

**THE CATALOGUE OF OCEANOGRAPHIC DATA
IN THE SOUTH CHINA SEA
DURING 7 APRIL – 19 MAY 1998**

AREA III : OFF THE WEST COAST OF THE PHILIPPINES



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Preface

The Interdepartmental Collaborative Research Program has been carried out since 1995 with the main objective of collecting and analyzing data and information necessary for the management of fishery resources and the protection of the environment through collaborative research among member countries and other organizations concerned. Five survey cruises have been conducted in South China Sea represented by two cruises in area I; Gulf of Thailand and East Coast of Peninsular Malaysia, two cruises in area II; the Coasts of Sabah and Sarawak, off Malaysia and Bruni Darussalam and another cruise in area III; off the West Coast of the Philippines.

This report lists the principle physical and chemical oceanographic data of the area III which covers from latitudes 11° N to 20° N and longitudes 117° E to 121° E, a total of 86,000 square nautical miles during 7 April-19 May 1998. It is a part of the physical characteristics of water in the South China Sea area III project and is published to be a principle source of information to all researchers in the SEAFDEC collaborative research program and the anyone who may be interested.

For readers who may need this report or digital data , please make inquires to :

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Introduction

The principle physical and chemical oceanographic data of 31 stations from off the West Coast of the Philippines from latitude 11° N to 20° N and longitude 117° E to 121° E (Table 1 and Fig 1) during 7 April–19 May 1998 were plotted as profiles, diagrams and contours. The data were composed with temperature, salinity, Oxygen, sigma theta, sound velocity, fluorescence, pH and light quantum intensity.

Integrated CTD Data Procedures

CTD Casting

1. Before each cast, the submersible sensing unit was acclimatized at 5 meters from the sea surface for at least 1 minute
2. Uninterrupted lowering speed was set at 1.5 m/s and the maximum depth for CTD casting during this cruise was limited to 1500 m
3. Lifting speeds were varied between 0.5 – 1.5 m/s depending on the position of the submersible unit as well as the status of the hydraulic system of the vessel
4. During lifting, water samples were collected at standard depths (1000, 500, 200, 150, 100, 50, 20 and sub-surface) by the attached Niskin sampler rosette. In addition, water from the oxygen minimum, fluorescence maximum, and other interesting layers observed on a real-time monitoring screen were also collected.

Data Acquisition System

The Falmouth Integrated CTD with the following sensors:

Property	Sensors
Temperature	Falmouth Scientific Platinum Resistance Thermometer (100 ms)
Conductivity	Falmouth Scientific Inductive Conductivity Sensor
Pressure	Falmouth Scientific Titanium Pressure Sensor
Dissolved Oxygen	Beckman Polarographic Membrane Sensor
Fluorescence	Sea Tech Fluorometer
pH	Innovative Teflon Junction pH Sensor

Remarks:

1. The pH sensing system was not functioned properly during this cruise and the *in situ* continuous pH reading was ignored
2. The ICTD unit was last sent for calibration and dock testing at the manufacturer in April 1997
3. The fluorometer was not functioning since St. 19 and the chlorophyll maximum layer was identified from oxygen data, using an empirical relationship.

The submersible sensing unit was connected to the Falmouth Scientific DT-1050 data terminal on board via the Armor sea cable (SEA Corporation). The data was recorded as a raw A/D count with a sampling frequency for each channel of 25 Hz.

Post Acquisition Data Processing/Quality Control

Raw data for each cast were searched for errors, especially the lift dataset where signal interference from the rosette sampler firing occurred. Bad data were replaced by linear interpolation between the last good data before and the first good data after the bad data range.

In order to reduce data noise, raw data was average at every 1 dbar pressure interval. The pressure averaged data profile for each cast was visualized again and any remaining outliers were subsequently removed manually.

Unless specified otherwise, only lowering data will be reported but both of the downcast and lift datasets were pressures averaged and archived.

Data Conversion

Raw counts for each variable were converted to the appropriate unit by a polynomial regression equation embedded in the calibration file of each cast. The equation for each variable was:

Standard physical oceanographic properties

- Conductivity (in mmho/cm) = $0.0001 \cdot \text{counts}$
- Temperature (in Celsius) = $0.000500119 \cdot \text{counts}$ (ITS-90 standard)
- Pressure (in dbar) = $0.1 \cdot \text{counts}$
- Salinity (PSS78) was calculated from conductivity, temperature and pressure (Fofonoff and Millard, 1978)
- Potential density anomaly (sigma theta in kg/m^3) was obtained from the equation of the state of the seawater using the potential temperature corrected to 0 dbar pressure
- Dynamic height (in dyn.m) was obtained by integrating specific volume anomaly over the pressure of 0 dbar to each observed pressure (Sverdrup *et al.* 1948)
- Depth (in m) was obtained by dividing dynamic height by gravity acceleration

Chemical/biological properties

- Fluorescence (in V) = $0.00732 \cdot \text{counts}$
- Dissolved oxygen (in ml/l) = $C \cdot \text{counts}^2 + D \cdot \text{count} + E$

Where C, D and E were obtained from the binomial regression between the observed saturation state (the ratio between titrated oxygen content of water sample and oxygen saturation according to Weiss, (1970) at that depth) and the raw count for oxygen current channel (Owens and Millard, 1985) for that cast. Sensor response time was assumed to be instantaneous, and the temperature and pressure corrections for the membrane were ignored.

Determination of Chlorophyll Maximum Layer

Up to Station 19, where the submersible fluorometer remained functioning, the depths of chlorophyll maxima was directly determined from the lowering fluorescence peaks. However after the fluorometer unfortunately malfunctioned, from Station 20 onward an indirect method was employed based on the depth where the oxycline began. From the data obtained from Stations 1 to 19, it was empirically found that the fluorescence peak was, on average, located at 20 meter below the depth where the oxycline began. This estimation is good within ± 10 m (Fig 2).

Starting from Station 25, up to 6 water samples were collected at every 5 m interval above and below the depth where the chlorophyll maxima was predetermined in order to fine adjust the actual depth. About 180 ml sub-sample from each depth was inline filtered through the 13 mm Whatman GF/C membrane and the color on the membrane was inspected visually.

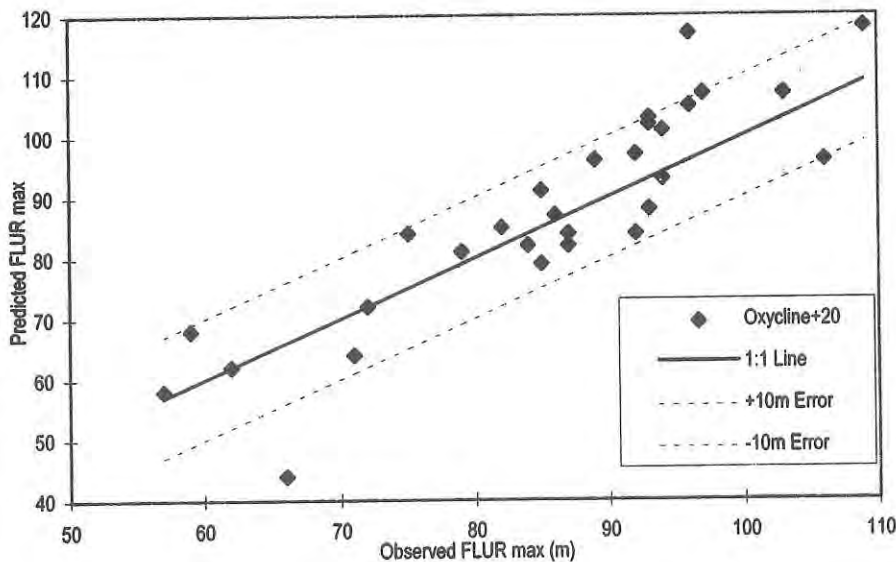


Fig 2.

Light Quantum Intensity Measurement

Light quantum intensity was measured both in air and underwater at the daytime stations as shown in Fig.3 . Data was recorded at every one meter from the surface down to the depth that the light quantum intensity was less than one percent of that at surface.

Sensors

In Air - LI-190SA Quantum Sensor (2π detector), LI-COR, Inc.
Underwater - LI-193SA Spherical Quantum Sensor (4π detector), LI-COR, Inc.

Data Logger

Li-1000 DataLogger, LI-COR, Inc.

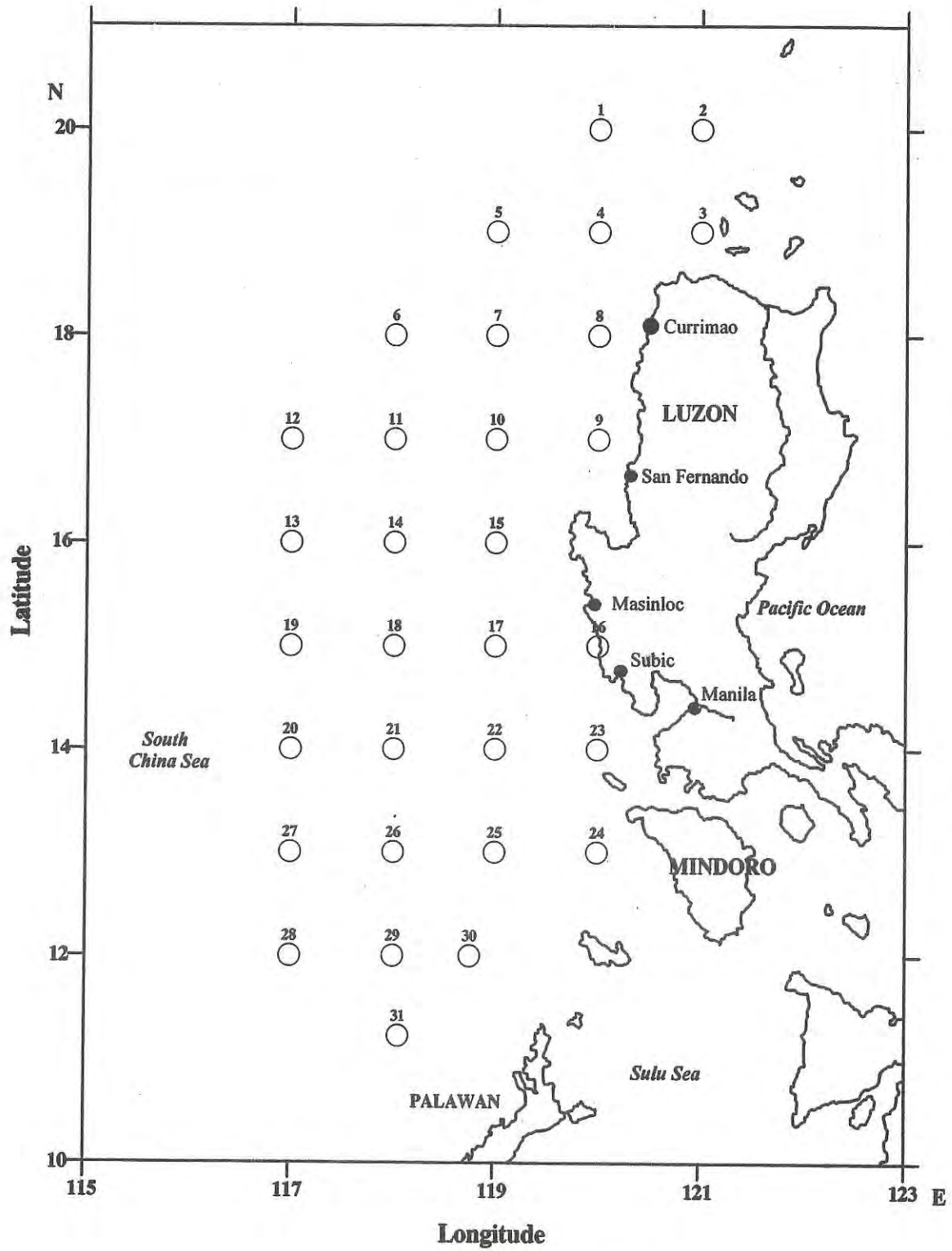
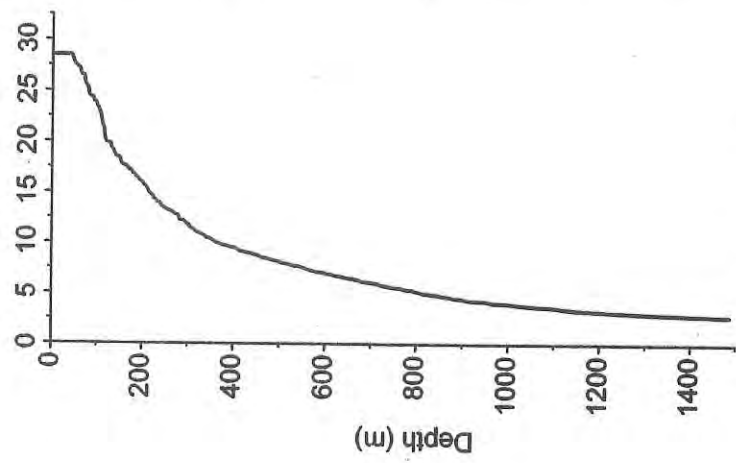
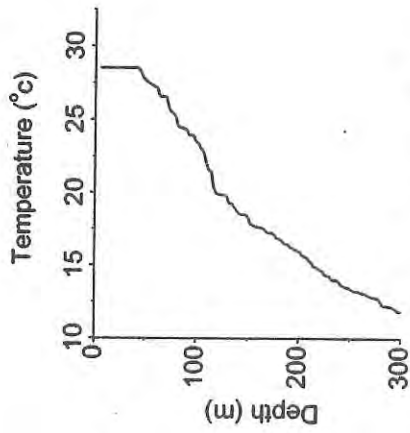


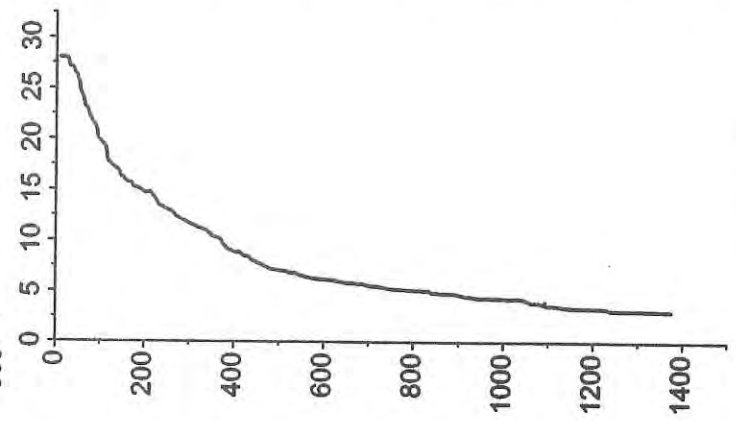
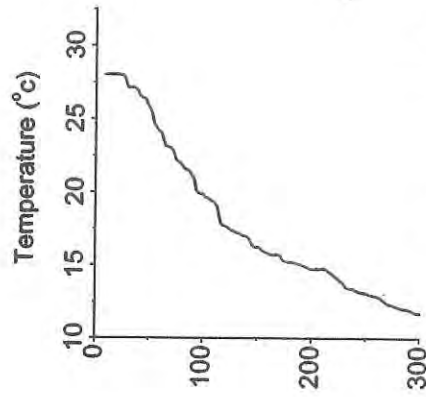
Fig. 1 Survey area and sampling station of SEAFDEC Collaborative Research Survey, Area III ; Western Philippines

Table 1. Partial details of sampling stations.

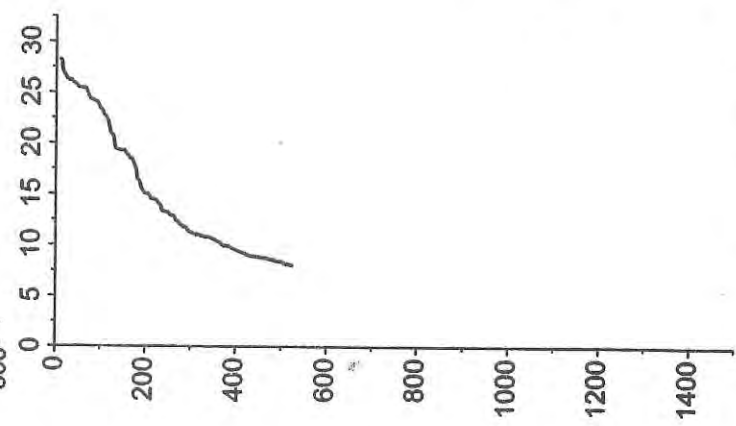
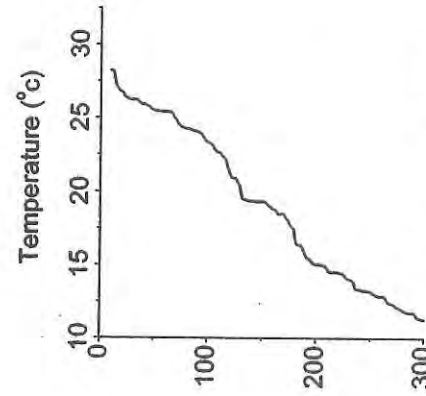
Station No.	Date	Local Time	Position		Depth (m)	Thermocline (m)	Chlorophyll Max.(m)	Transparency (m)
			Latitude	Longitude				
1	18-Apr-98	7:45	19_59.2 N	119_58.7 E	3620	42.2	108.8	19
2	18-Apr-98	20:45	20_00.0 N	121_00.2 E	1434	25.3	59.1	-
3	19-Apr-98	5:07	19_01.5 N	121_00.4 E	vary	12.4	69.1	15
4	19-Apr-98	13:25	19_00.2 N	120_00.4 E	1100	30.3	69.1	22
5	20-Apr-98	7:40	19_00.2 N	120_04.0 E	3820	18.4	75.0	26
6	21-Apr-98	0:30	18_00.0 N	118_00.0 E	1830	27.3	83.0	-
7	21-Apr-98	20:55	18_00.3 N	119_00.2 E	1075	18.4	66.1	-
8	22-Apr-98	9:50	18_00.0 N	120_00.0 E	2955	30.3	82.0	26
9	22-Apr-98	17:25	17_00.0 N	120_00.0 E	1467	28.3	98.9	25
10	25-Apr-98	2:35	17_00.0 N	119_00.0 E	1851	40.3	95.9	-
11	25-Apr-98	9:55	17_00.0 N	118_00.0 E	3967	33.3	85.0	44
12	25-Apr-98	17:25	17_00.0 N	117_00.0 E	4020	41.2	91.9	29
13	26-Apr-98	21:10	16_00.3 N	117_00.6 E	3320	71.1	93.9	-
14	27-Apr-98	7:45	16_00.4 N	118_00.7 E	4034	56.2	73.1	37
15	28-Apr-98	6:30	16_01.3 N	119_00.35 E	3781	61.1	96.9	22
16	28-Apr-98	17:40	15_01.3 N	120_00.4 E	54	-	48.2	30
17	29-Apr-98	7:20	15_00.4 N	118_57.4 E	4657	26.3	77.0	30
18	29-Apr-98	20:49	15_00.0 N	117_59.9 E	936	18.4	90.9	-
19	30-Apr-98	4:00	14_59.6 N	116_59.3 E	1209	25.3	-	-
20	30-Apr-98	12:00	14_00.2 N	116_59.5 E	1677	18.4	-	30
21	1-May-98	6:20	14_04.2 N	117_57.7 E	1775	29.3	-	32
22	1-May-98	21:30	14_00.3 N	118_59.9 E	1820	28.3	-	-
23	2-May-98	5:05	14_01.6 N	119_59.9 E	2012	29.3	-	20
24	4-May-98	16:15	13_00.7 N	119_58.6 E	530	36.3	-	27
25	5-May-98	0:05	12_59.8 N	118_59.0 E	671	44.2	-	-
26	5-May-98	7:40	13_00.2 N	117_58.9 E	834	33.3	-	41
27	5-May-98	15:09	13_01.3 N	116_59.1 E	3810	41.3	-	27
28	6-May-98	21:02	12_00.34 N	116_59.57 E	vary	25.4	-	-
29	7-May-98	6:14	12_01.6 N	118_00.0 E	1143	21.4	-	28
30	8-May-98	19:20	11_59.9 N	118_45.6 E	1622	37.3	-	25
31	8-May-98	9:30	11_13.5 N	118_03.1 E	578	19.4	-	20



