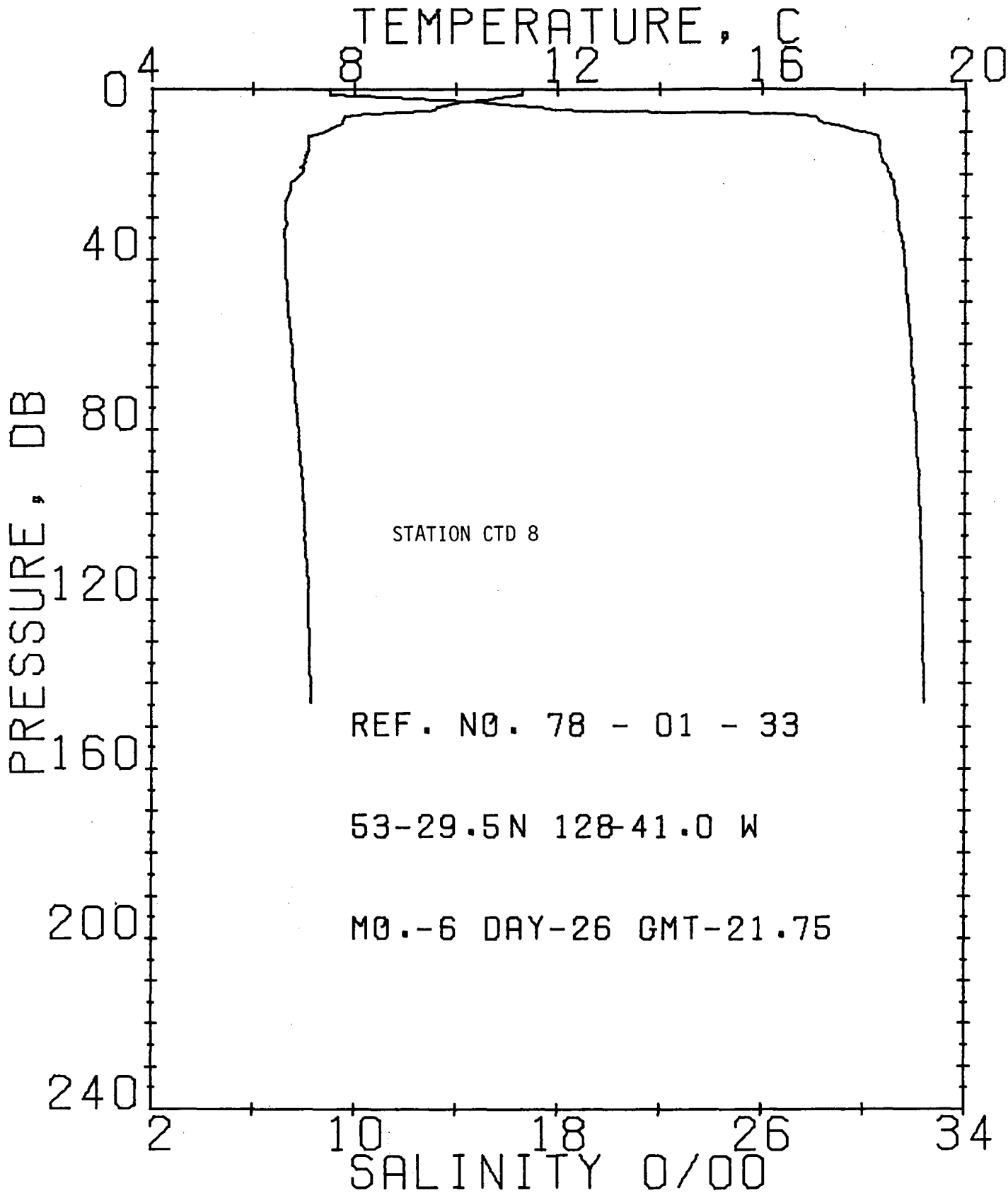
SALINITY O/OO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PRESSURE, DB
STATION CTD 8
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MO.-6 DAY-26 GMT-21.75