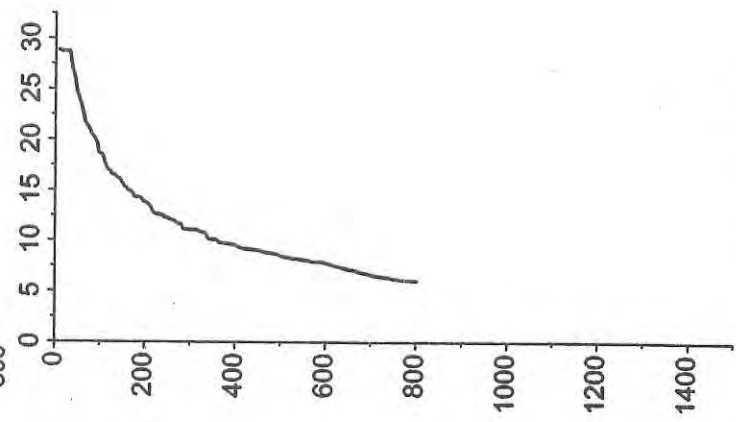
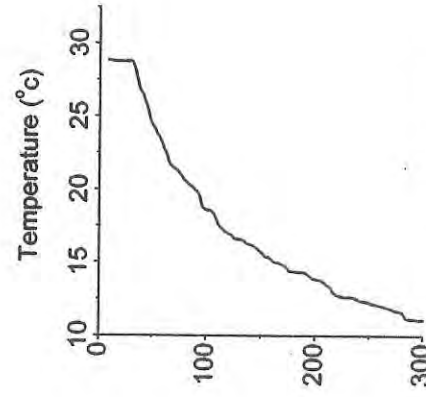
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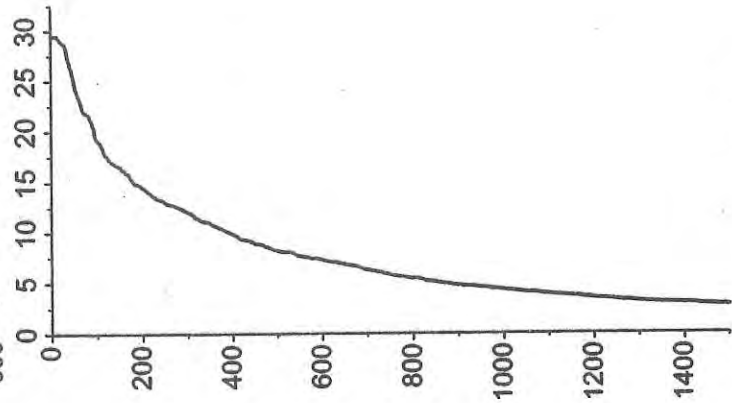
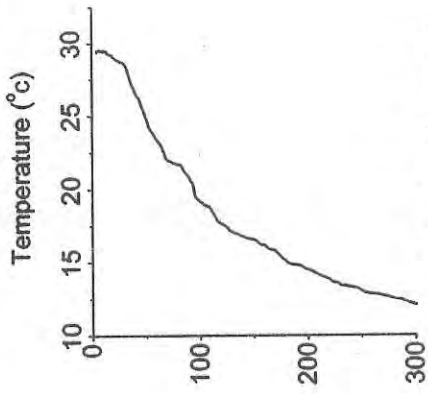
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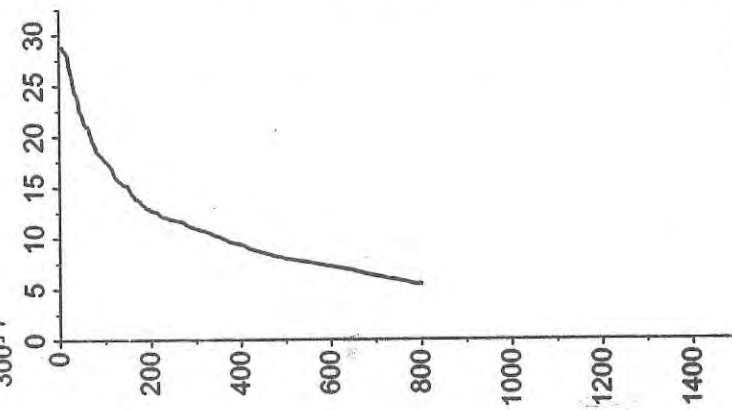
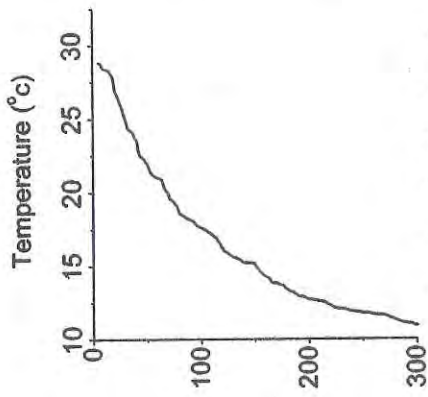
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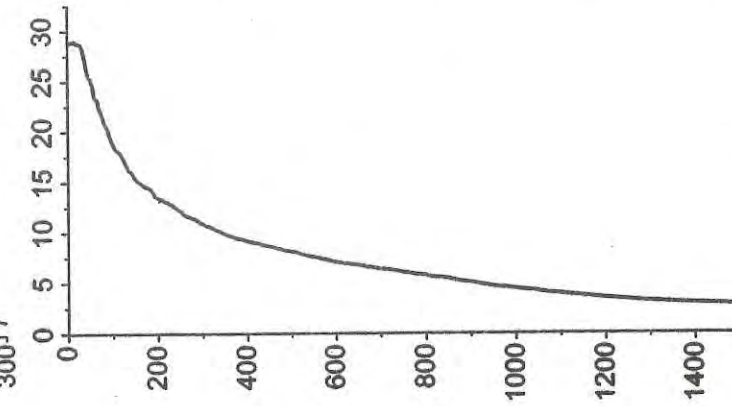
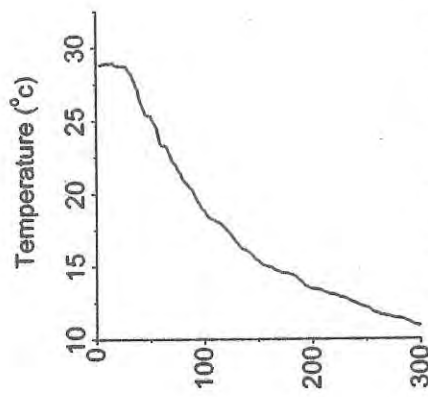
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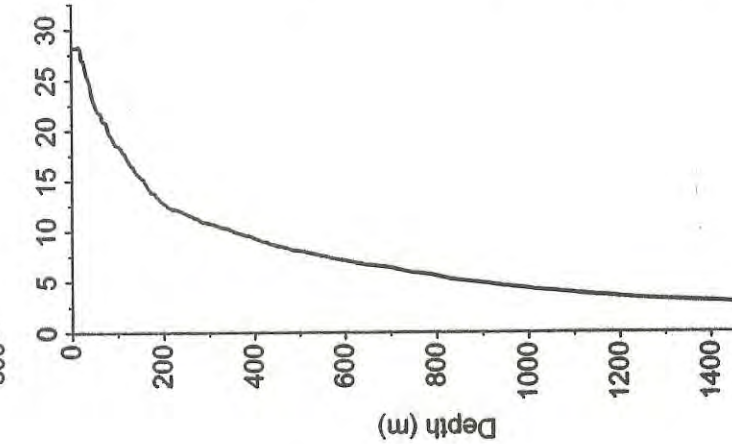
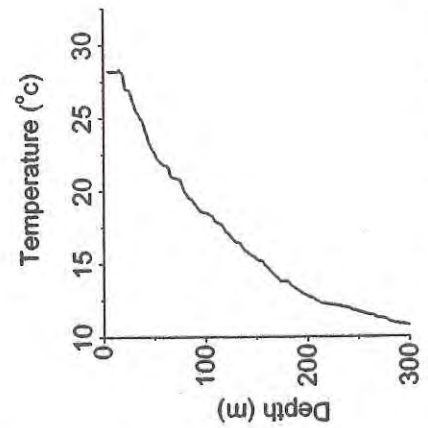
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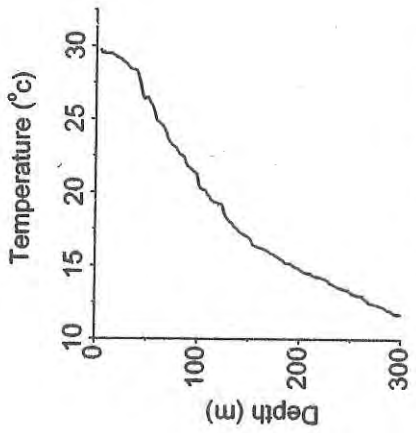
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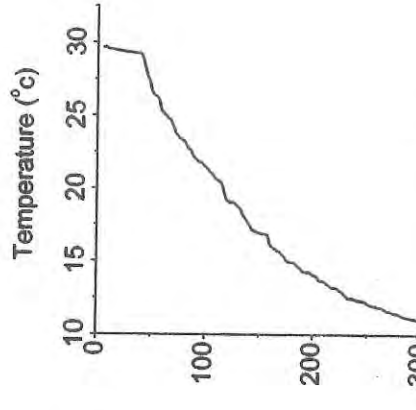
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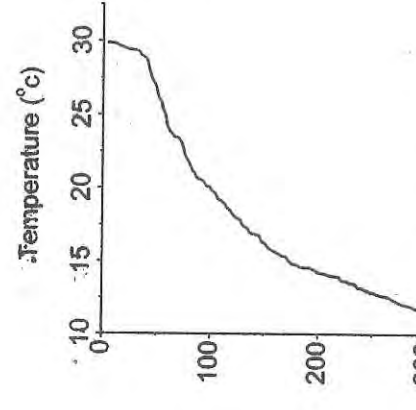
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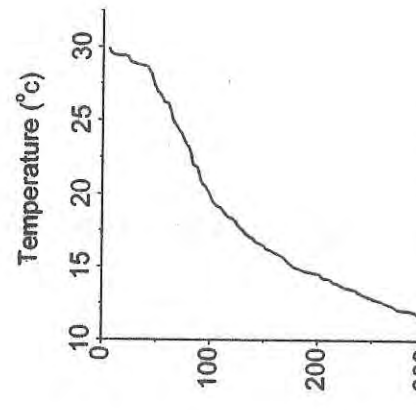
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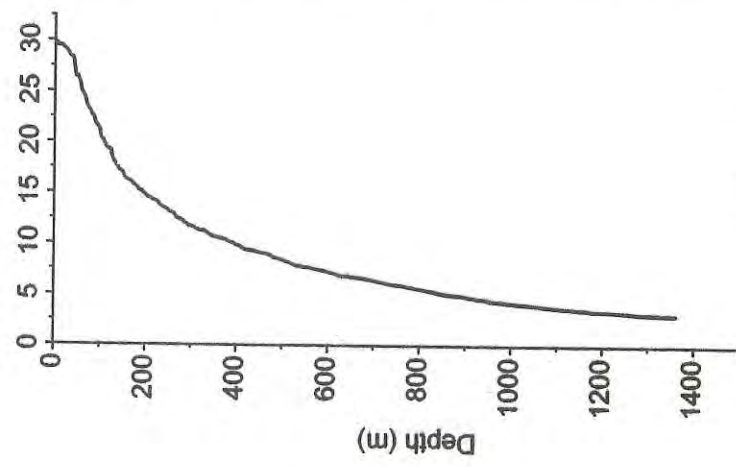
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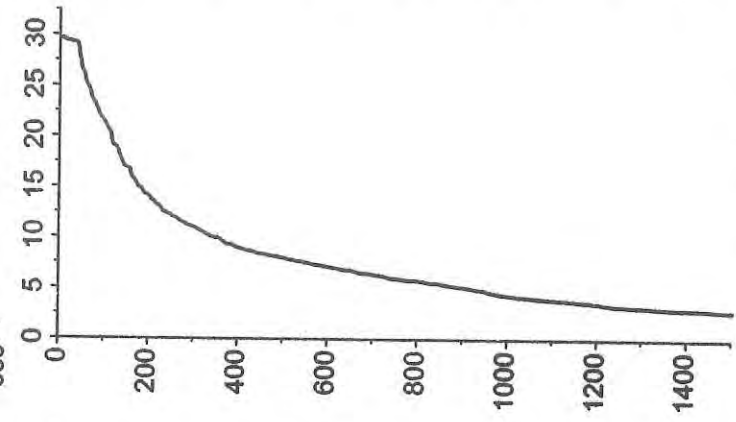
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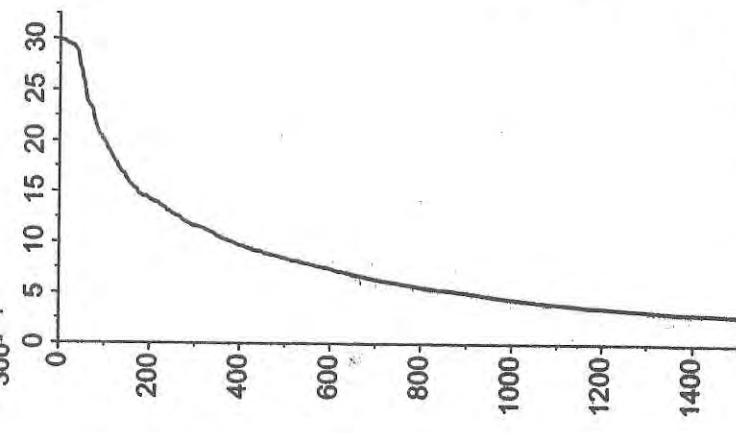
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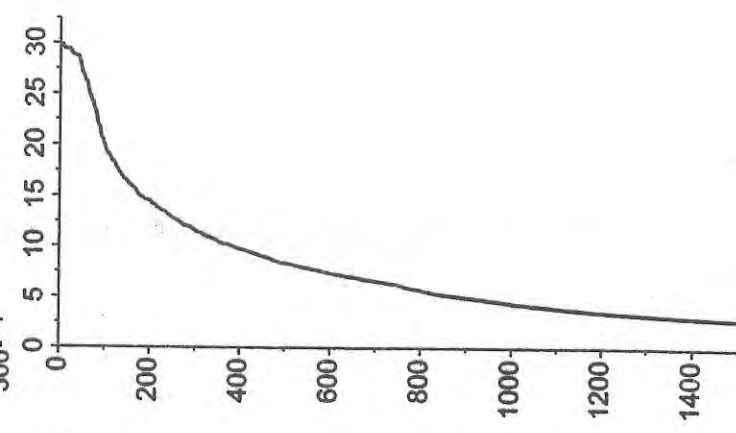
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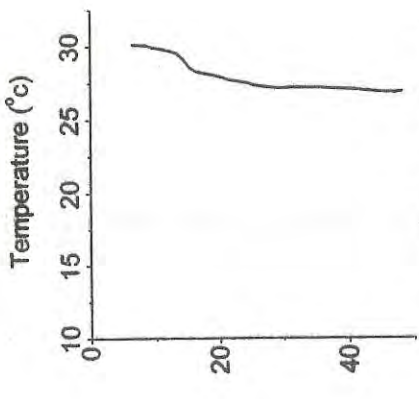
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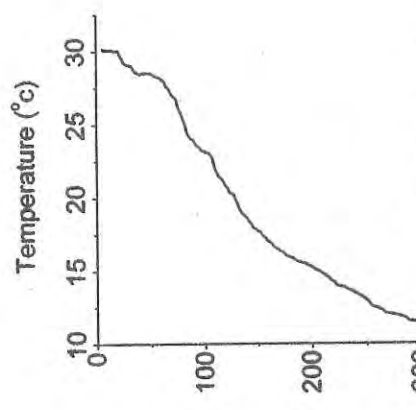
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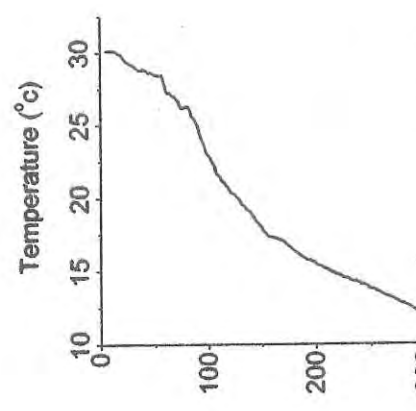
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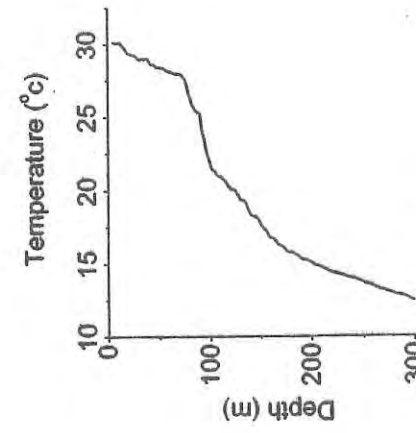
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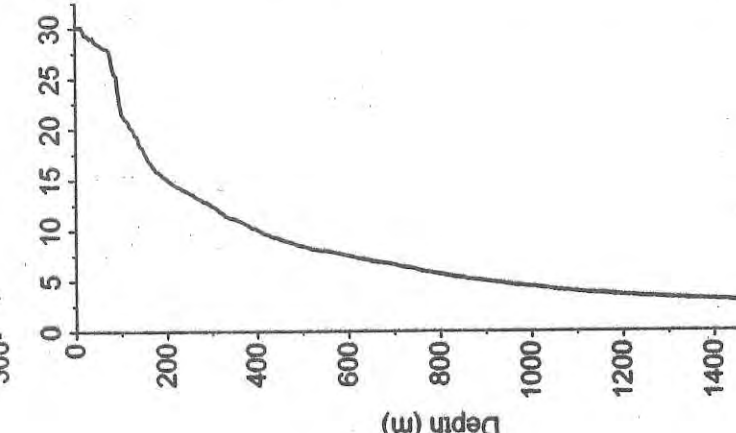
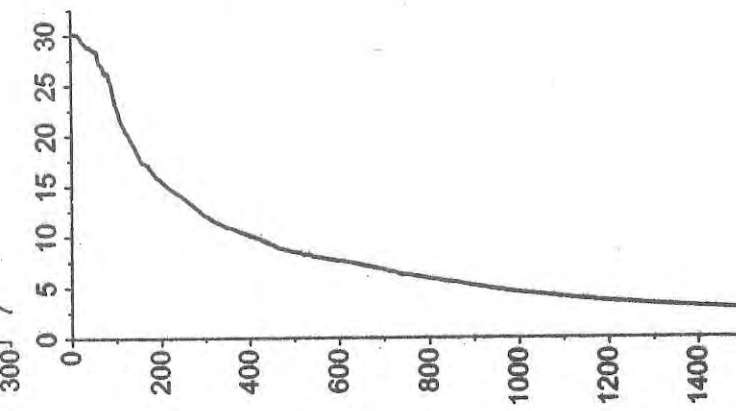
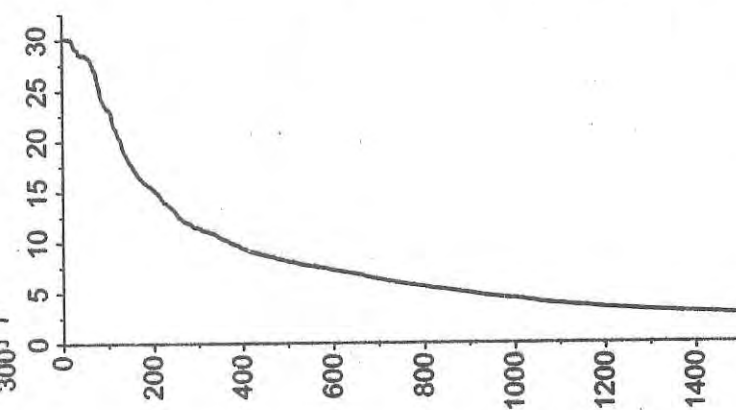
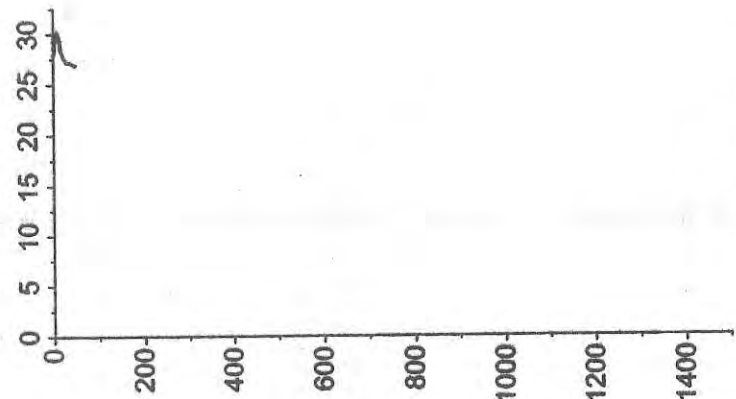
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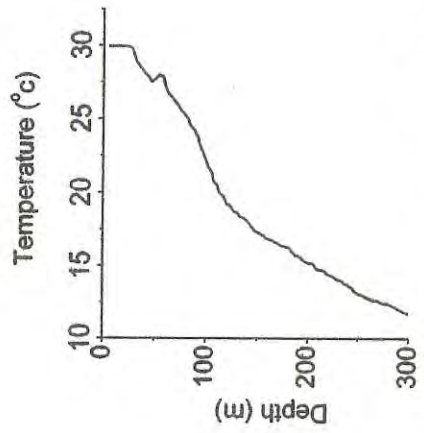


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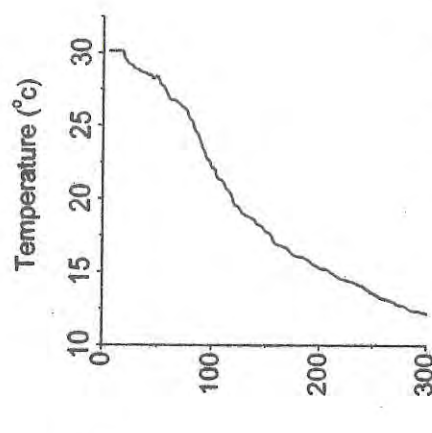


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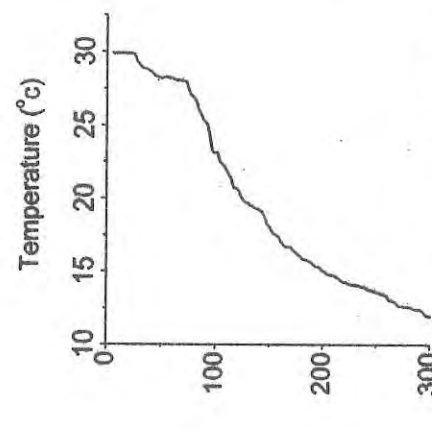




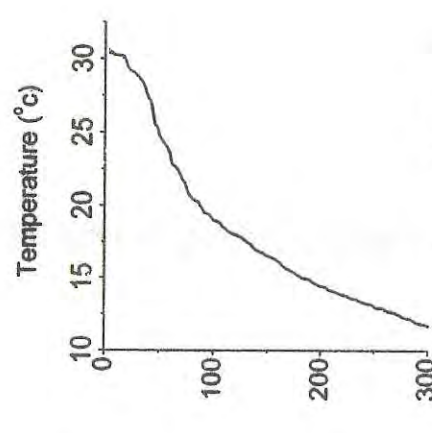
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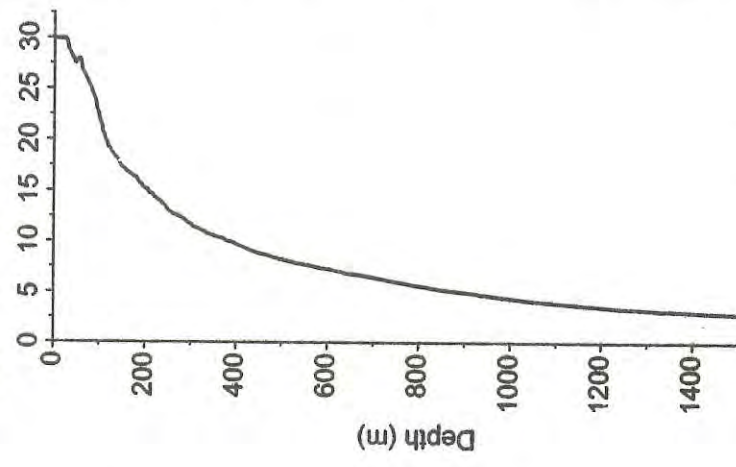
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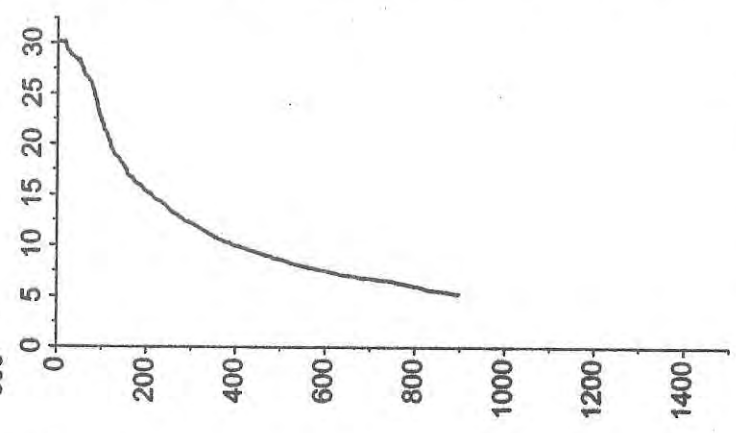
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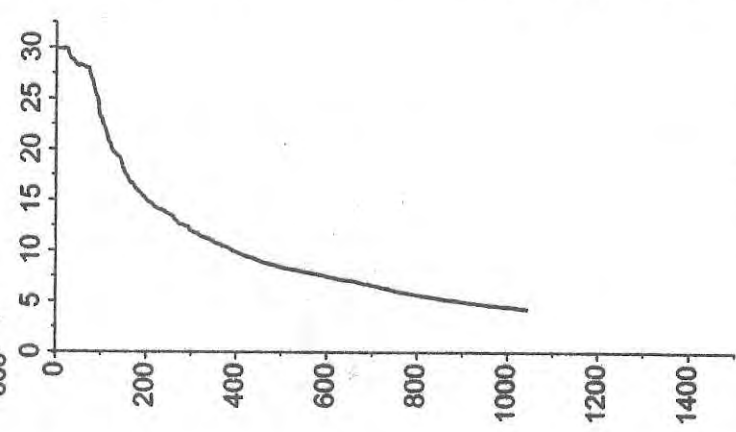
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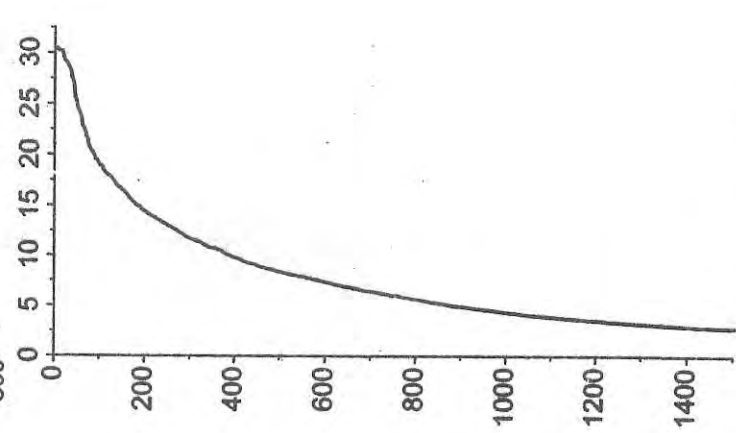
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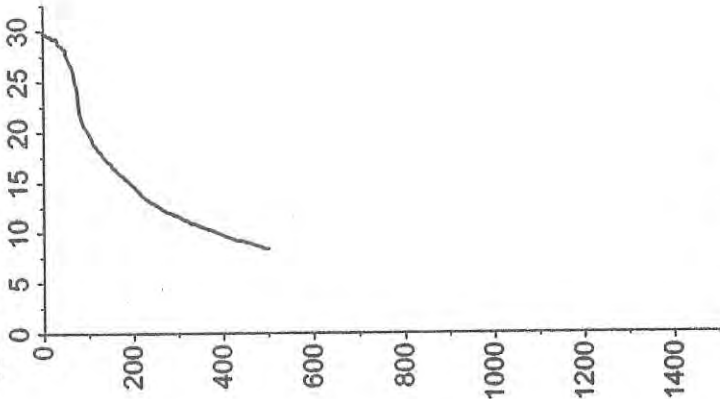
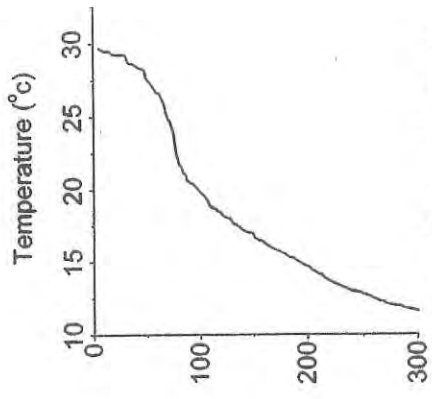
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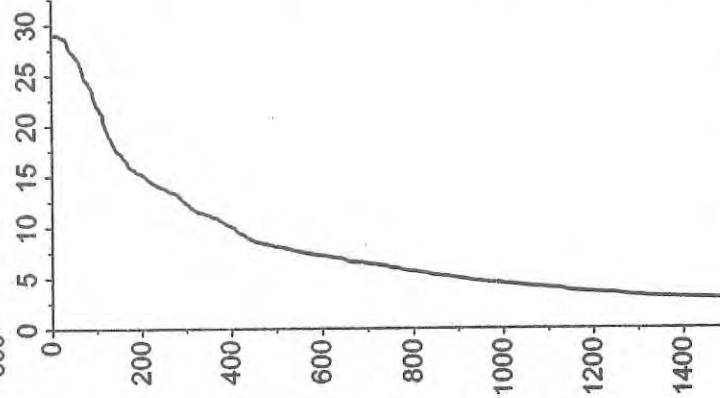
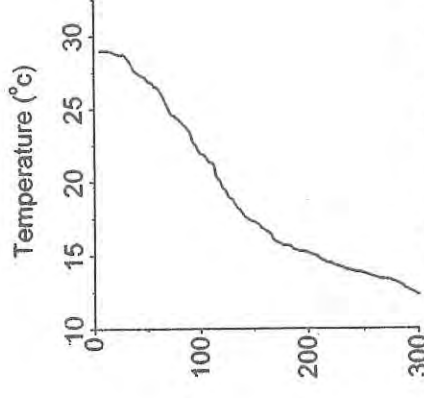
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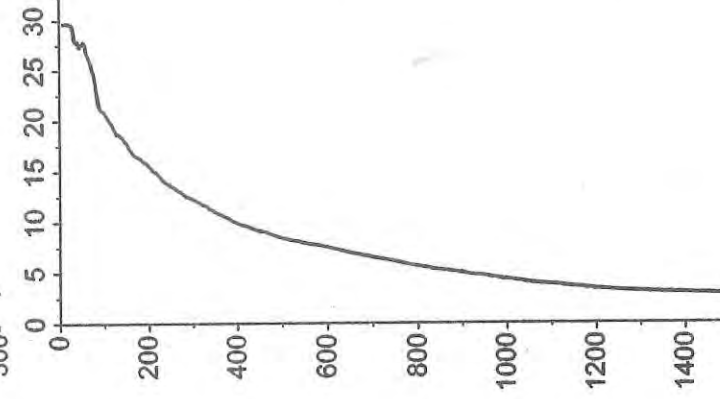
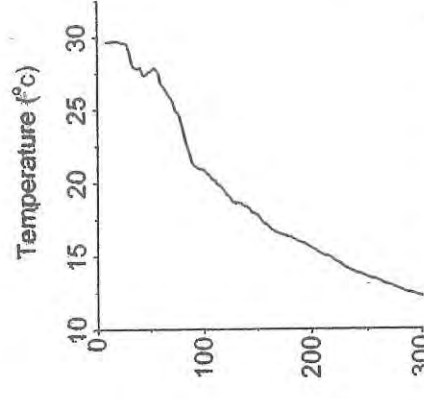
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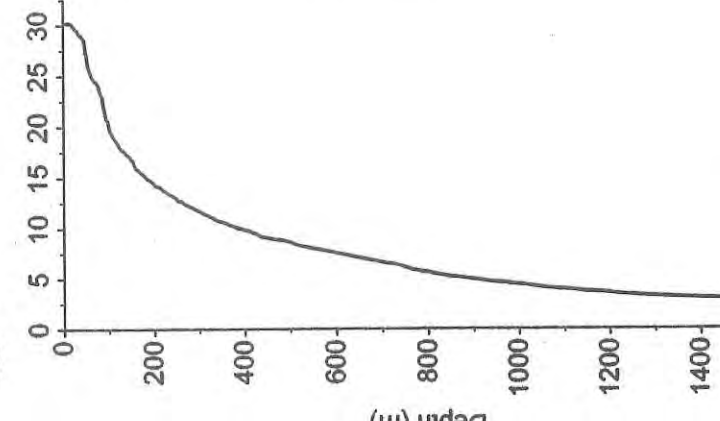
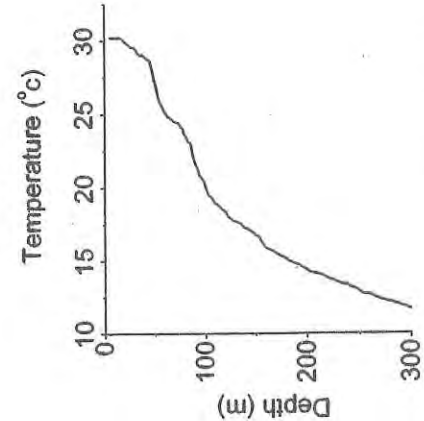
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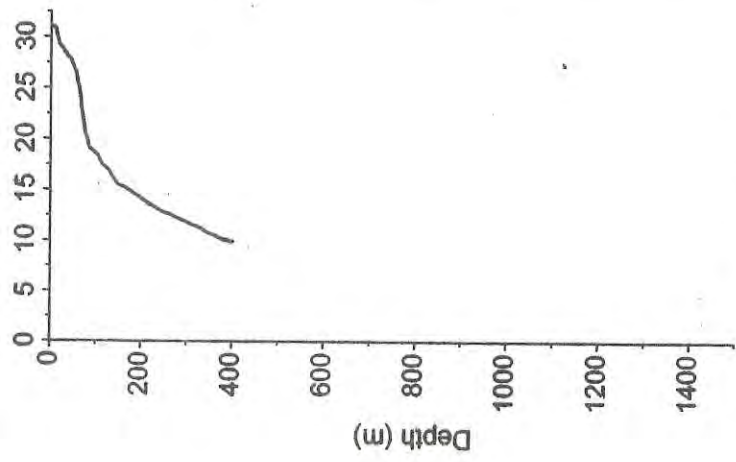
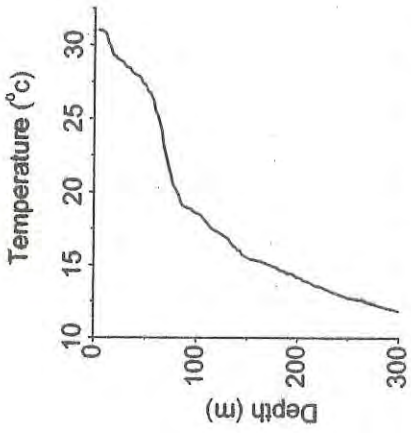
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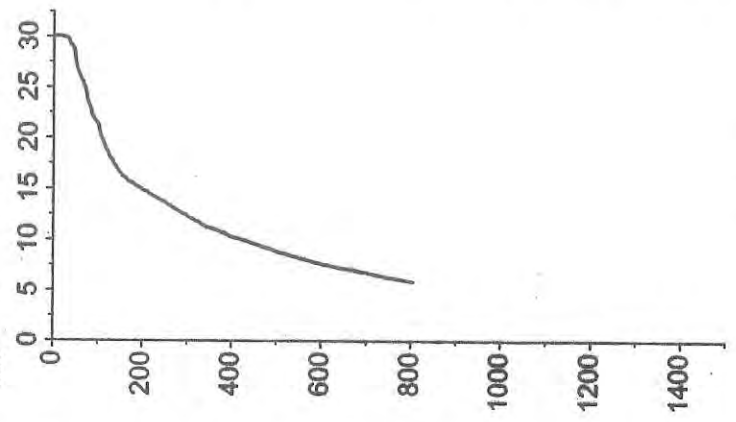
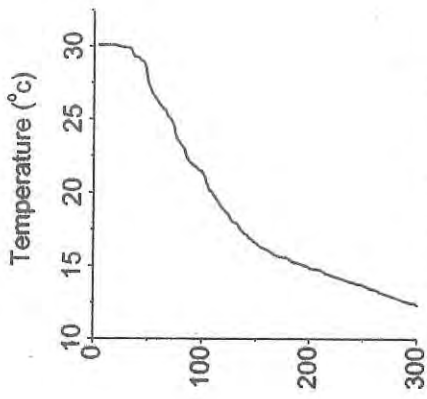
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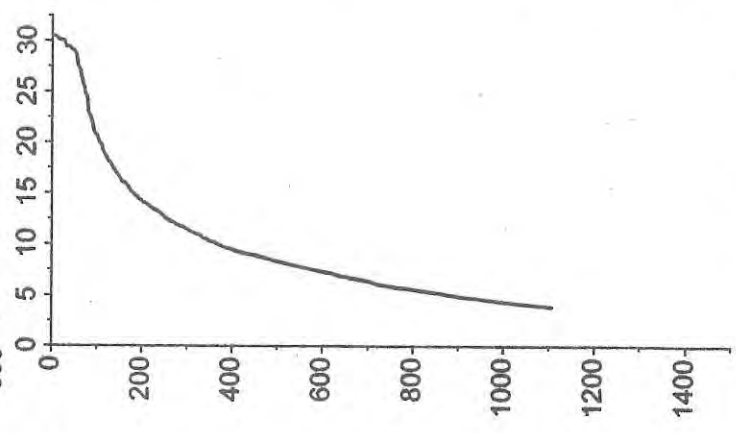
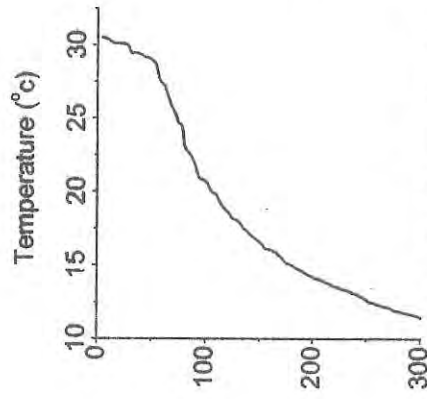
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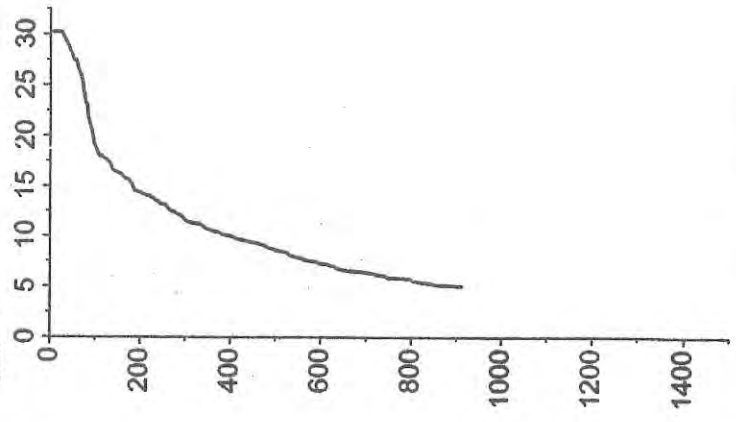
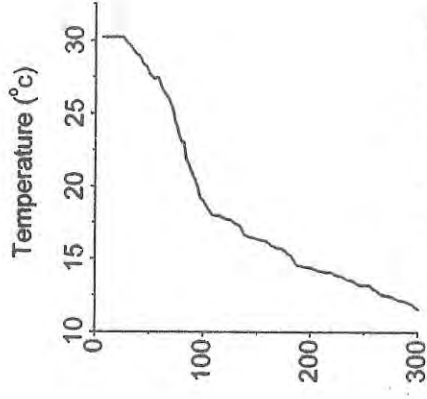
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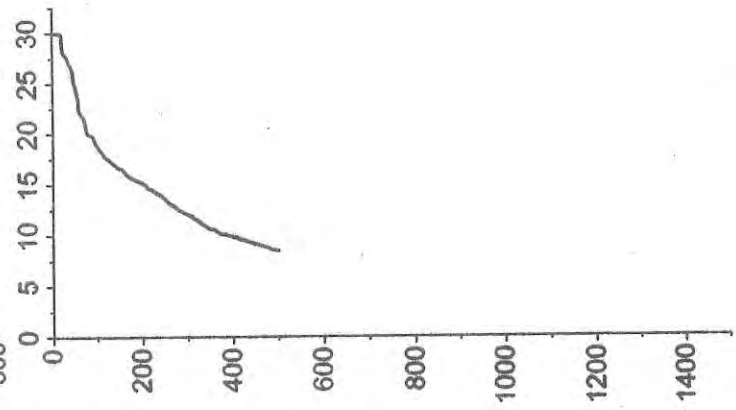
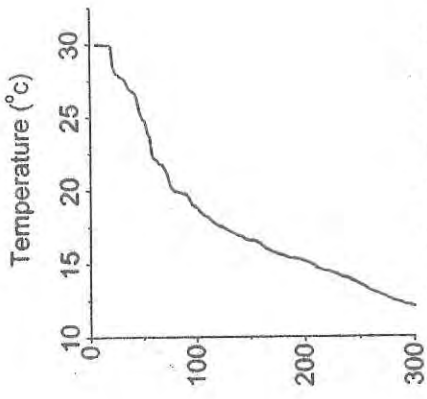
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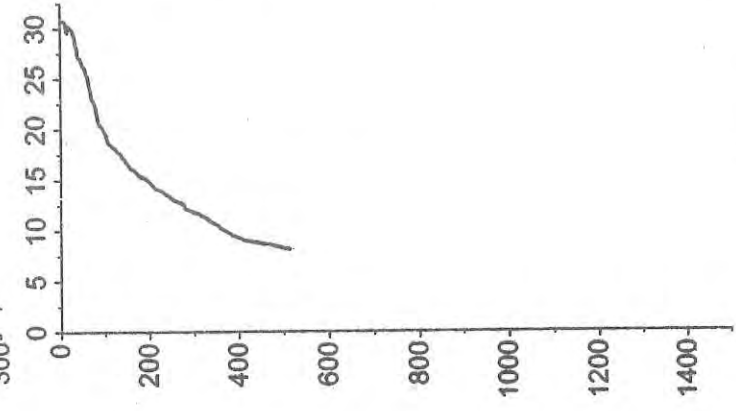
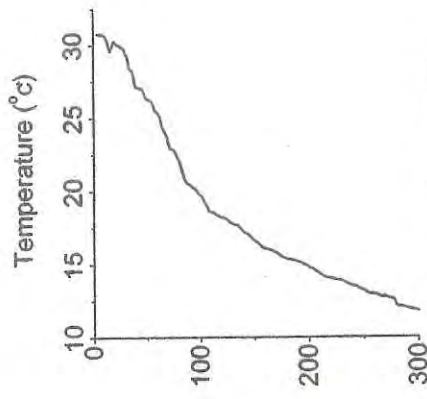
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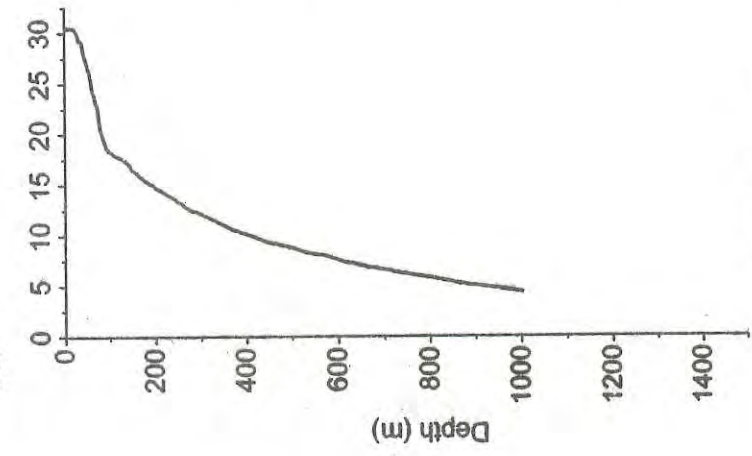
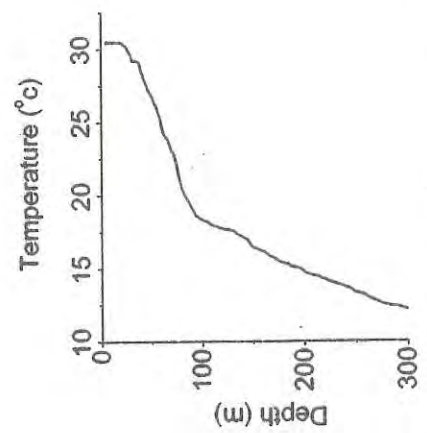
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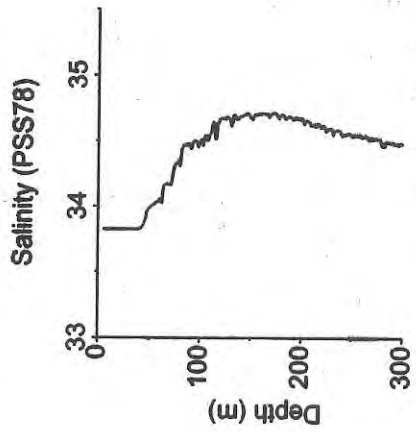
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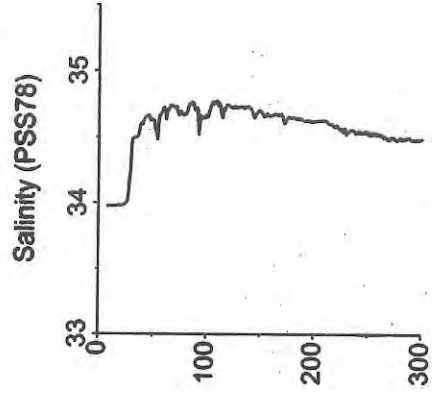
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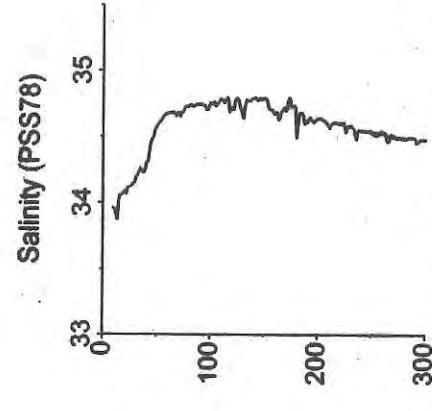
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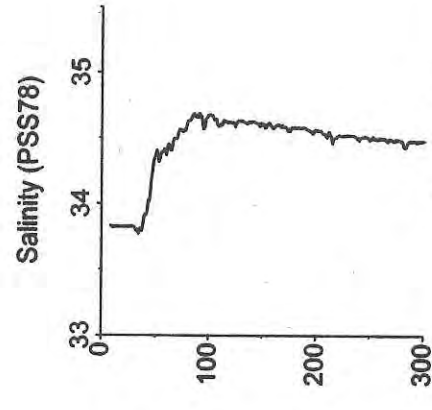
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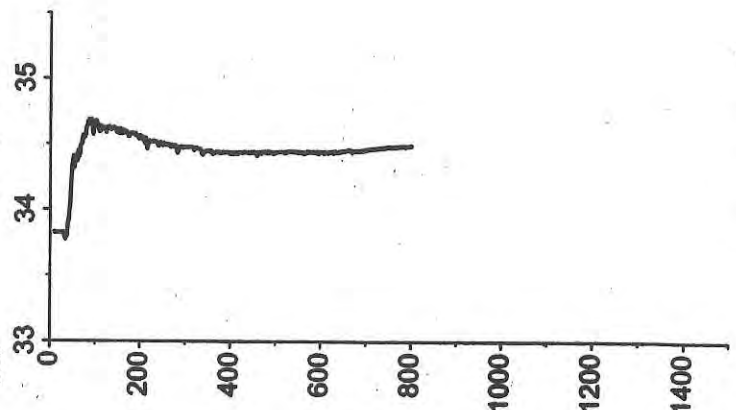
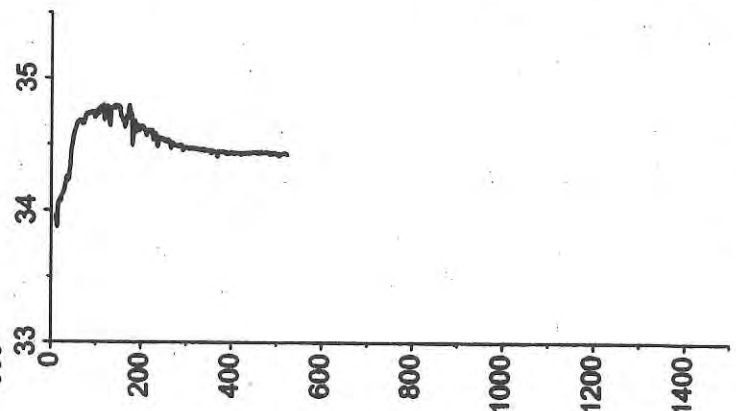
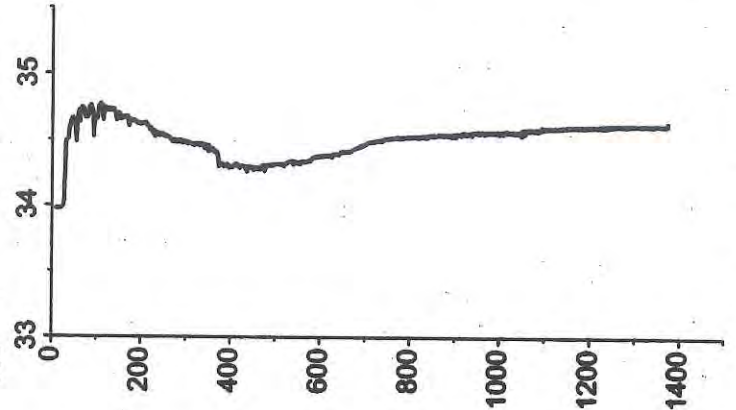
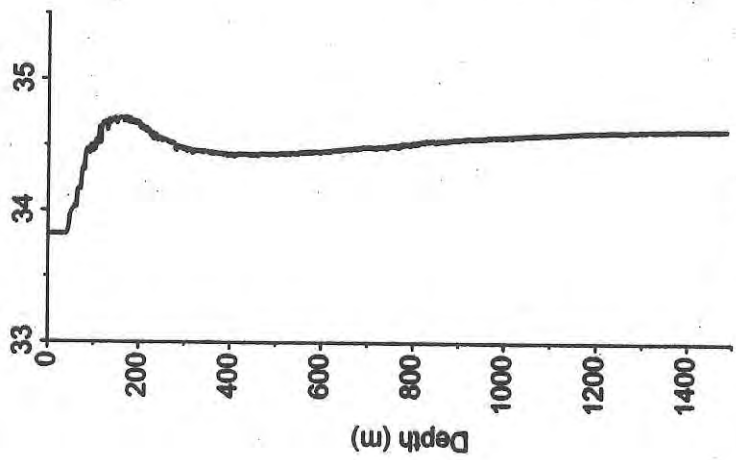
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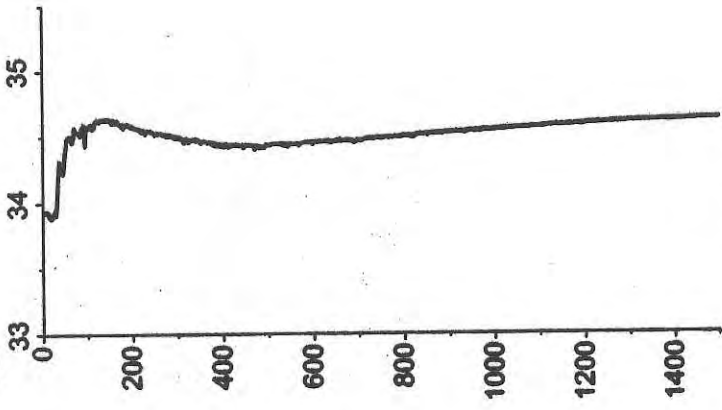
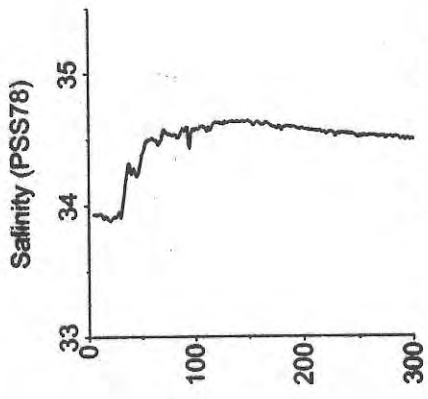