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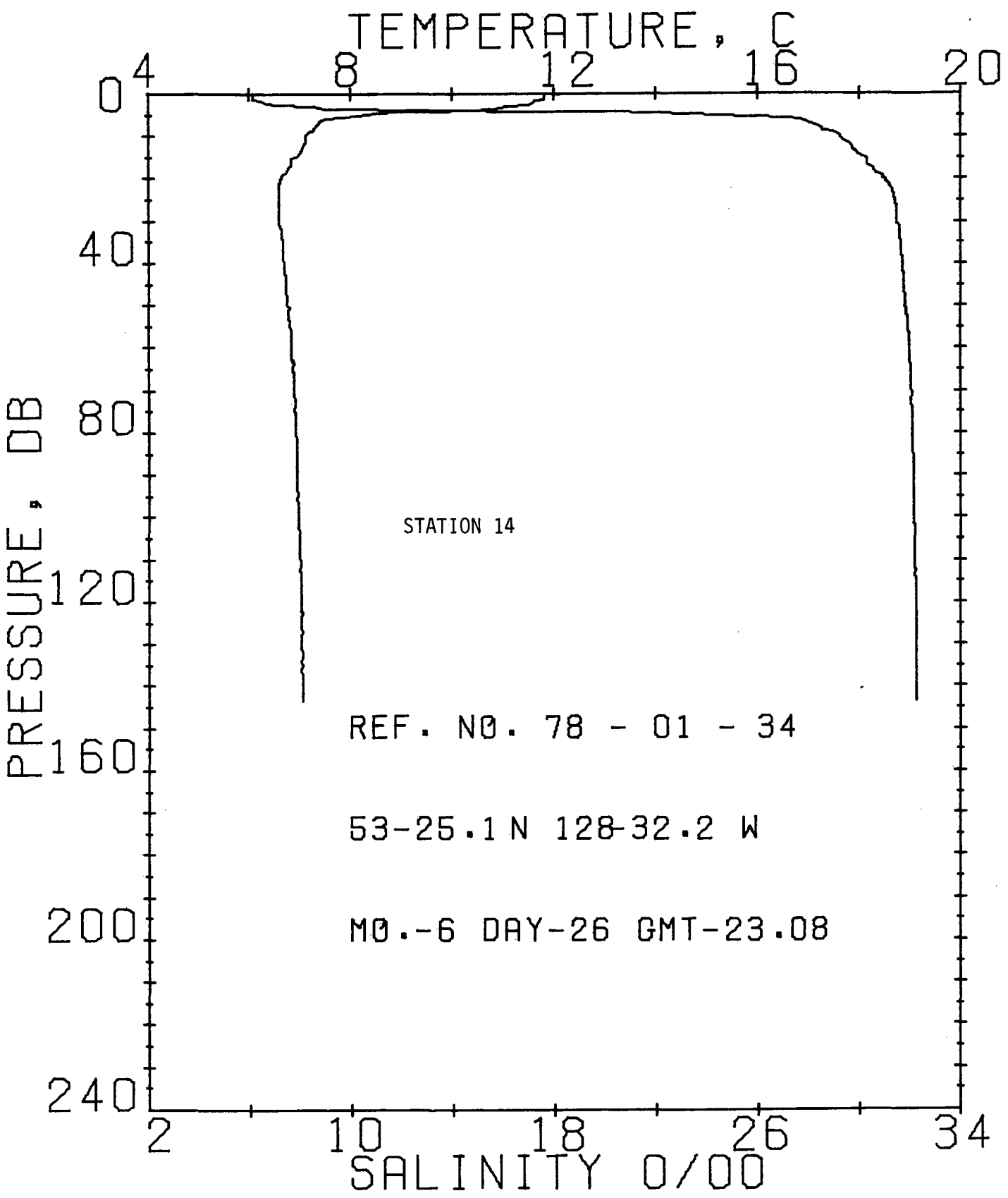
SALINITY O/OO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PRESSURE, DB
STATION 14
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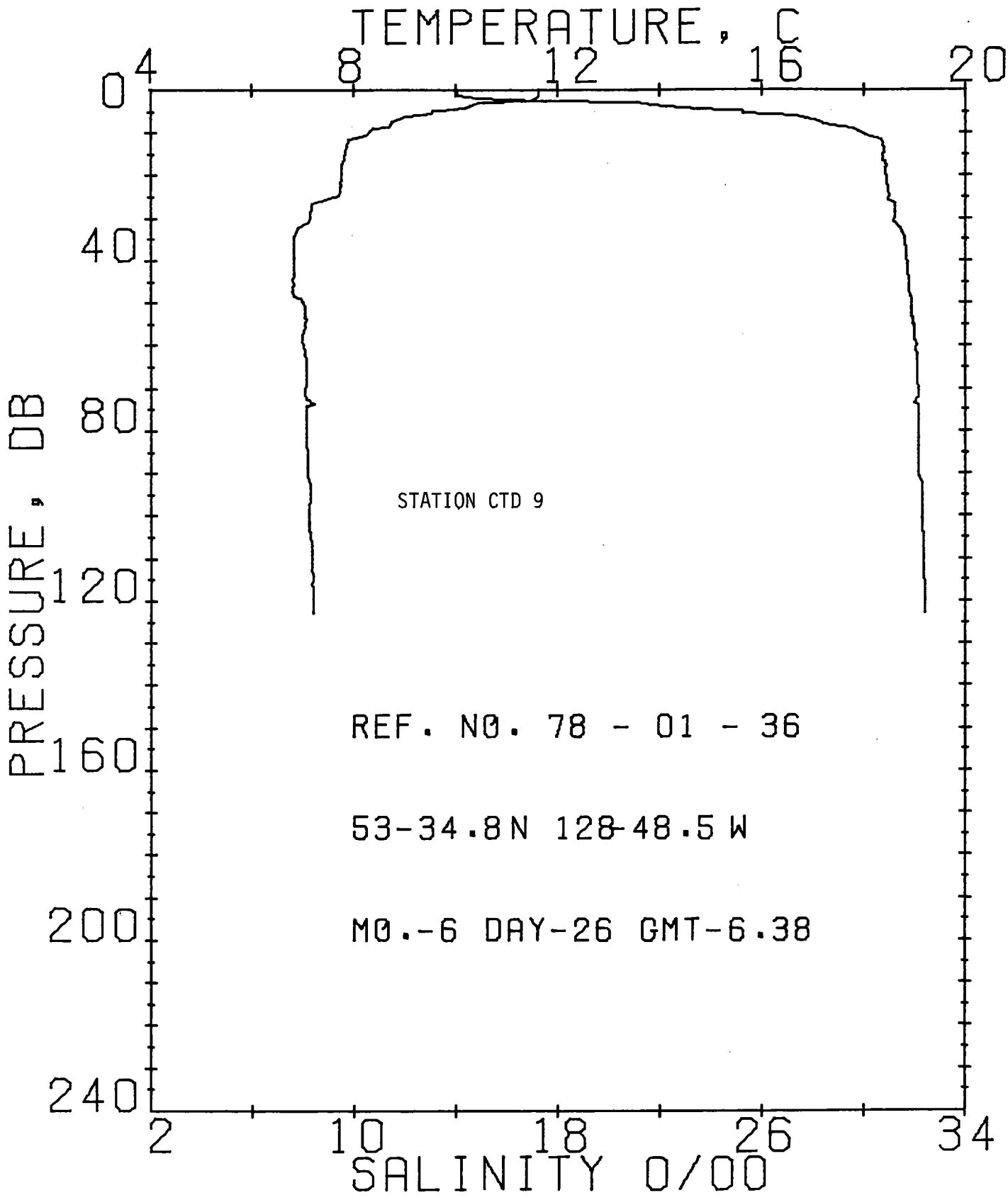