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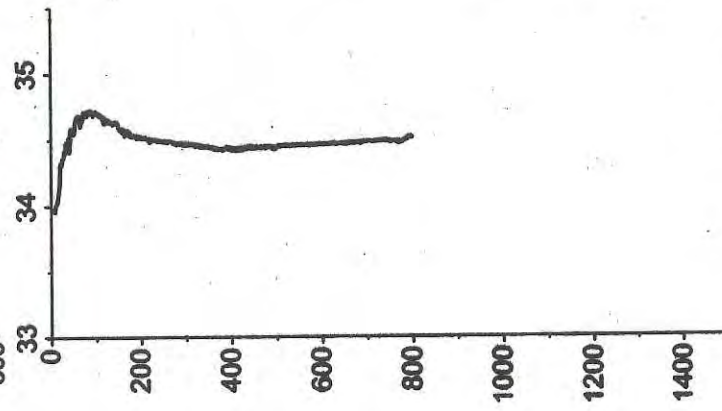
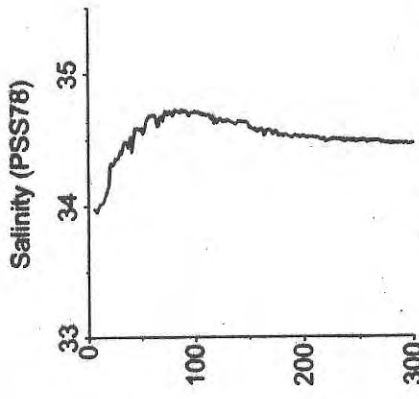


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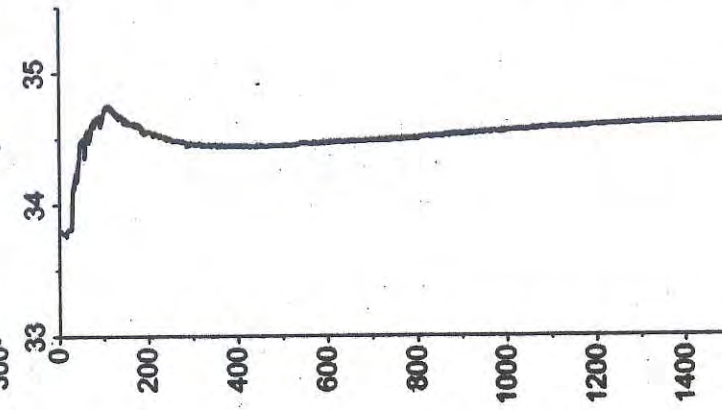
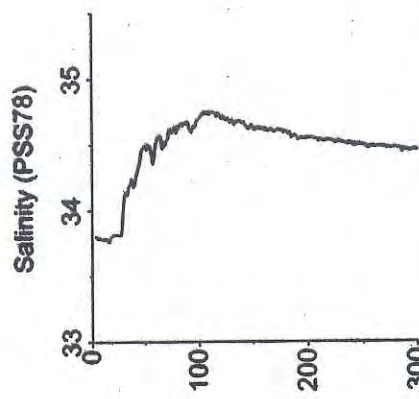




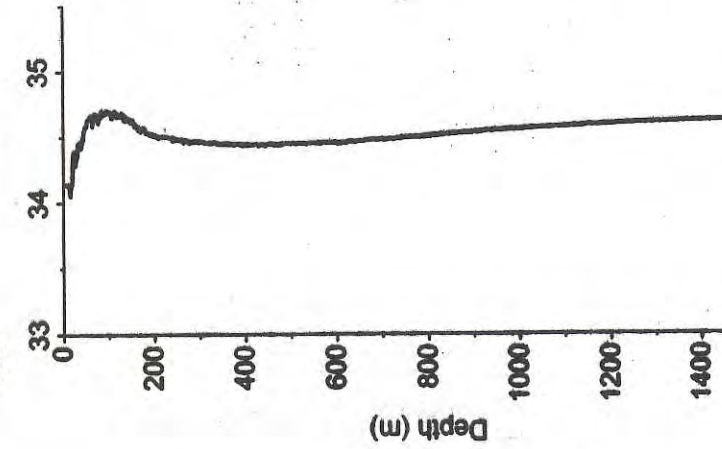
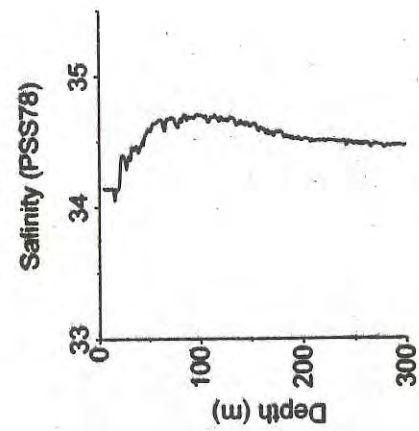
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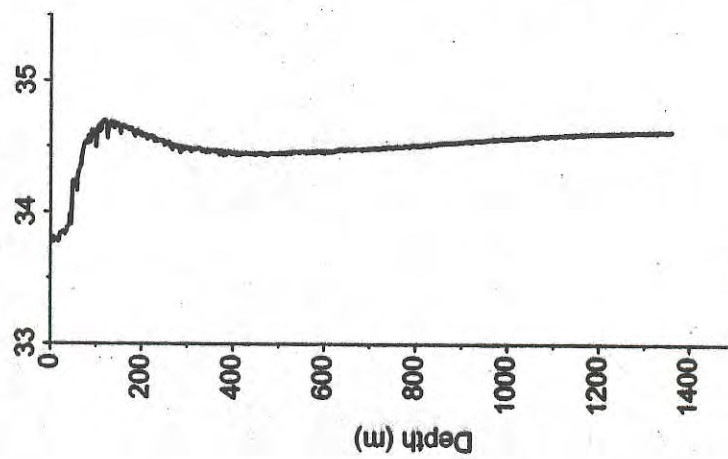
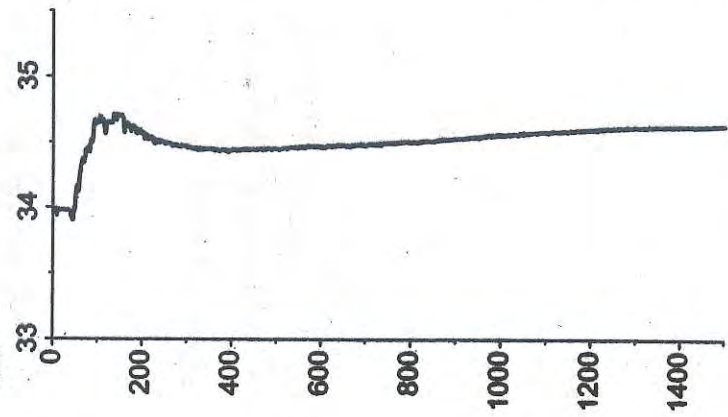
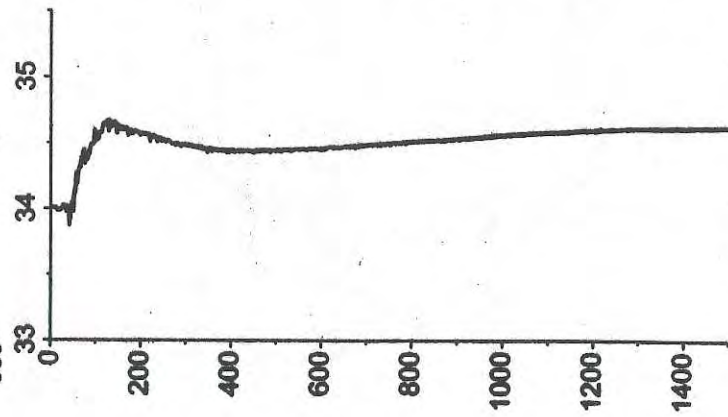
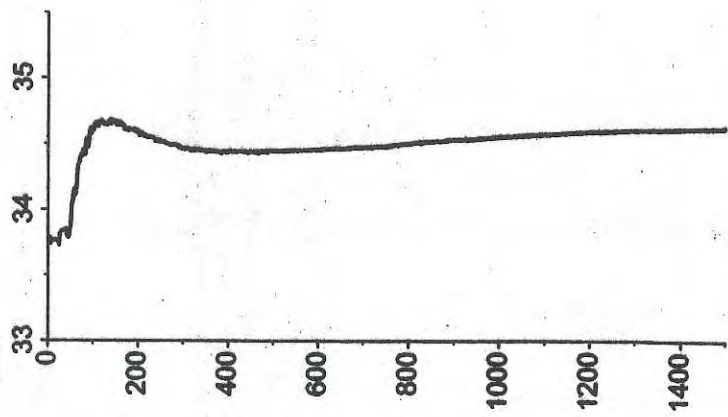
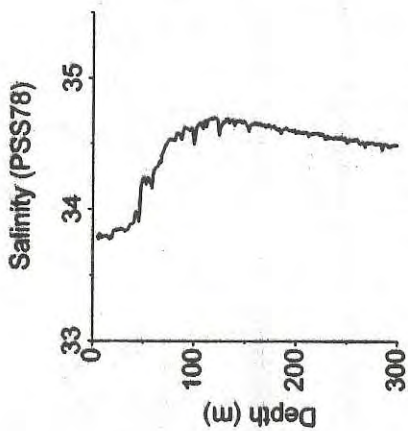
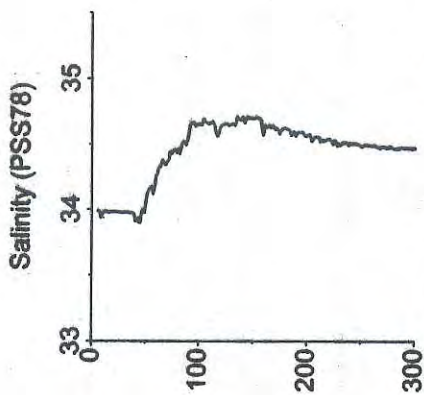
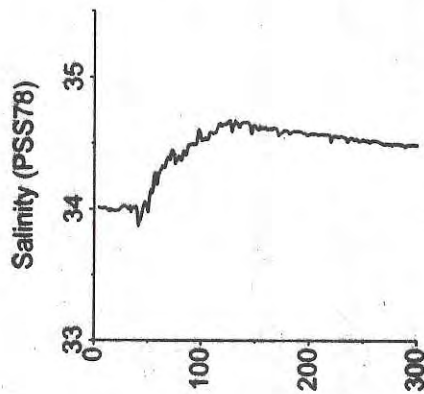
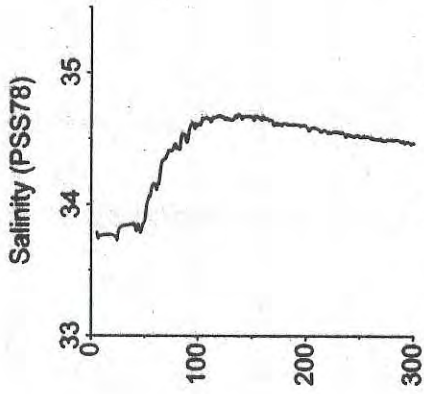
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Station No. 6



Station No. 5

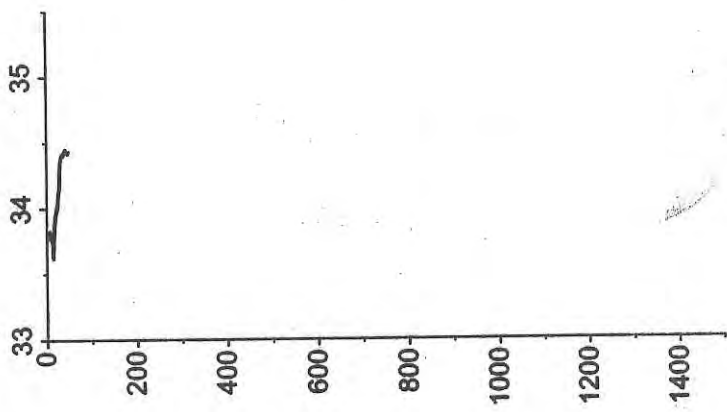
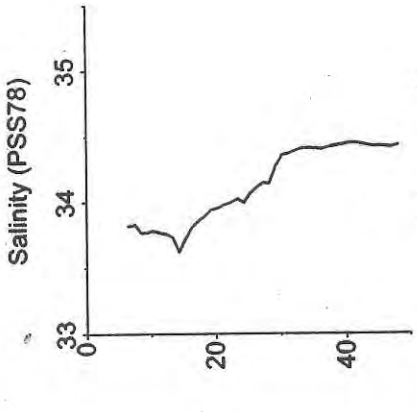


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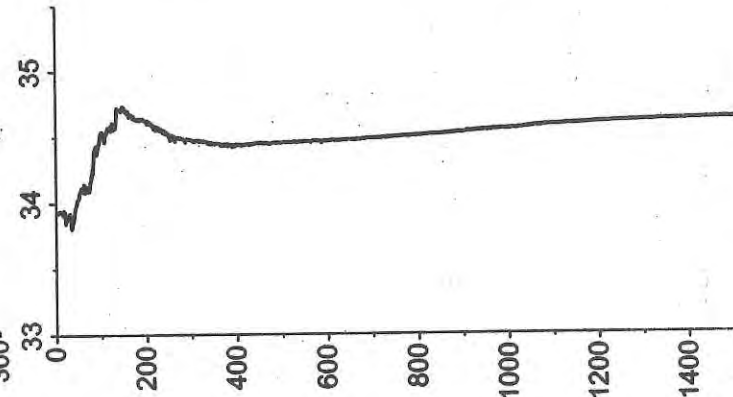
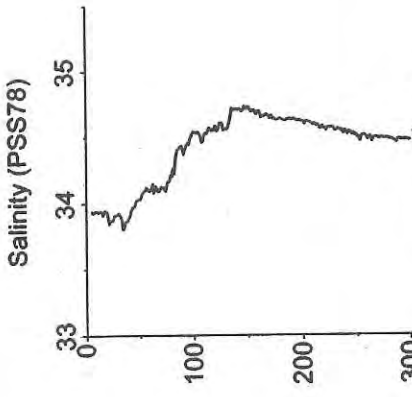
Station No. 11

Station No. 10

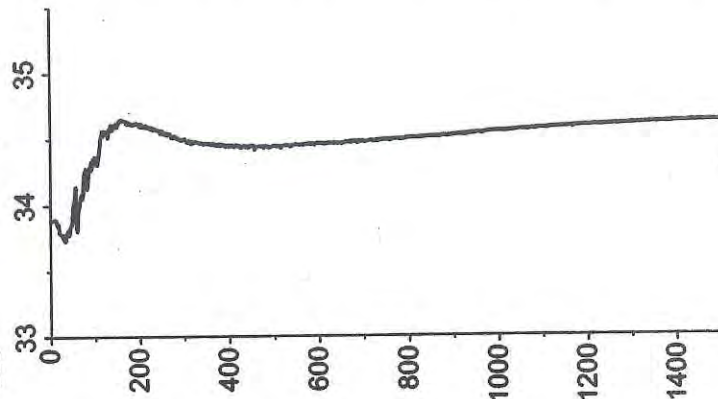
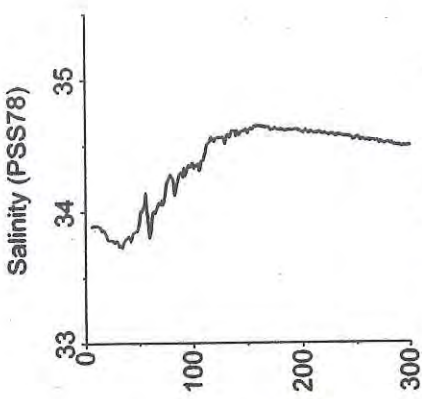
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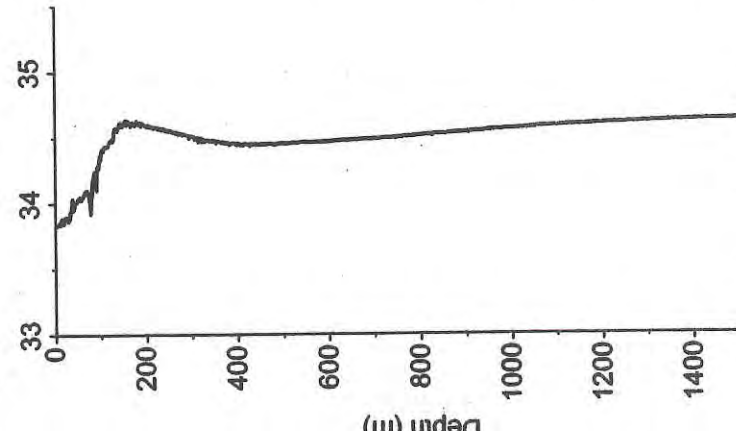
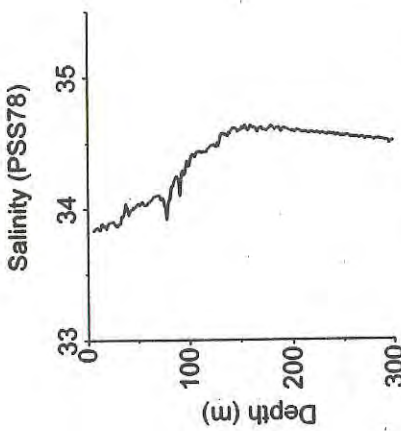
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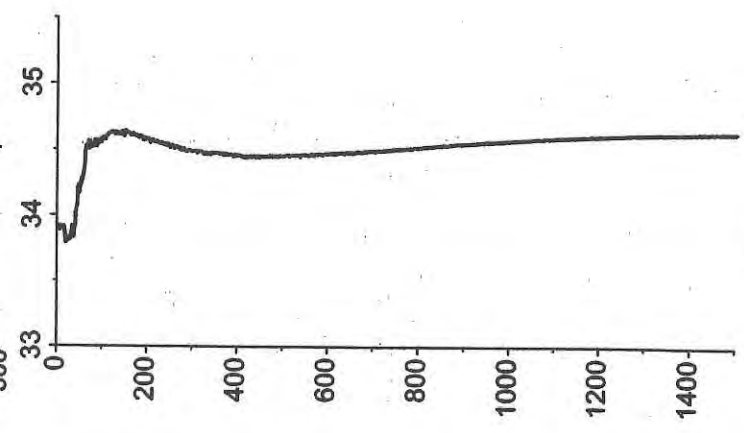
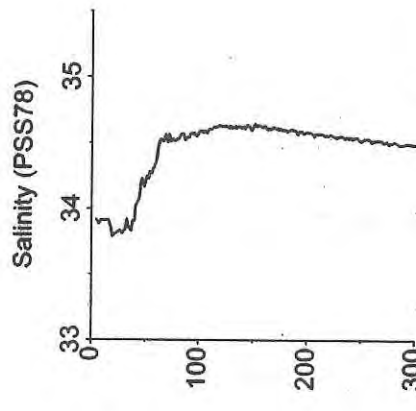
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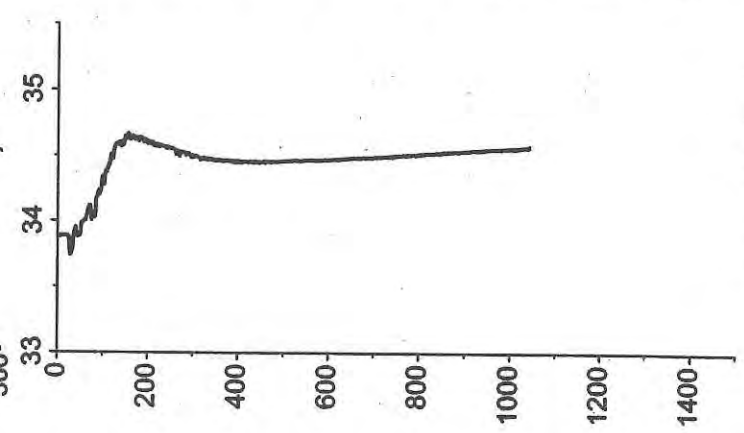
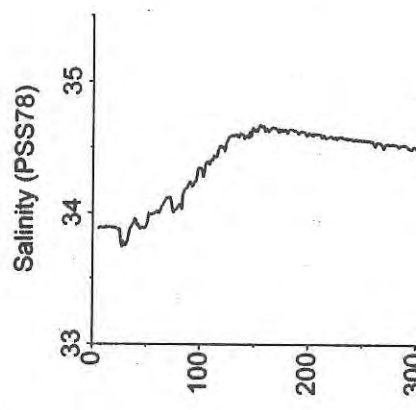
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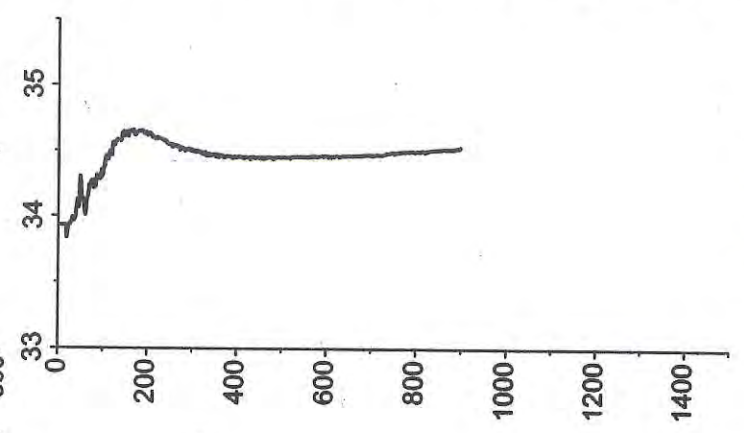
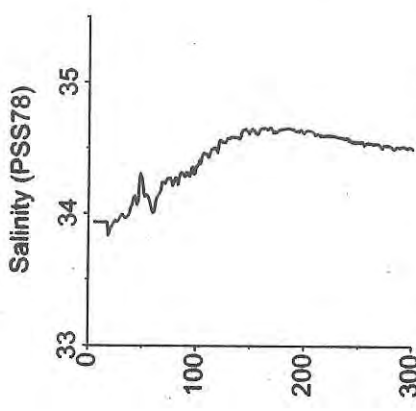
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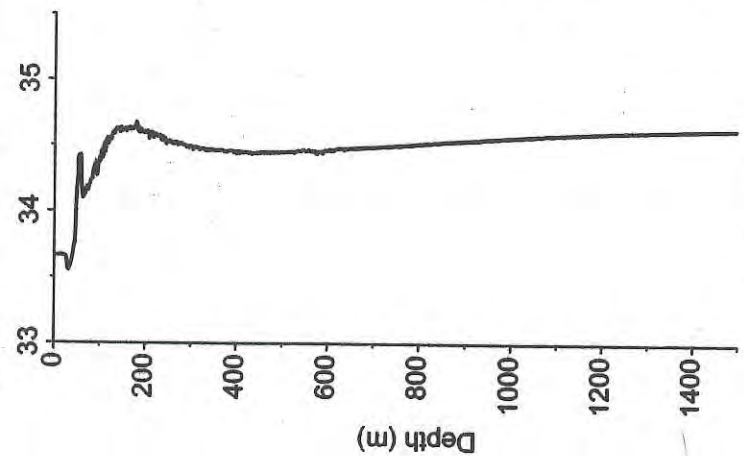
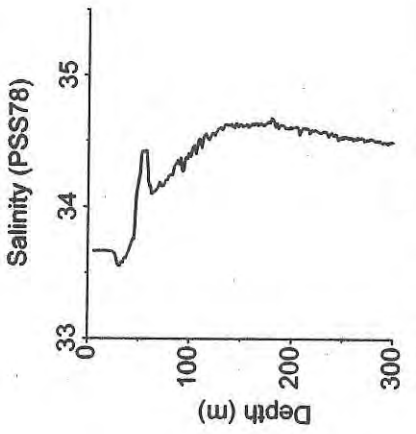
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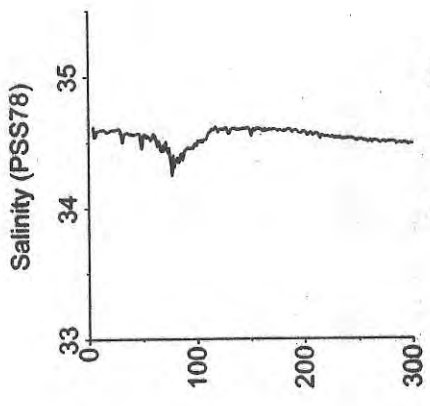
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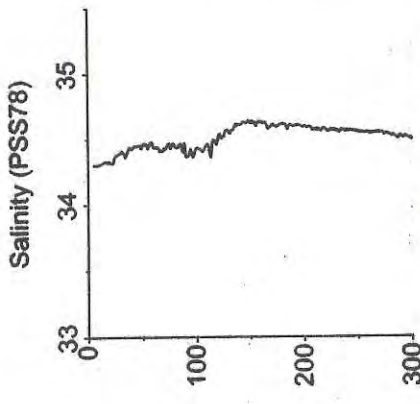
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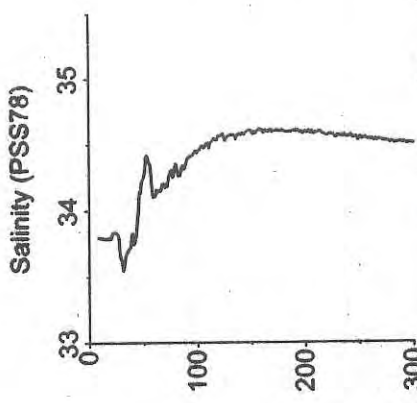
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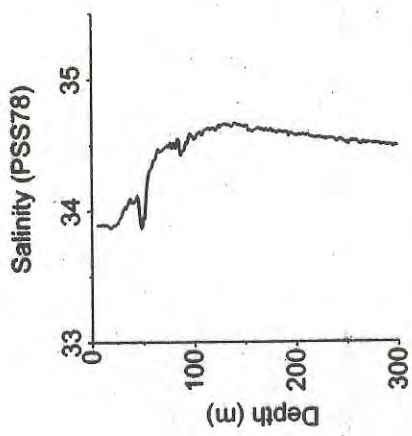
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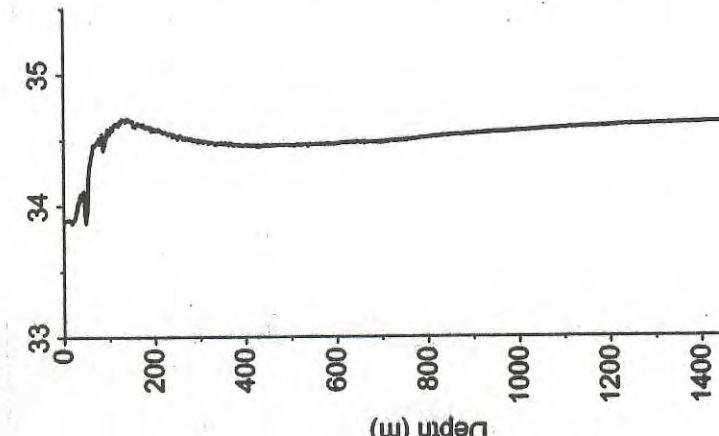
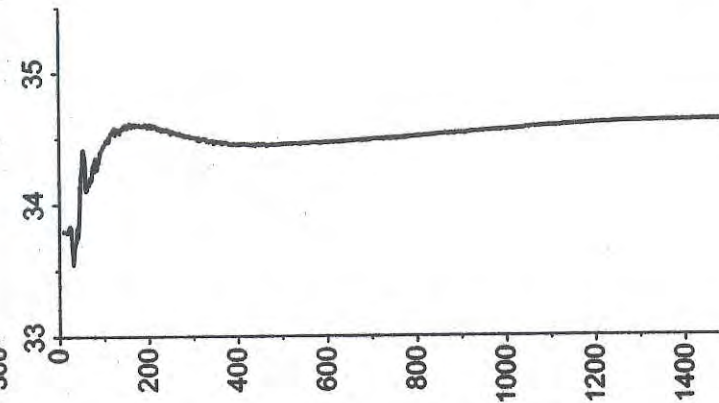
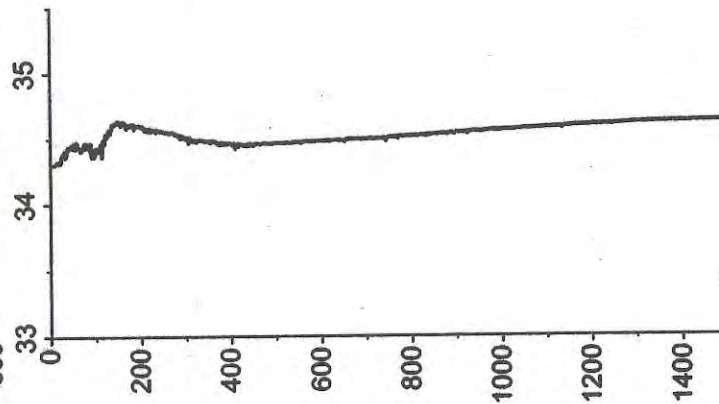
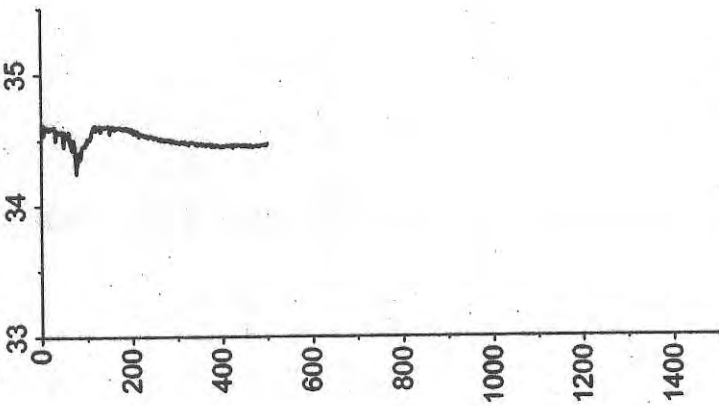
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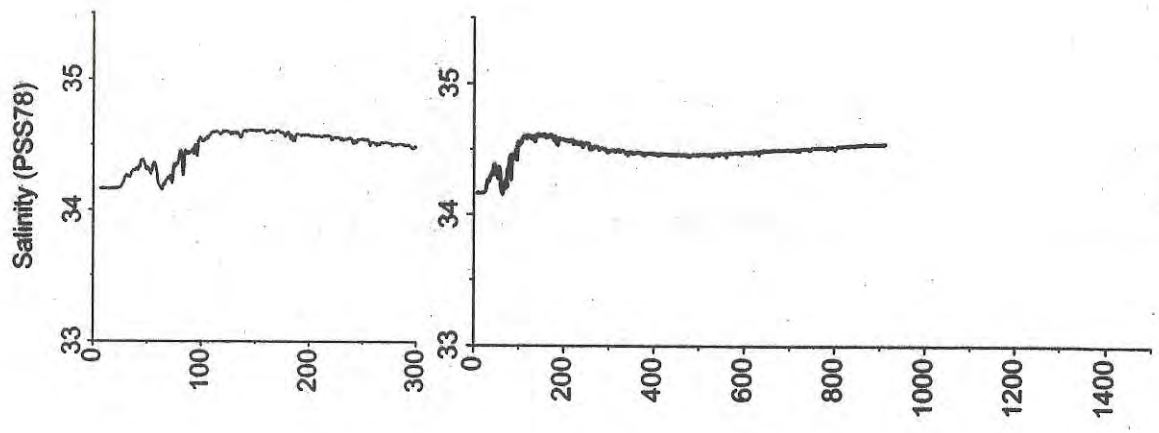


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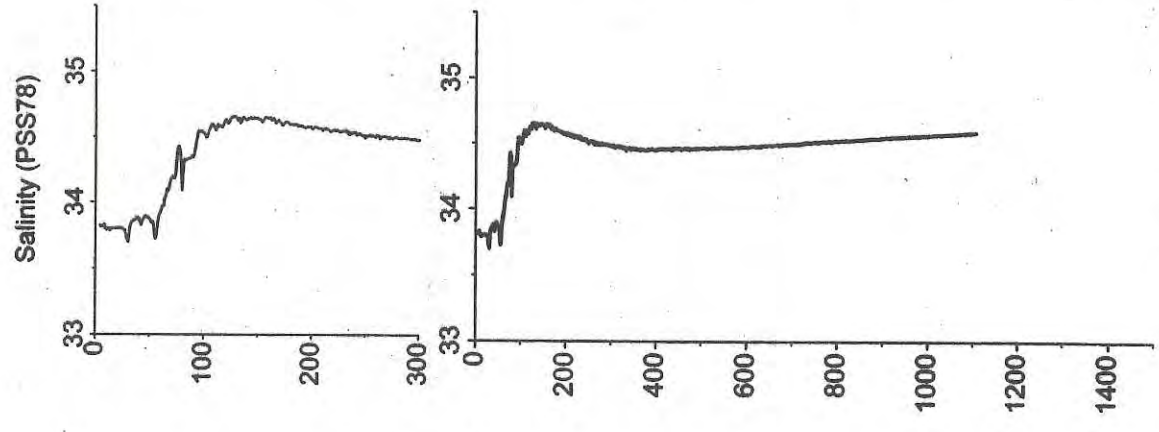


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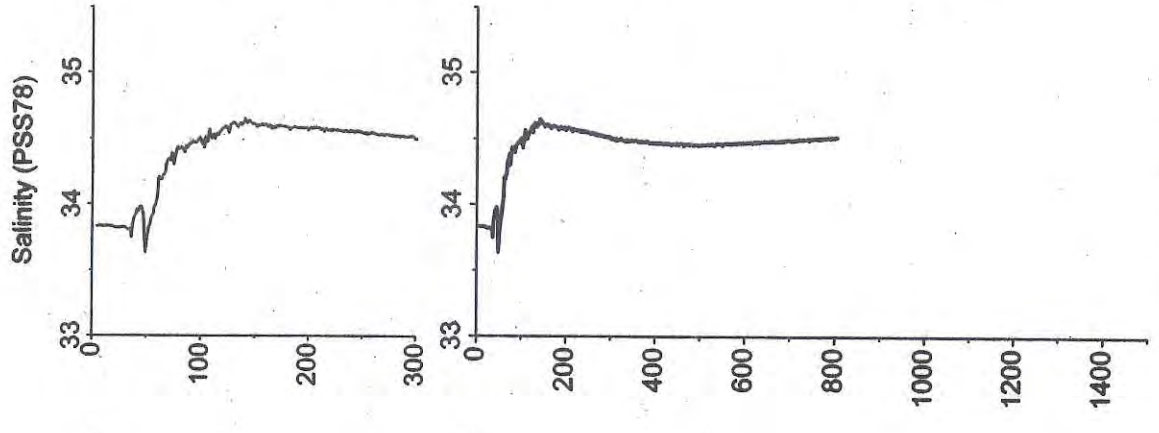




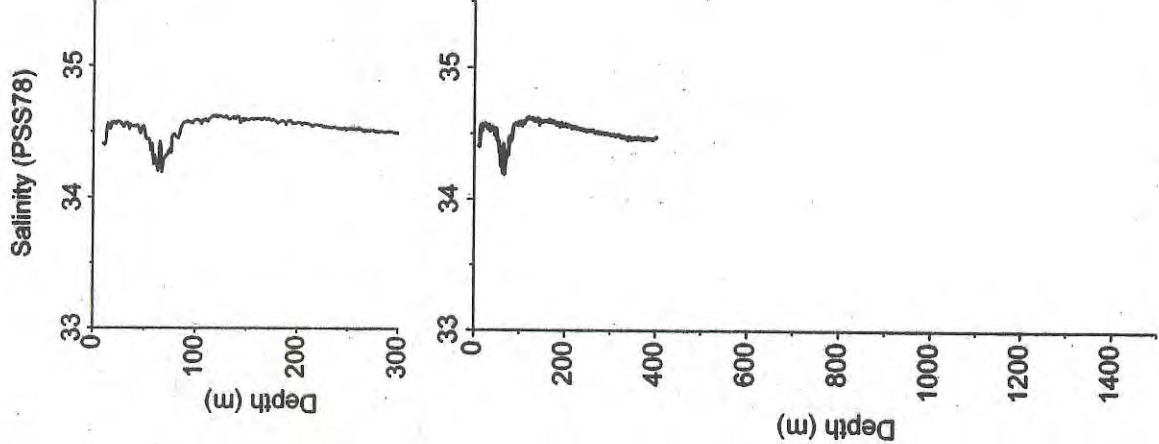
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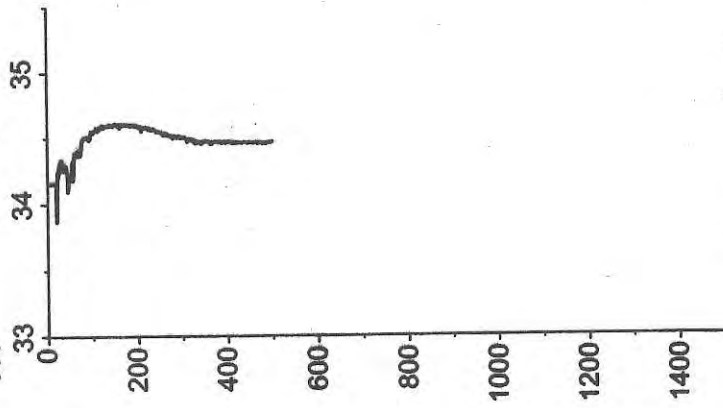
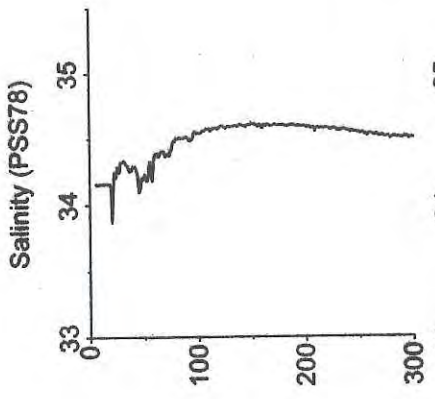
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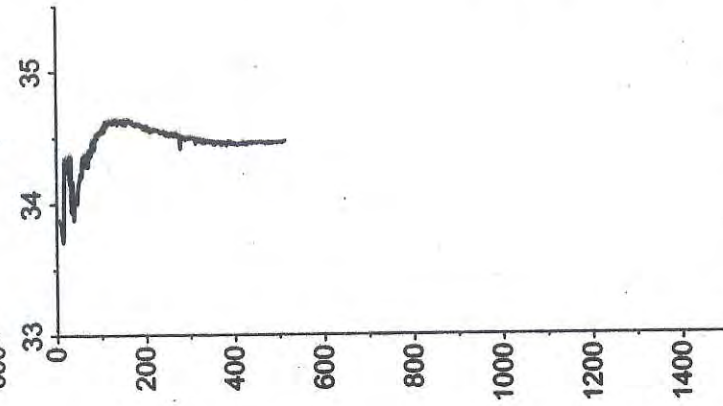
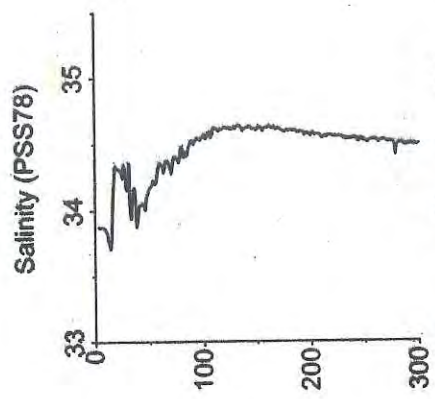
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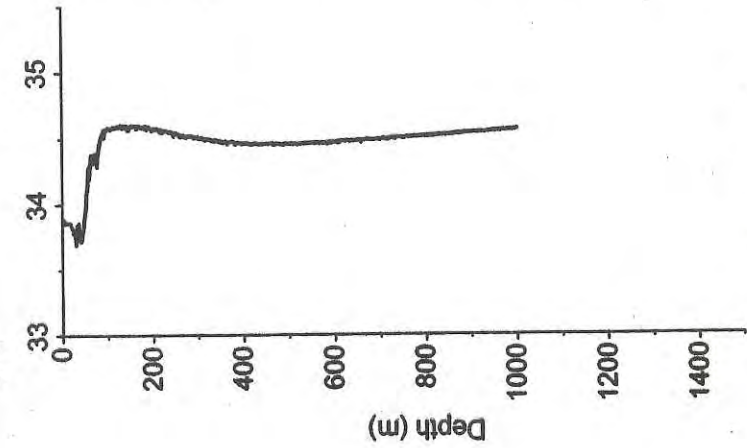
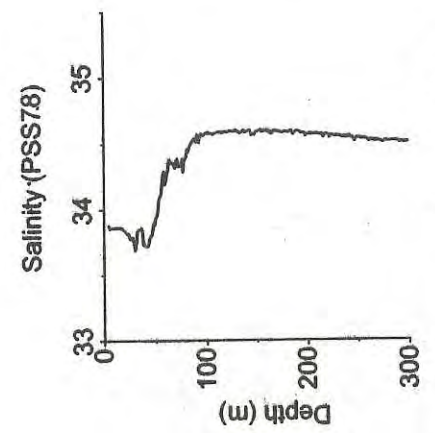
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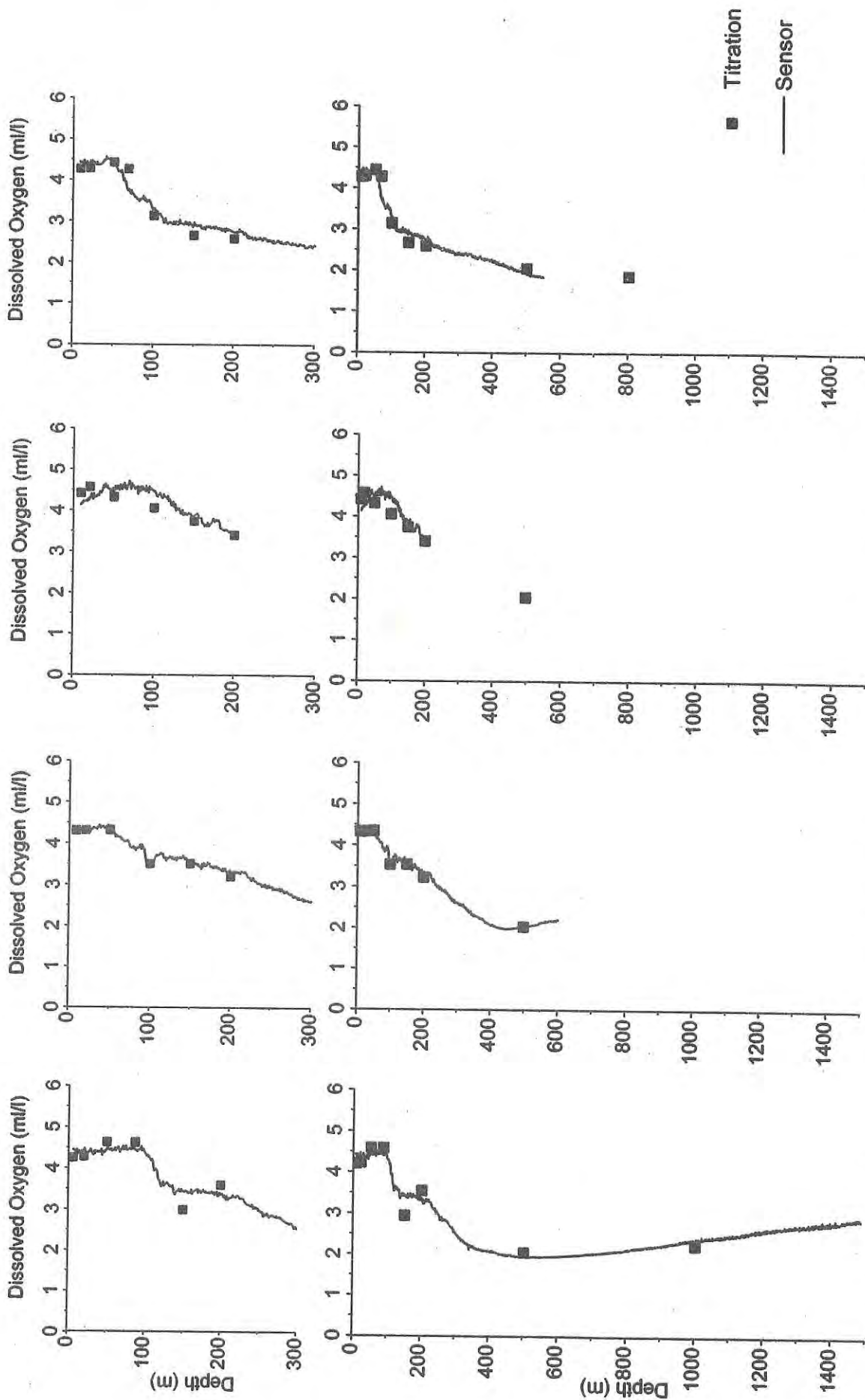
Station No. 31