SALINITY O/OO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PRESSURE, DB
STATION CTD 9
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MO.-6 DAY-26 GMT-6.38
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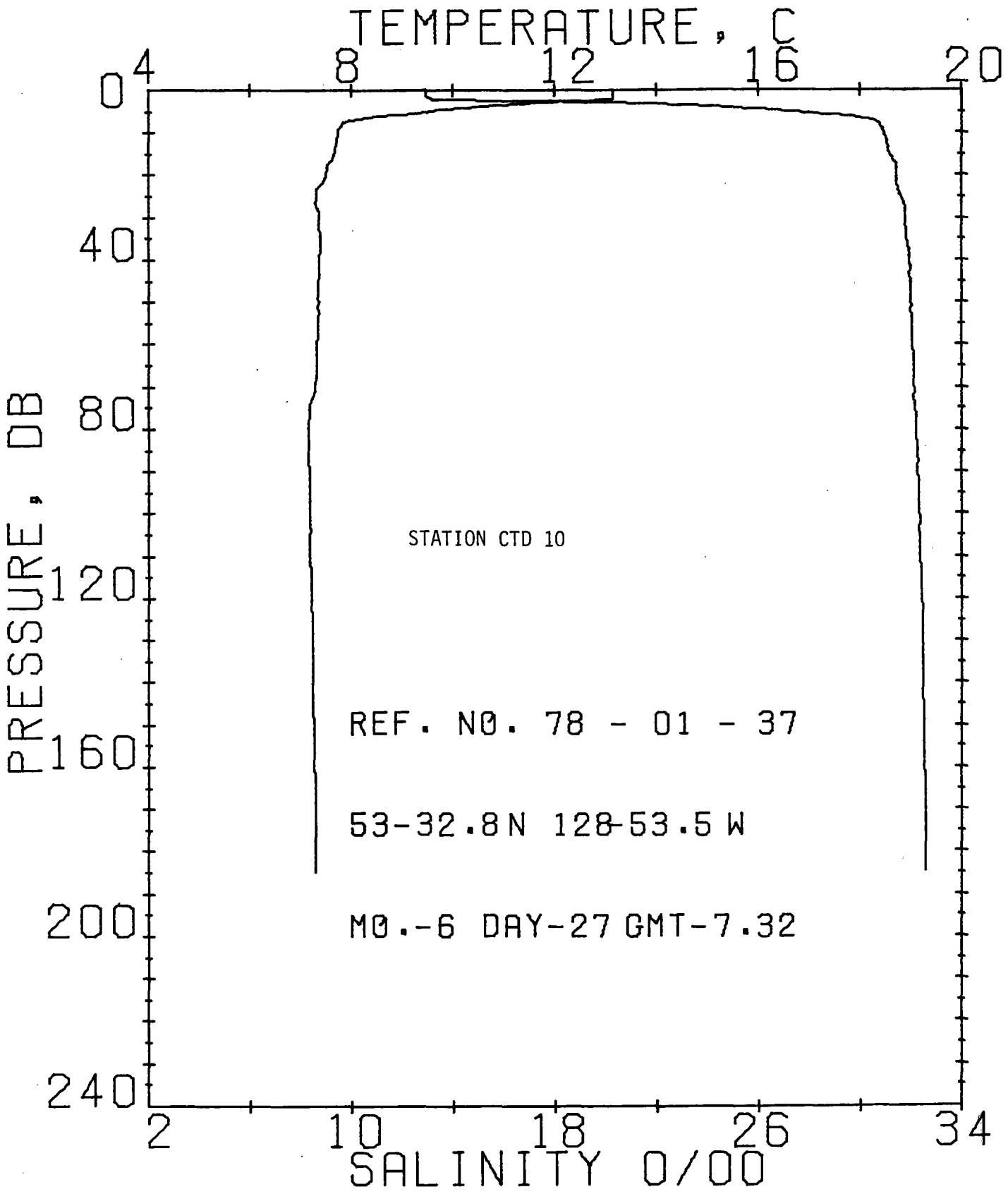
SALINITY O/OO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STATION CTD 10
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MO.-6 DAY-27 GMT-7.32
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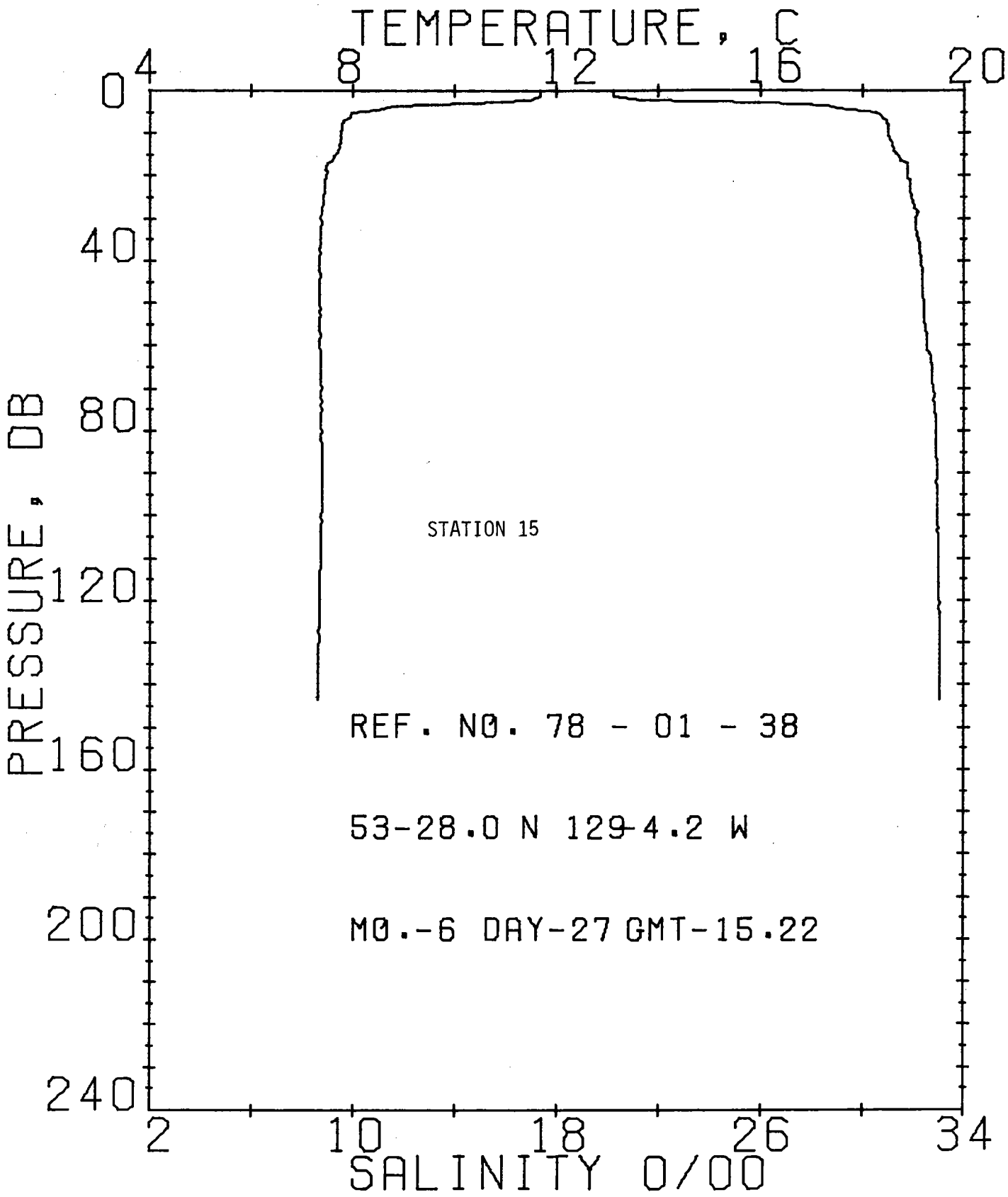
SALINITY O/OO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PRESSURE, DB
STATION 15
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MO.-6 DAY-27 GMT-15.22
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