Station No. 30



Station No. 29

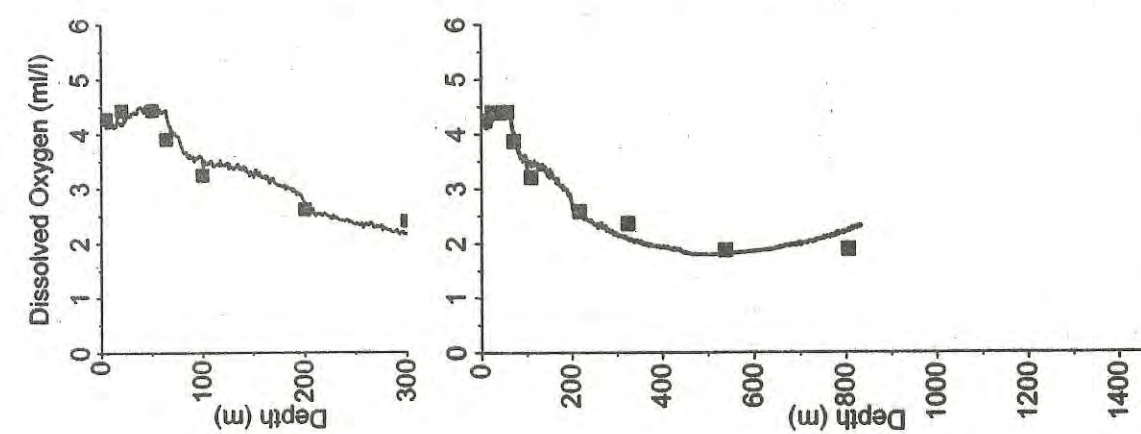
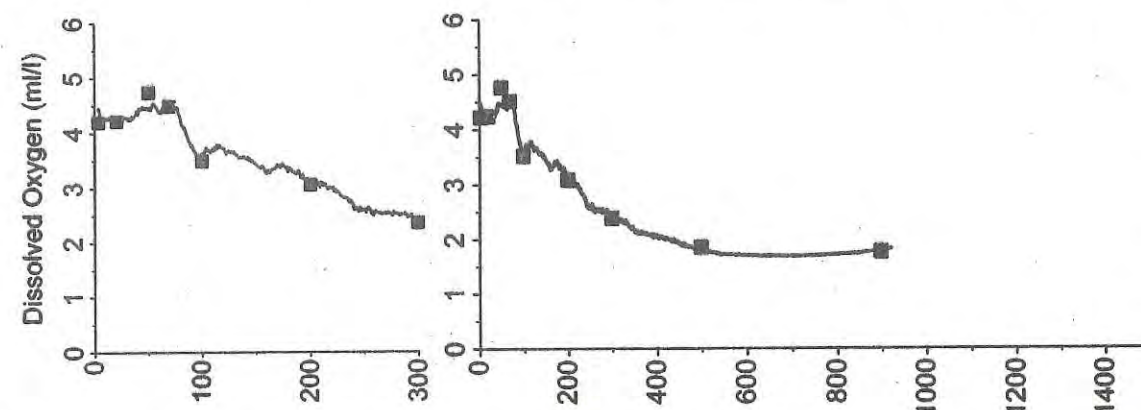
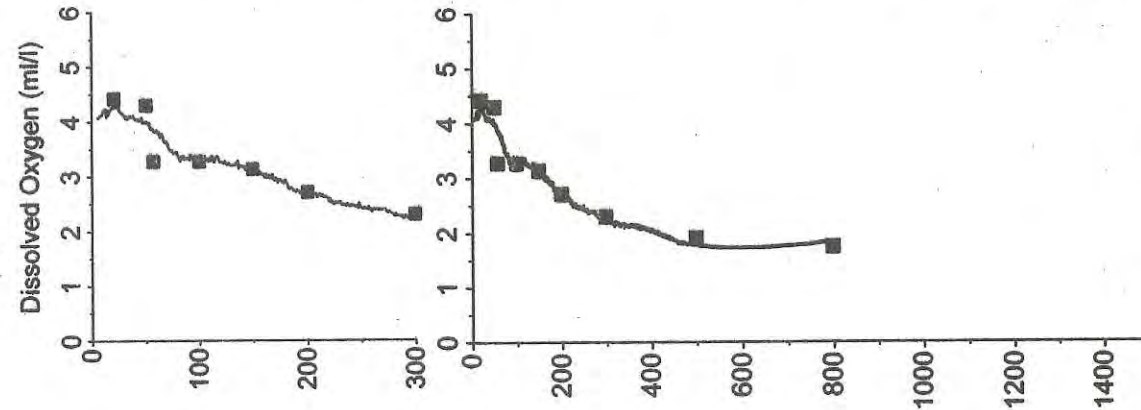
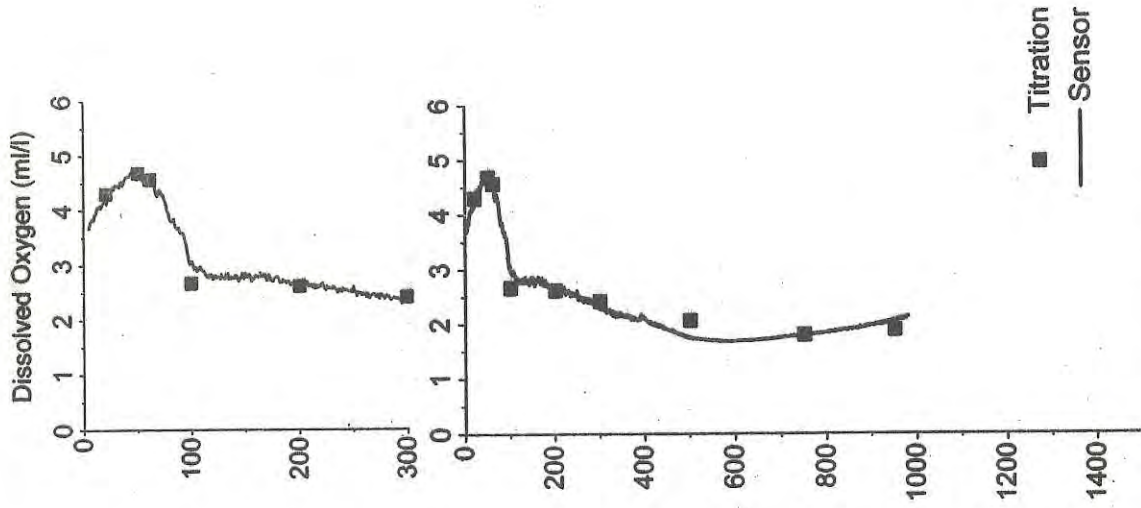


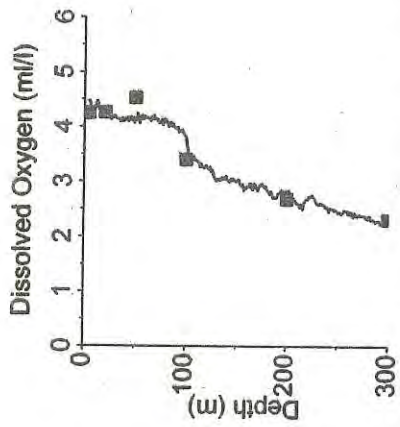
Station No. 4

Station No. 3

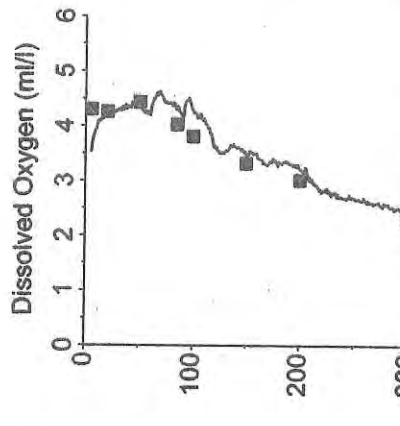
Station No. 2

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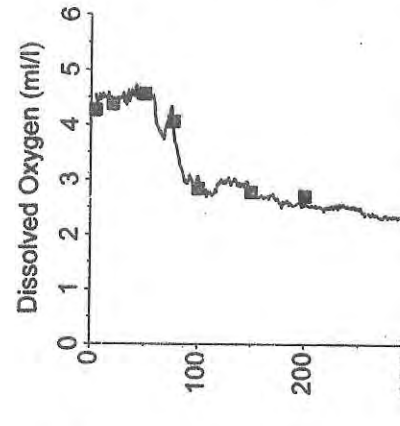




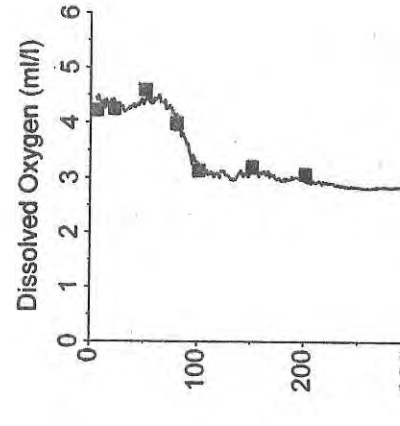
Station No.9



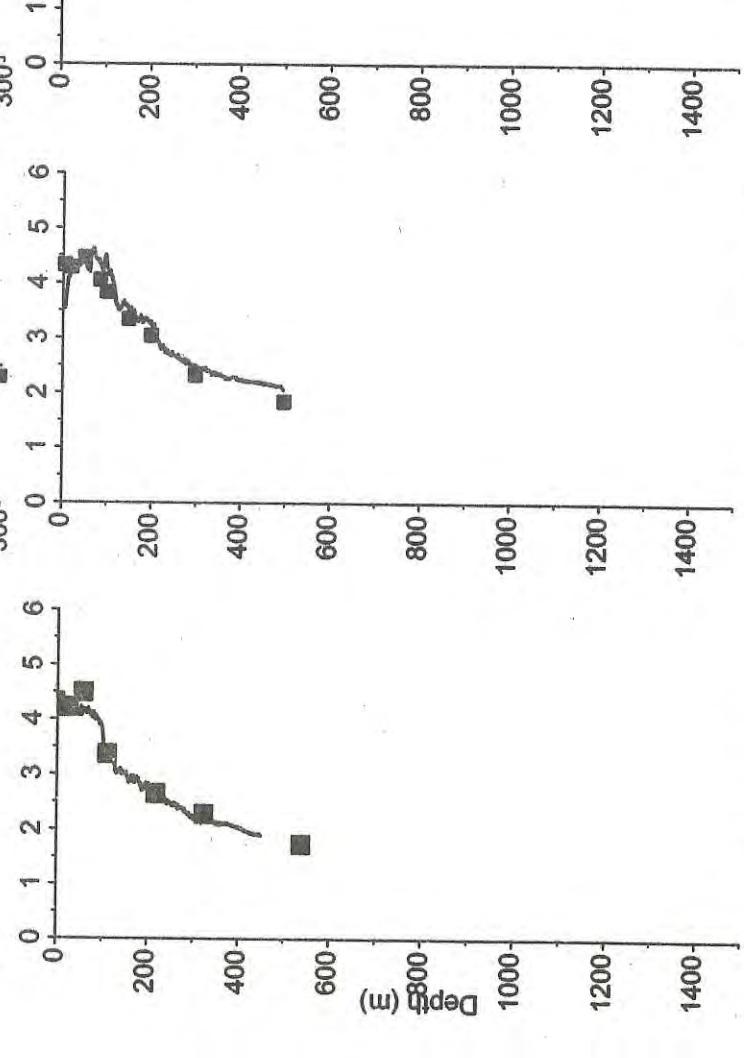
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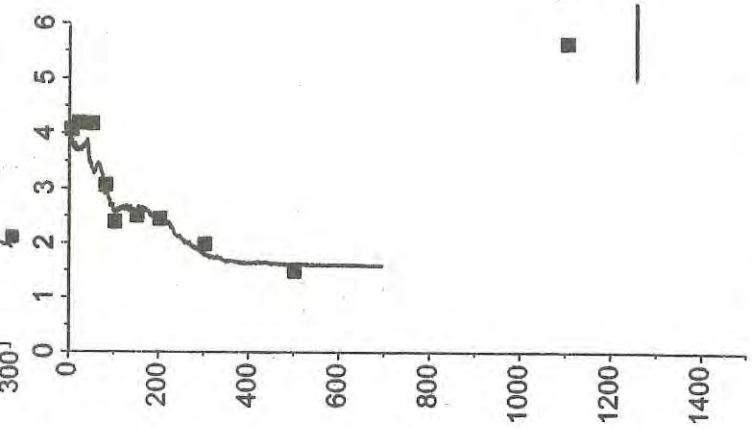
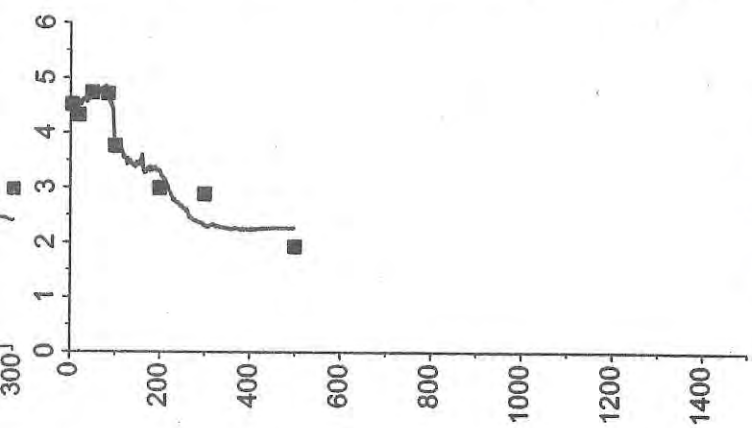
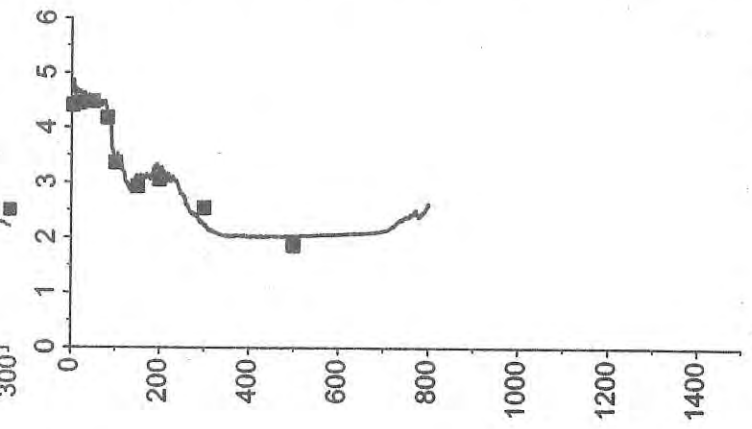
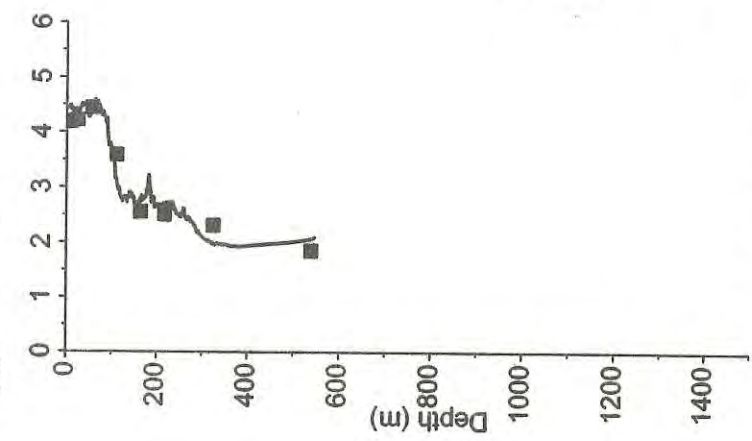
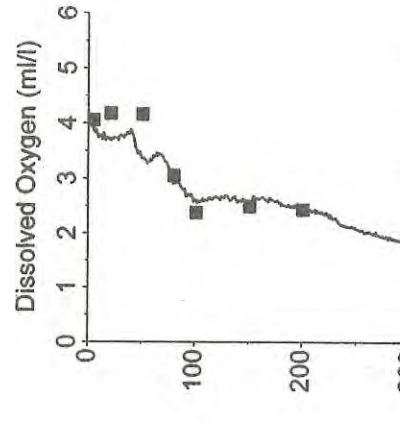
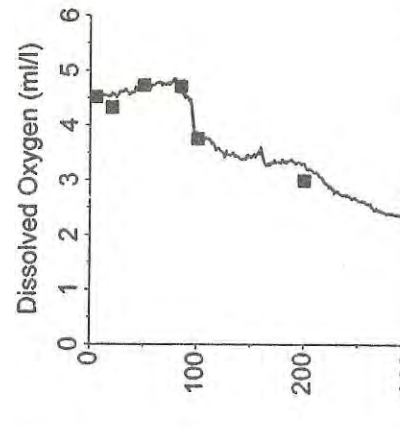
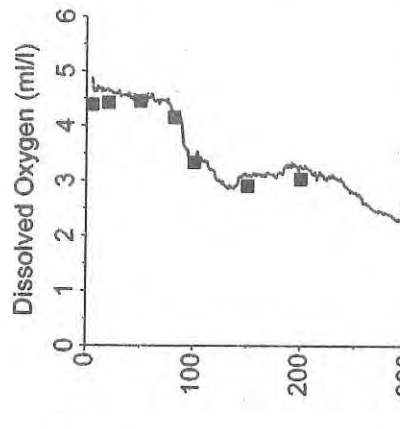
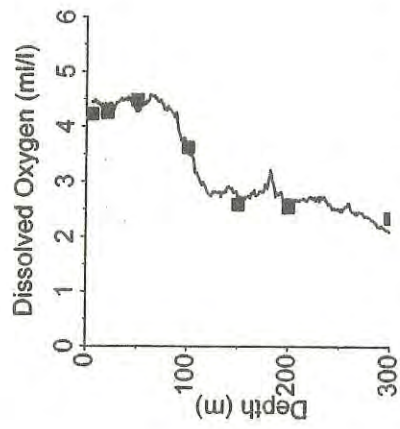
Station No. 11



Station No. 12



■ Titration
— Sensor



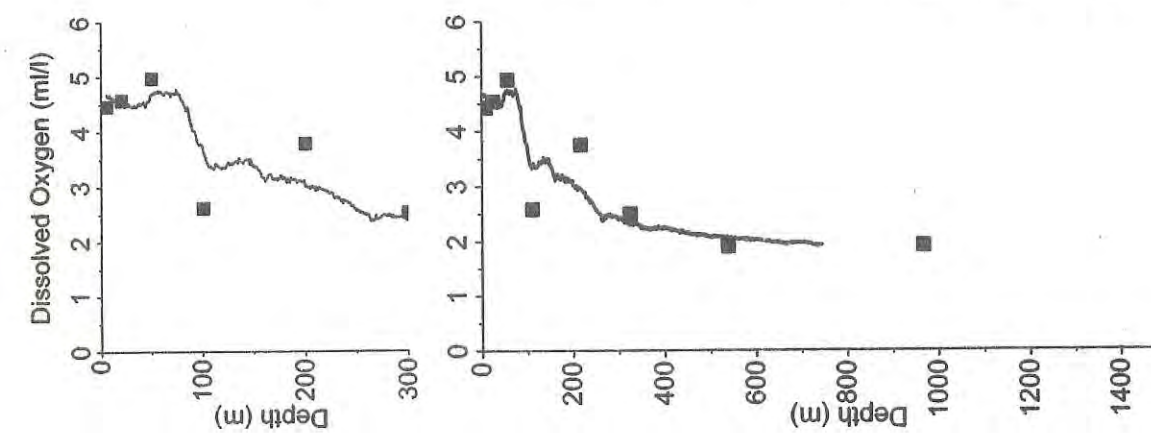
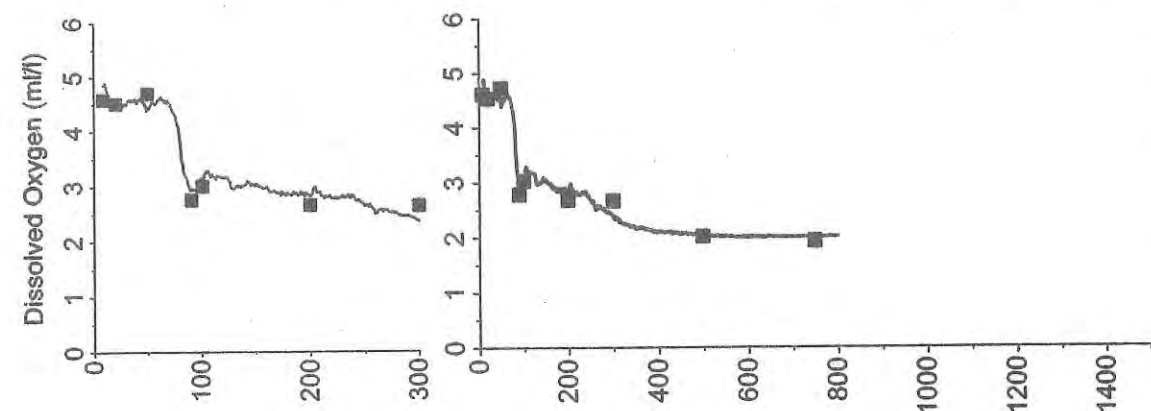
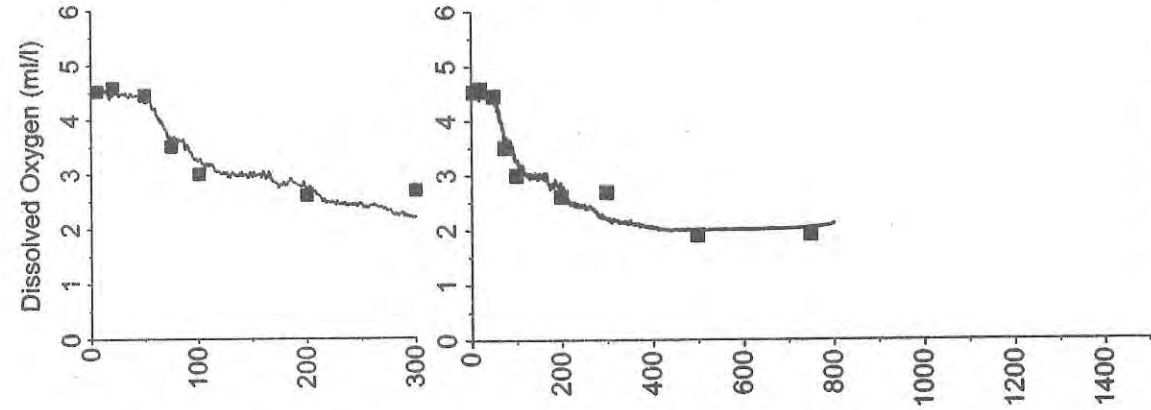
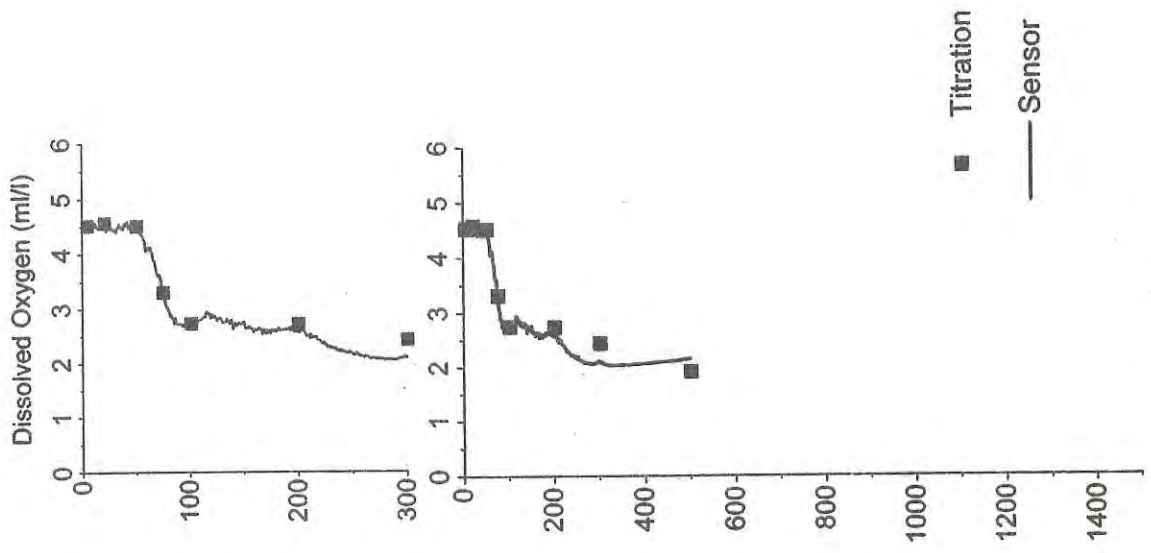
■ Titration
— Sensor