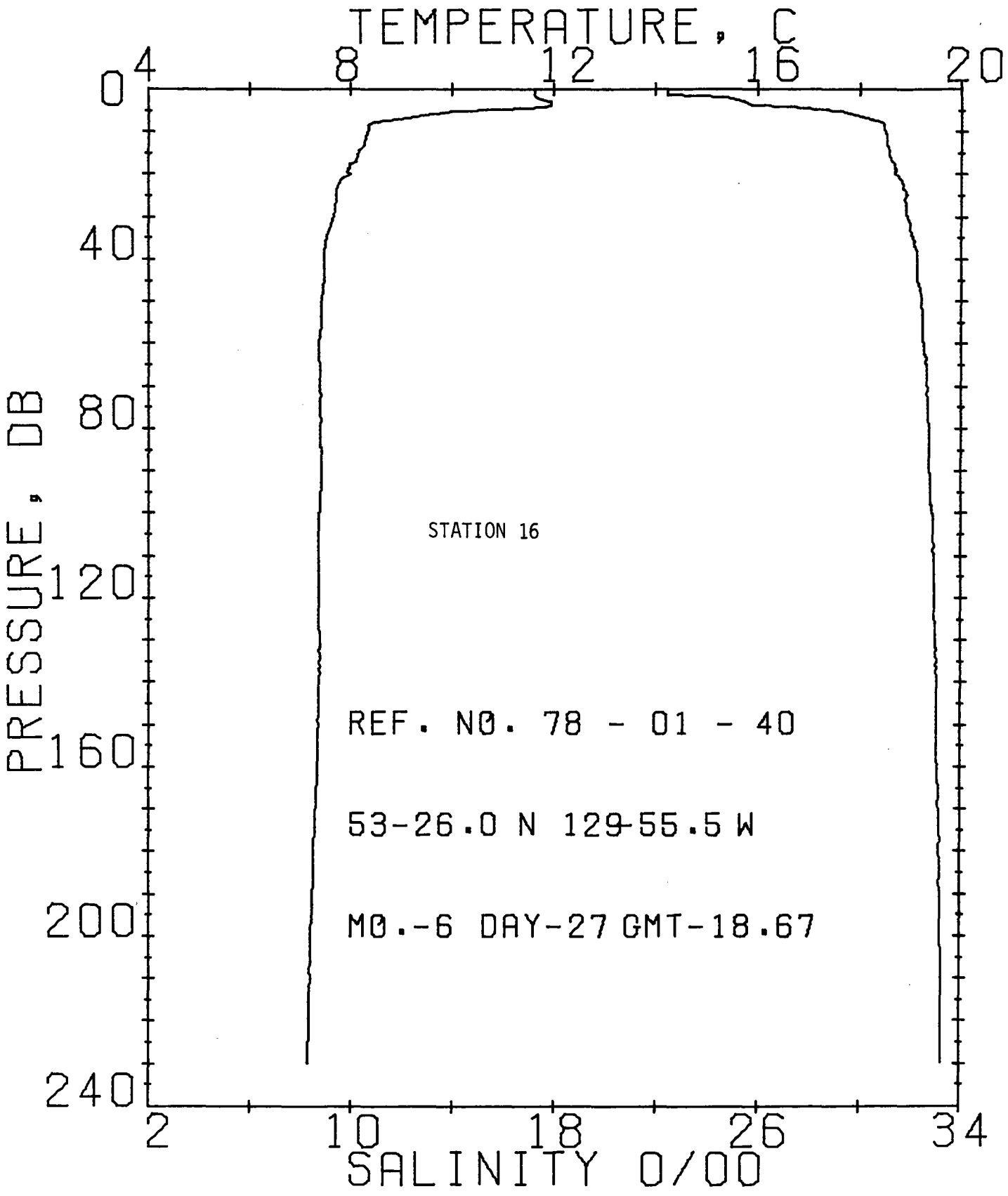
SALINITY O/OO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PRESSURE, DB
STATION 16
REF. NO. 78 - 01 - 40
53-26.0 N 129-55.5 W
MO.-6 DAY-27 GMT-18.67
2
10
18
26
34
SALINITY O/OO