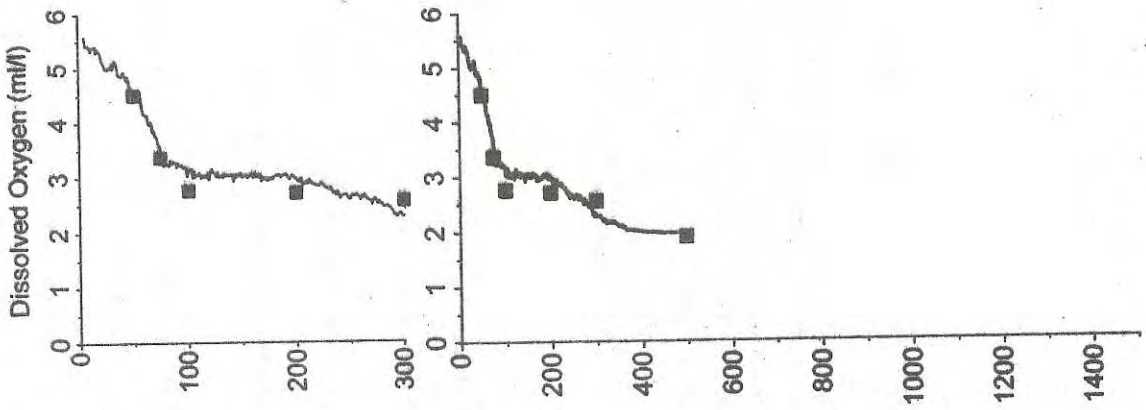
Station No. 17

Station No. 18

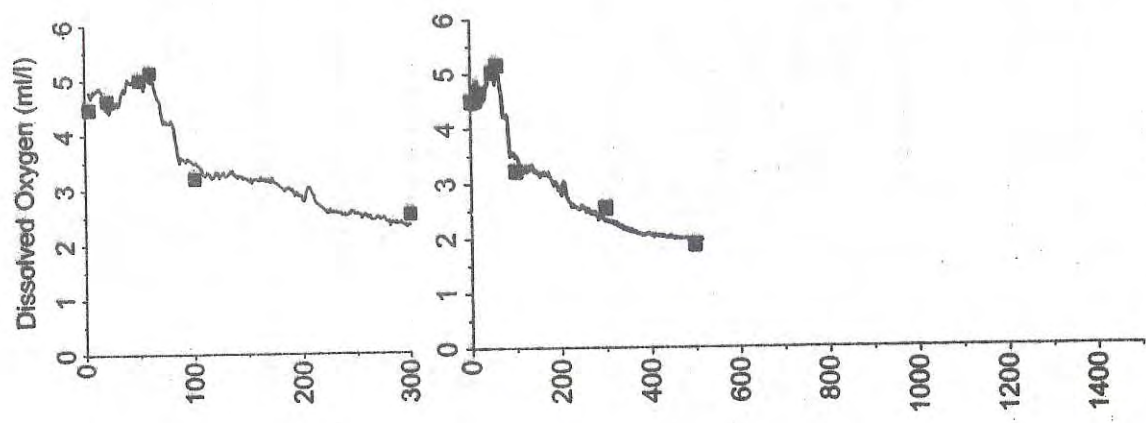
Station No. 19

Station No. 20

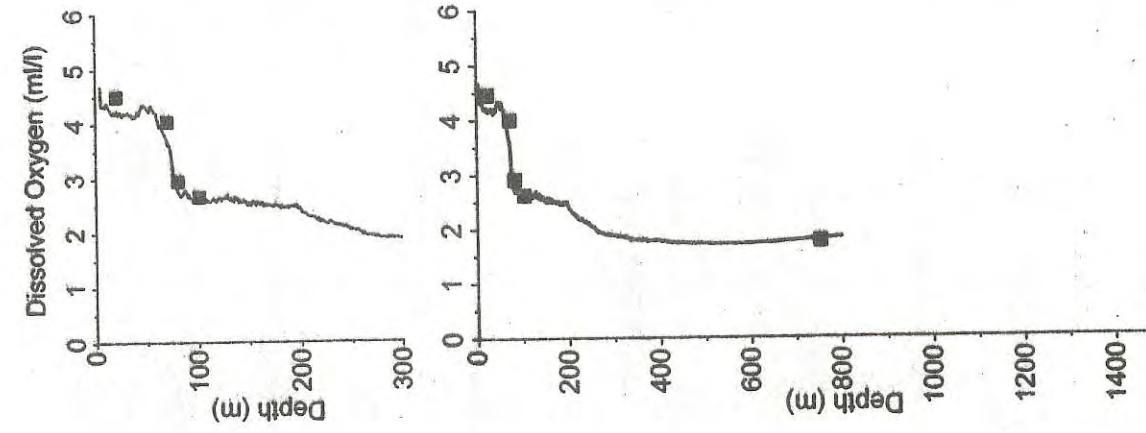




Station No. 31

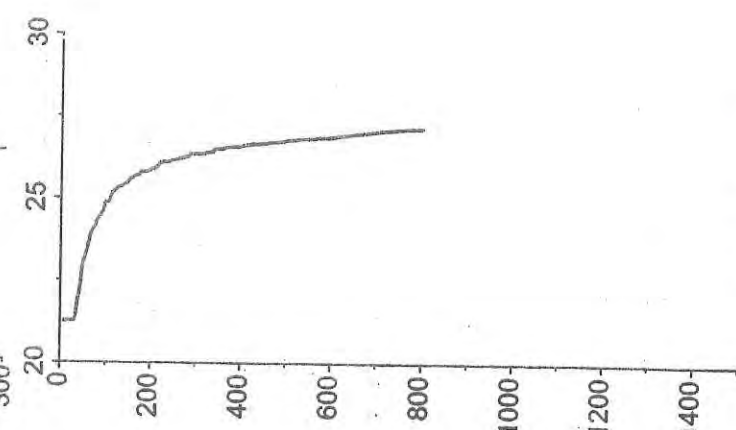
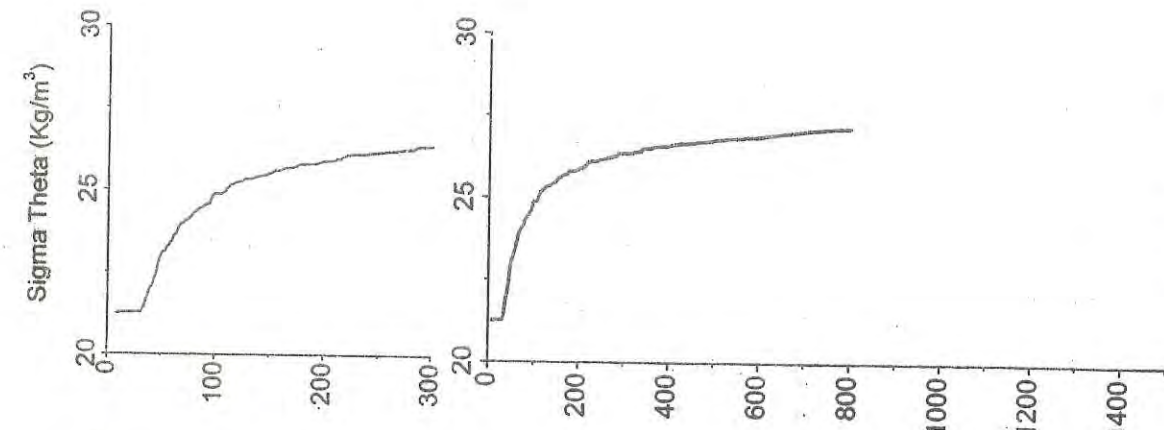
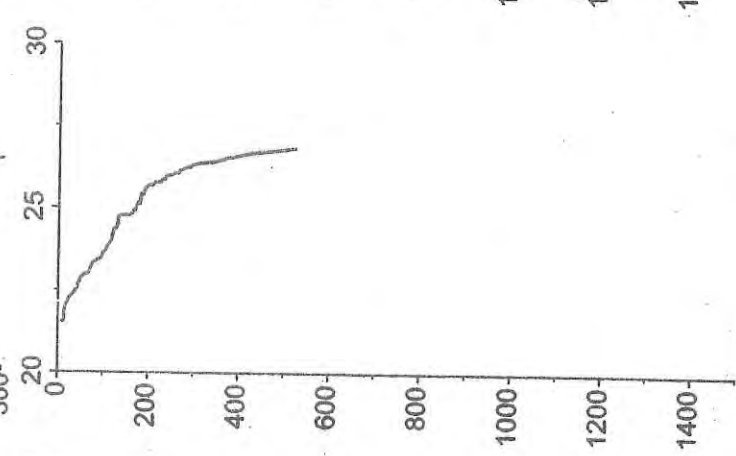
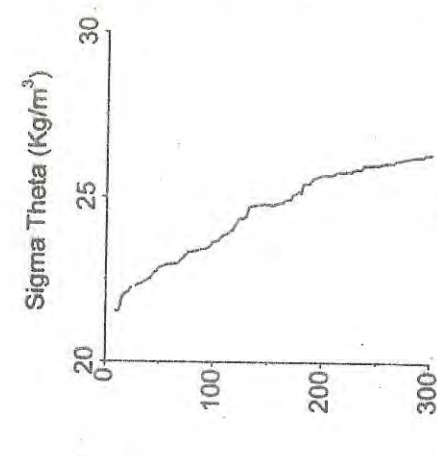
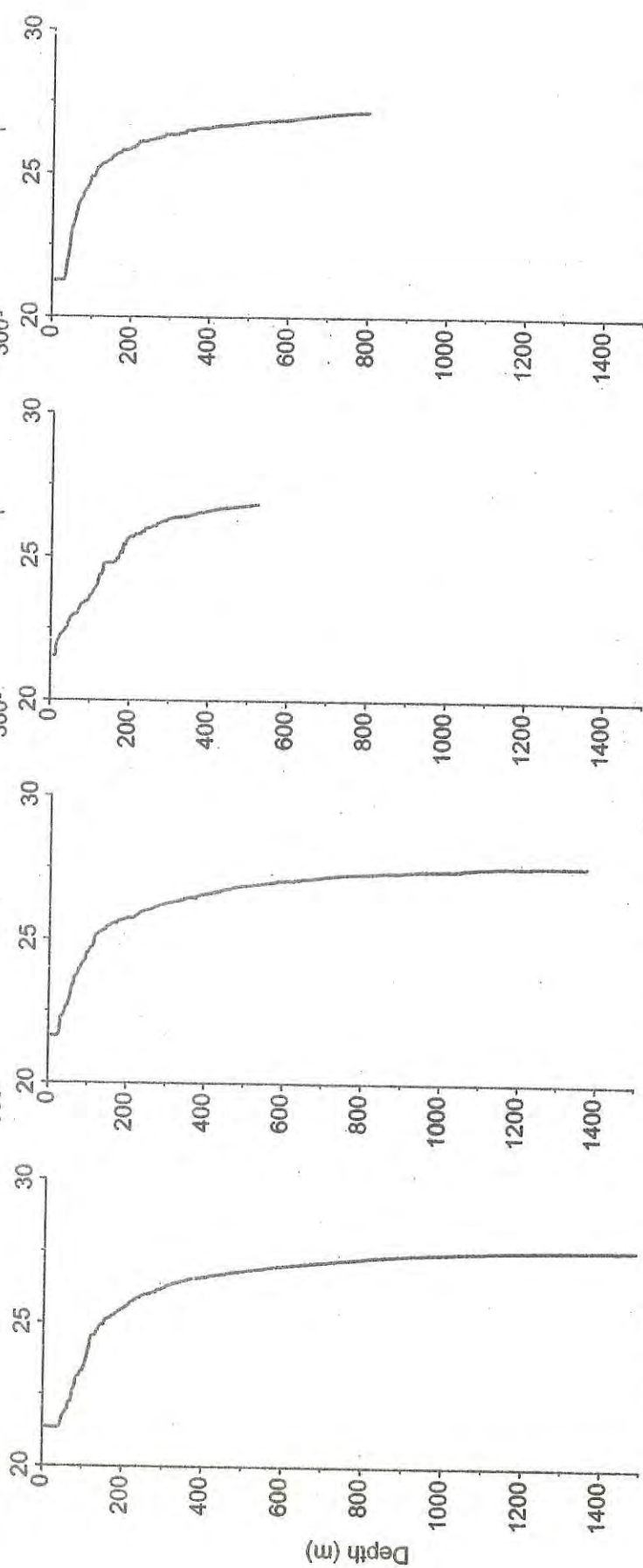
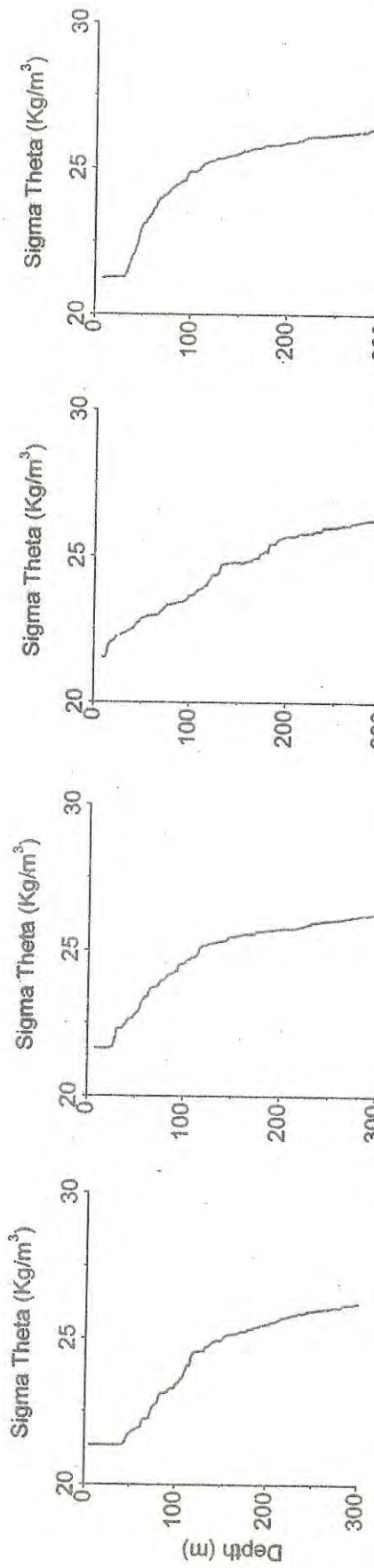


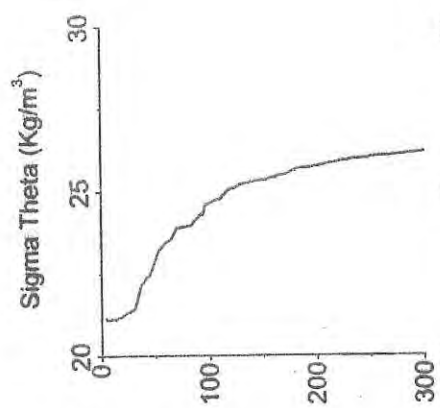
Station No. 30



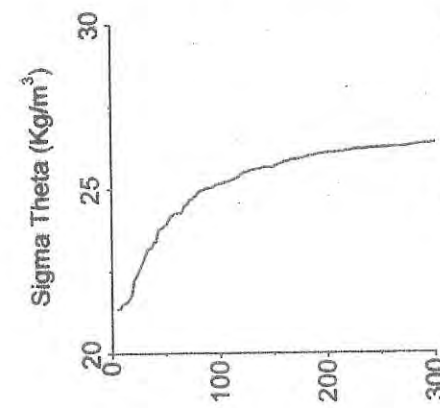
Station No. 29

■ Titration
 — Sensor

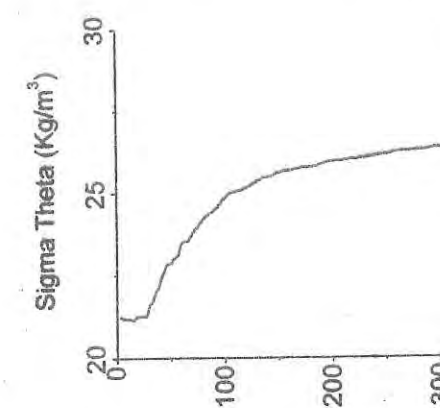




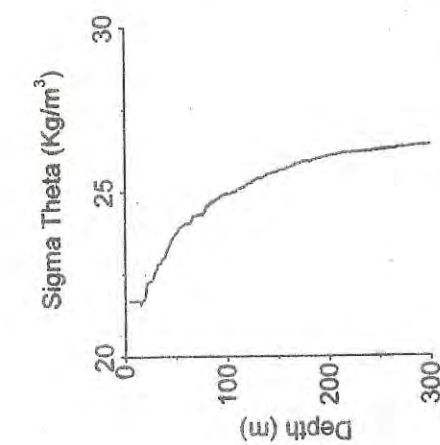
Station No. 8



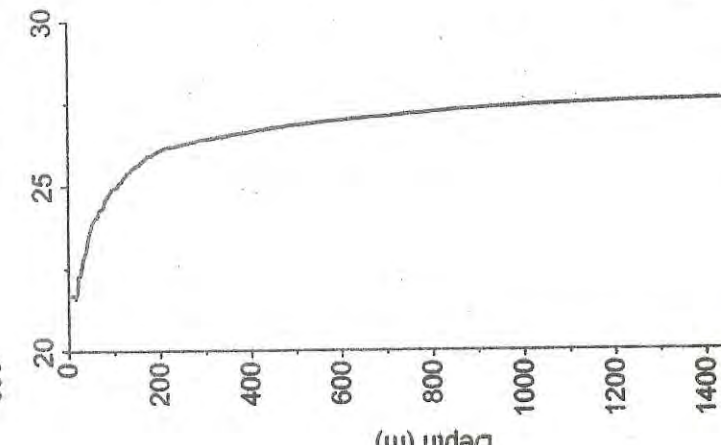
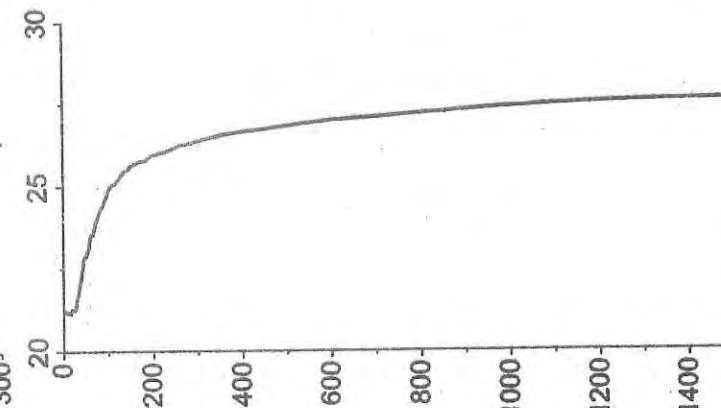
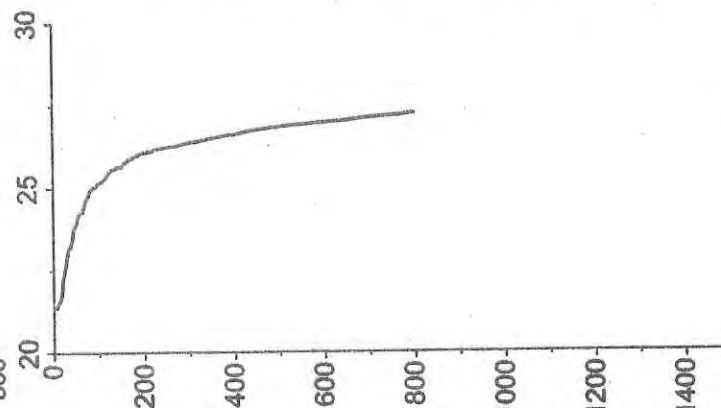
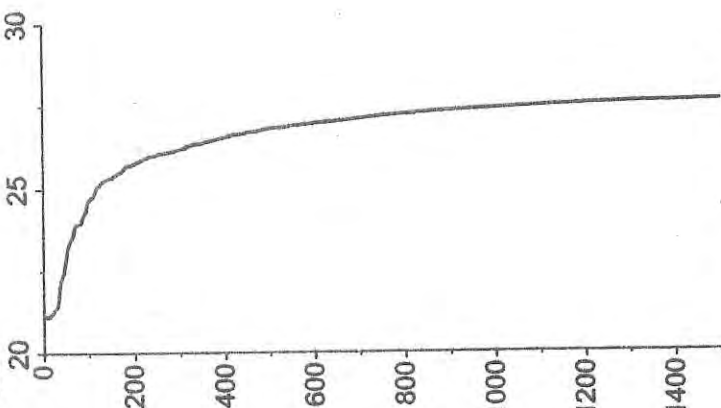
Station No. 7

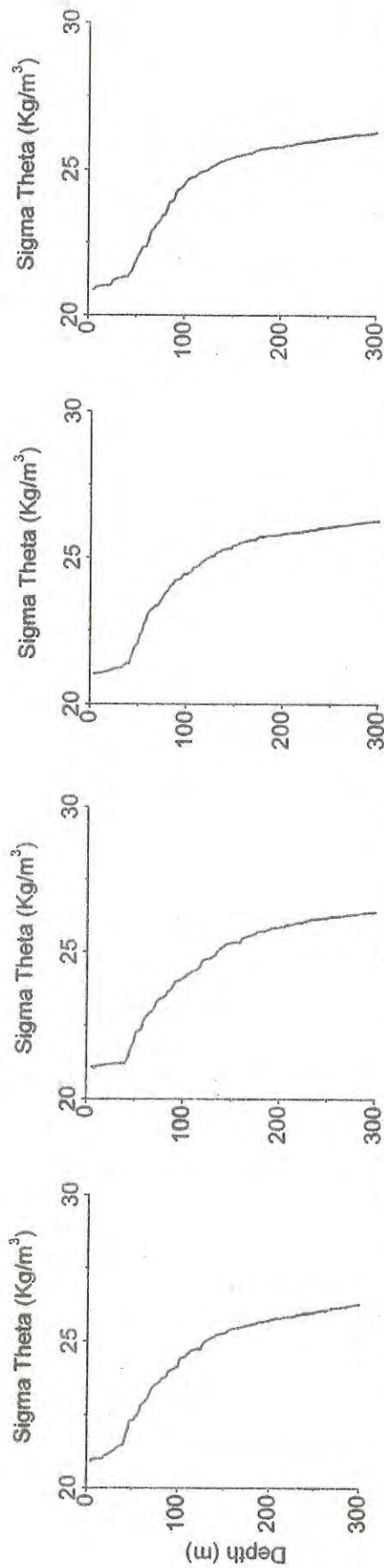


Station No. 6

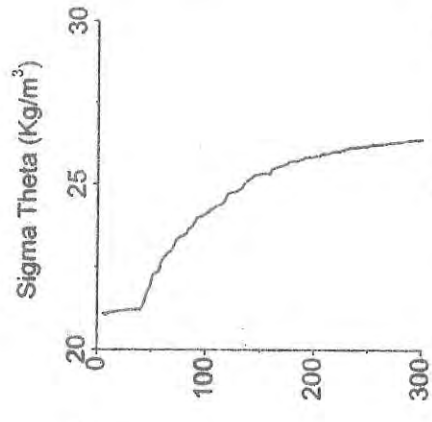


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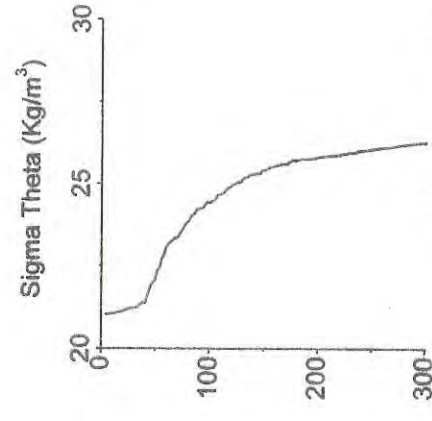




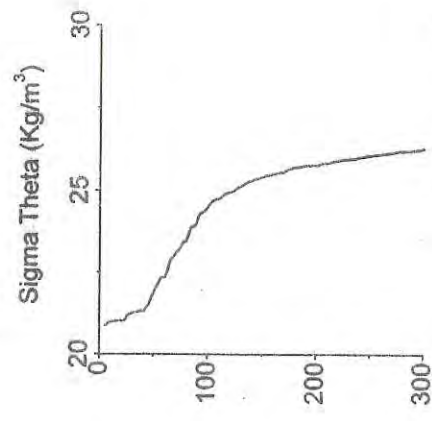
Station No. 9



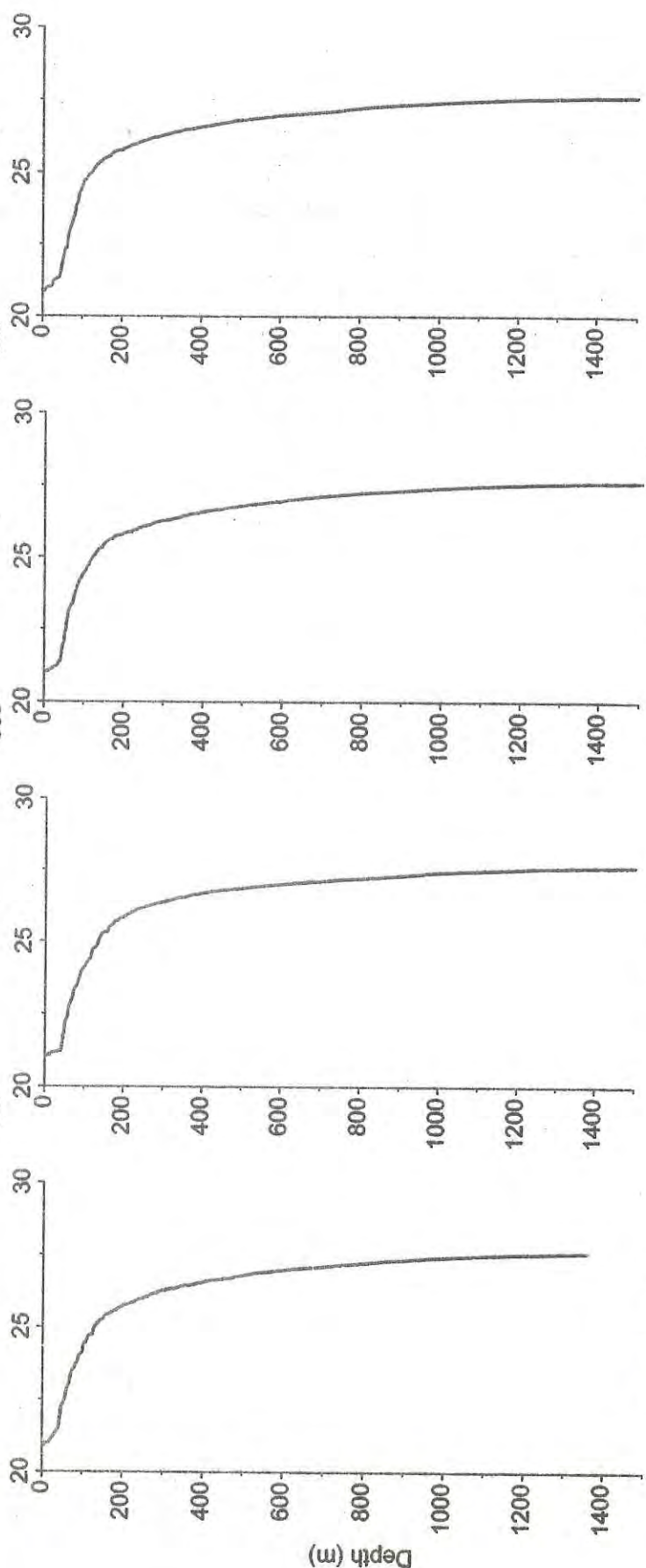
Station No. 10



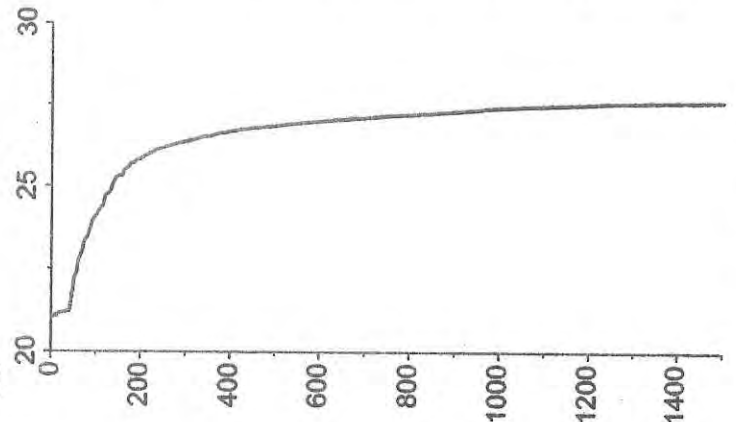
Station No. 11



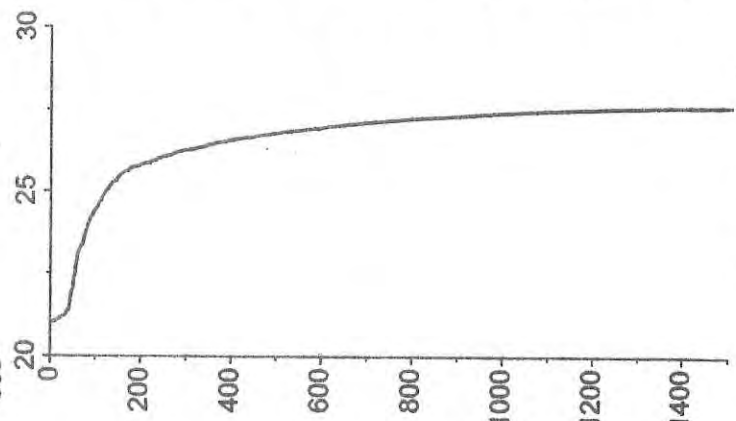
Station No. 12



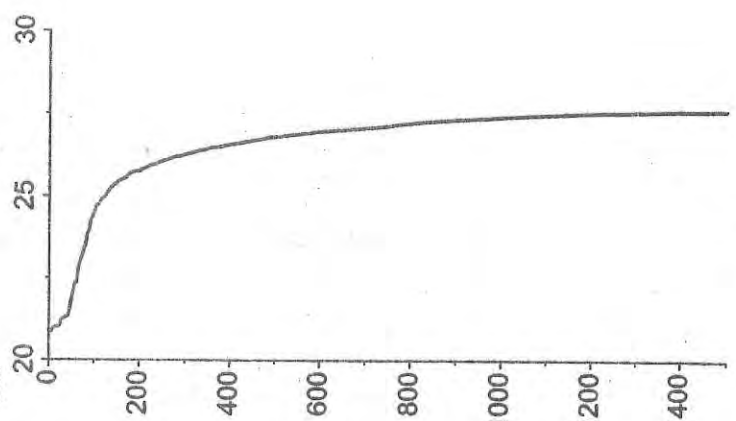
Station No. 9



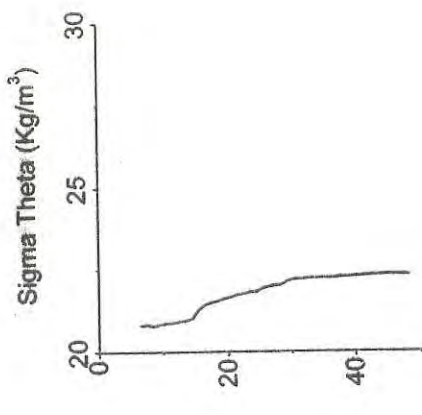
Station No. 10



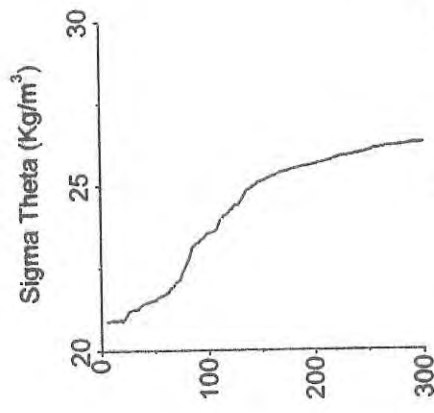
Station No. 11



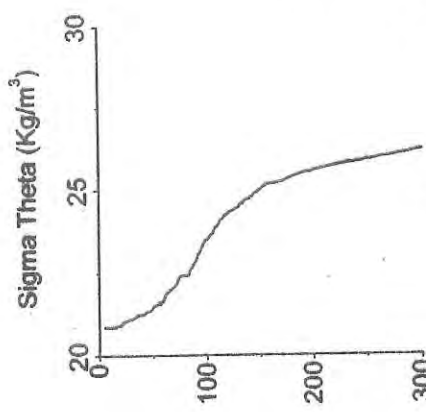
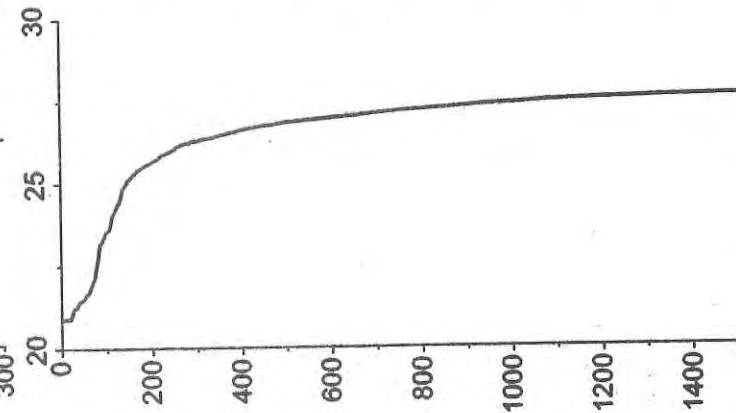
Station No. 12



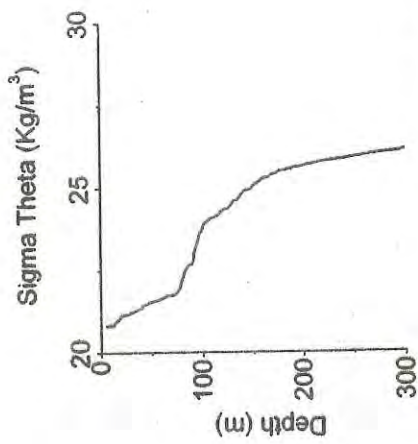
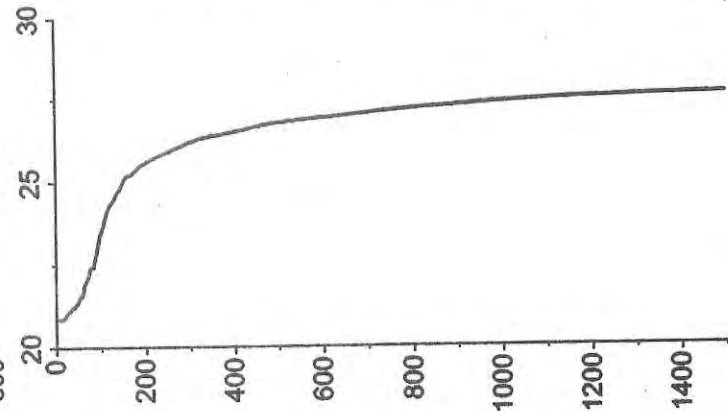
Station No. 16



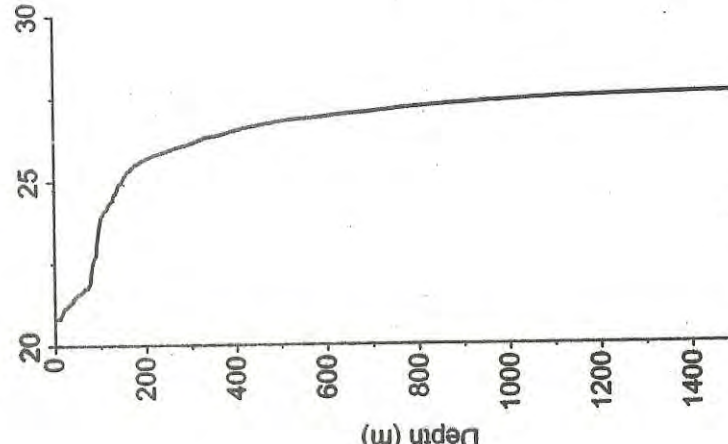
Station No. 15

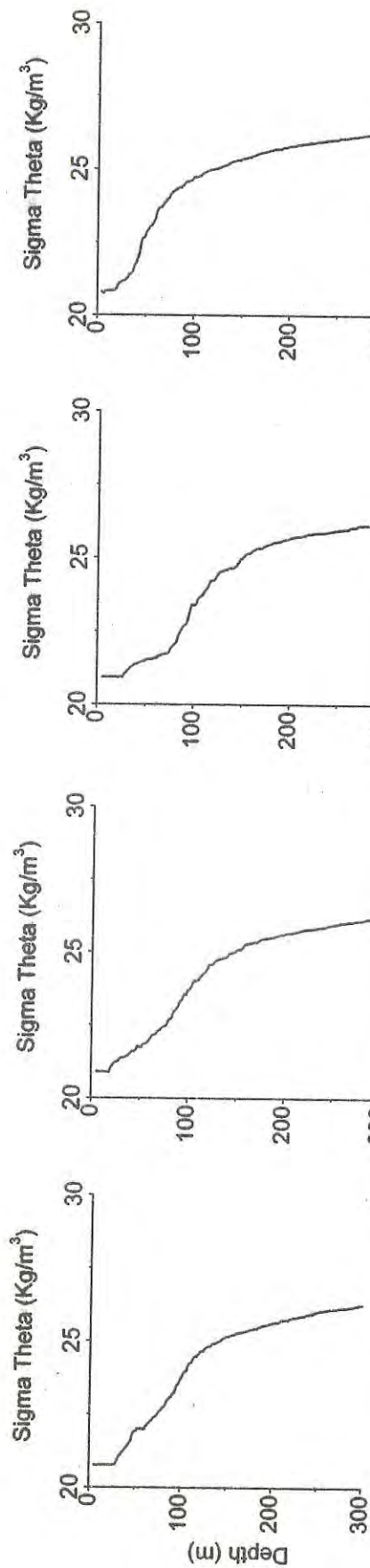


Station No. 14

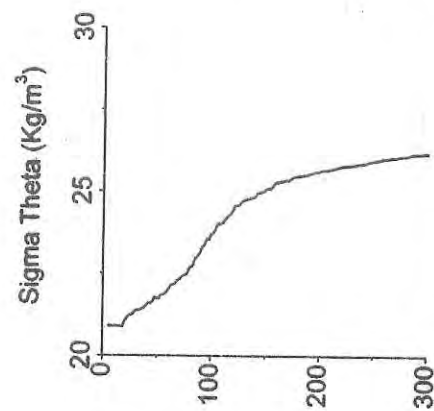


Station No. 13

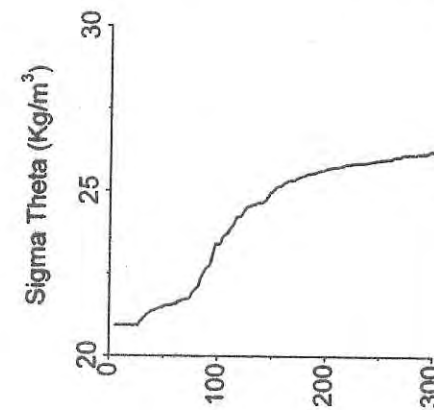




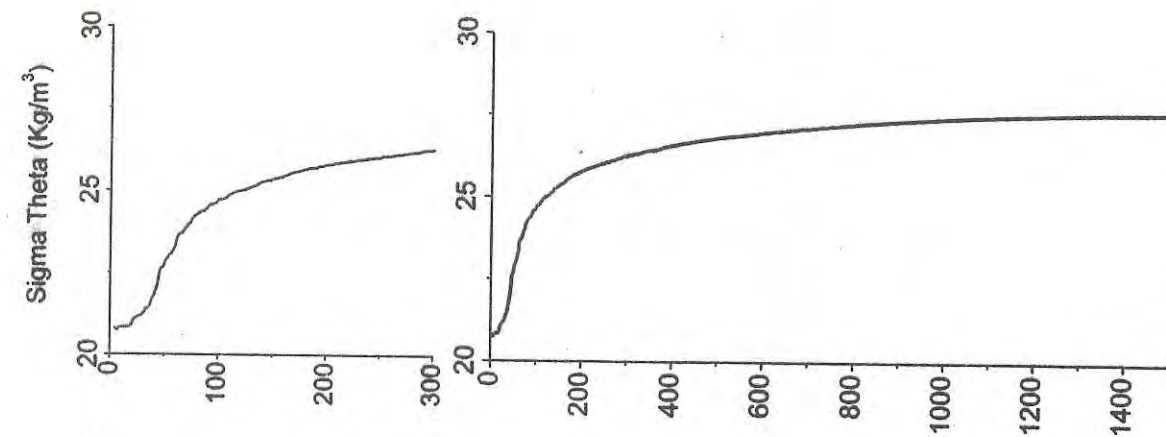
Station No. 17



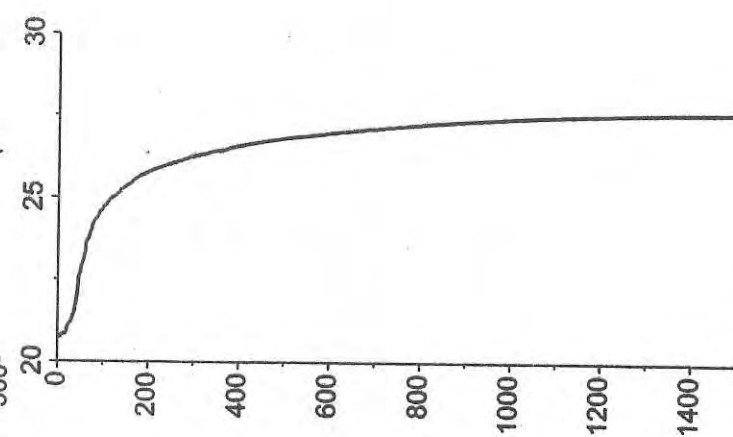
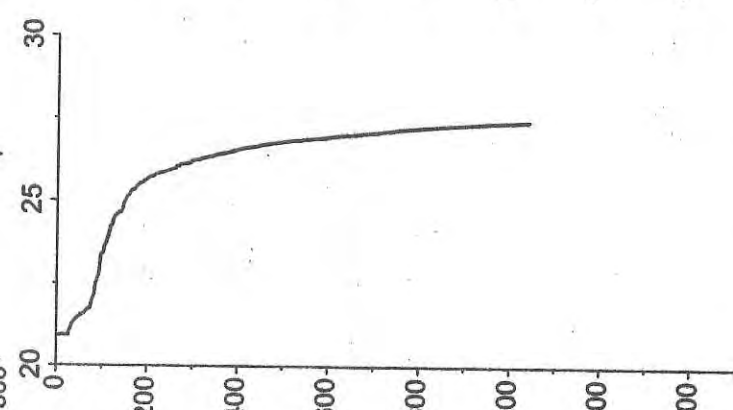
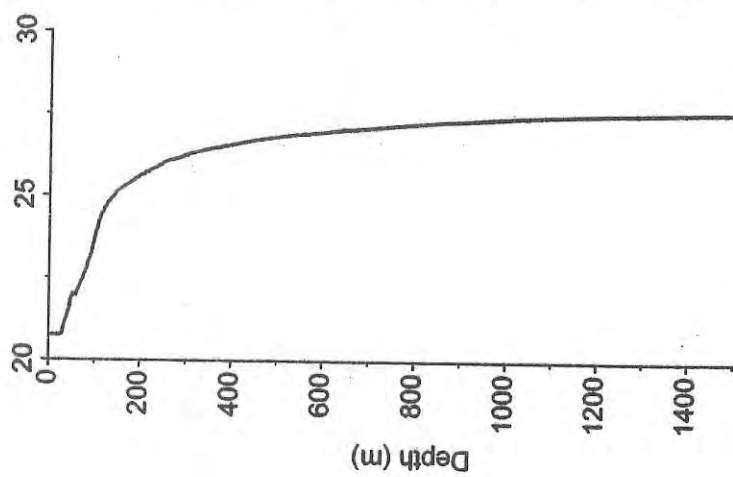
Station No. 18

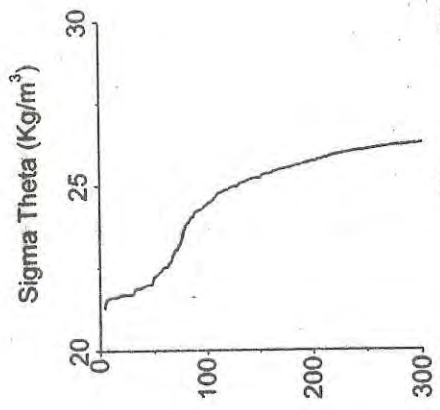


Station No. 19

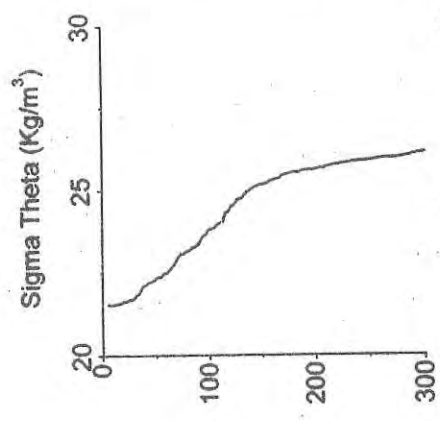


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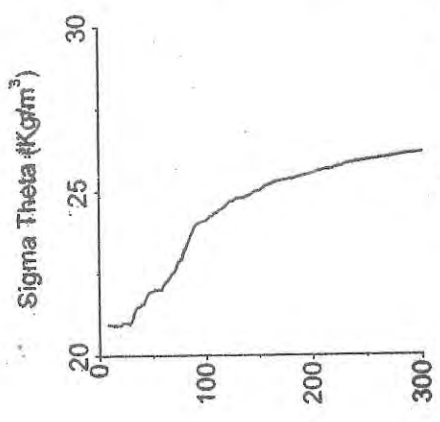




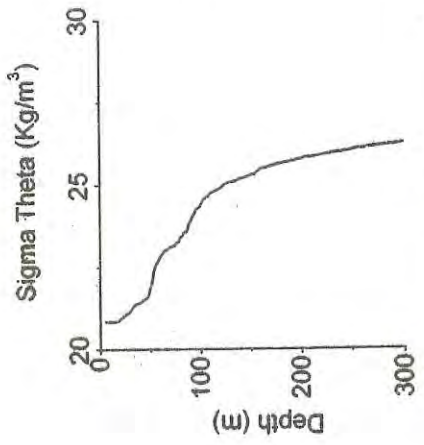
Station No. 24



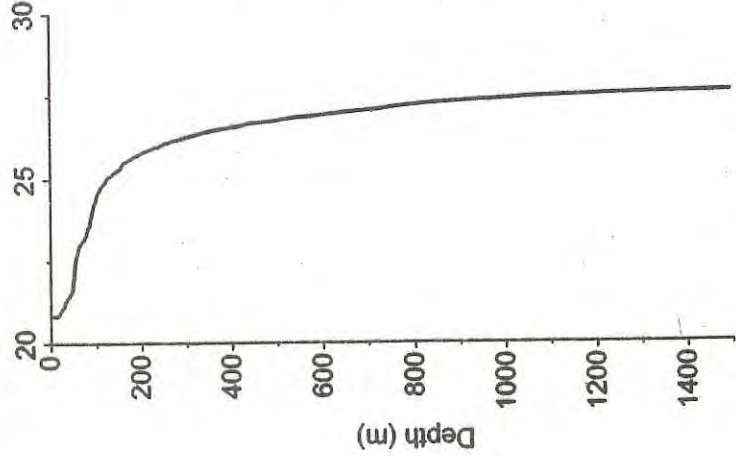
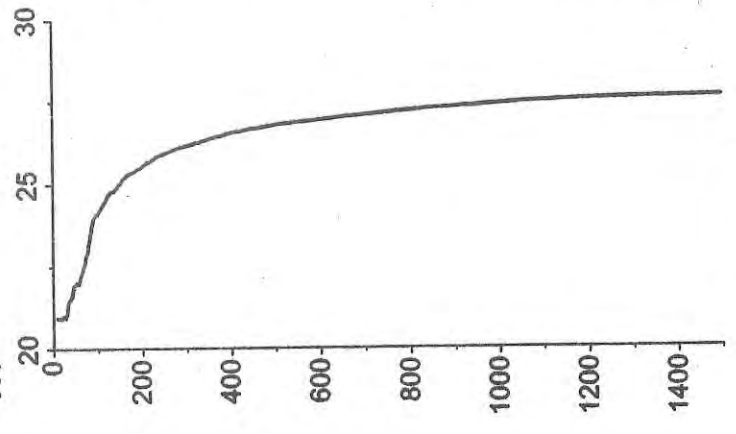
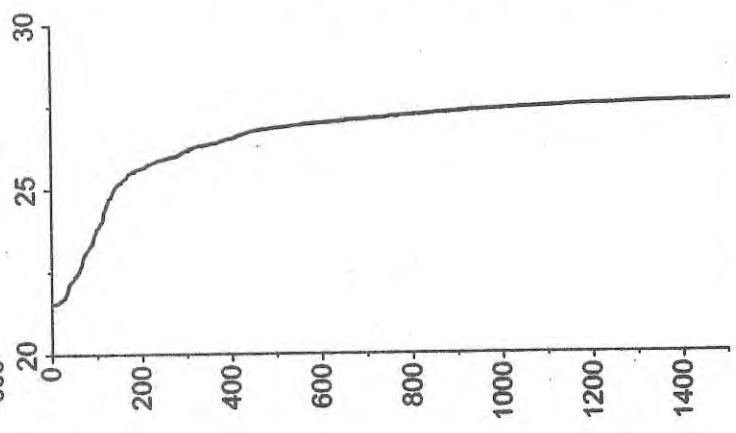
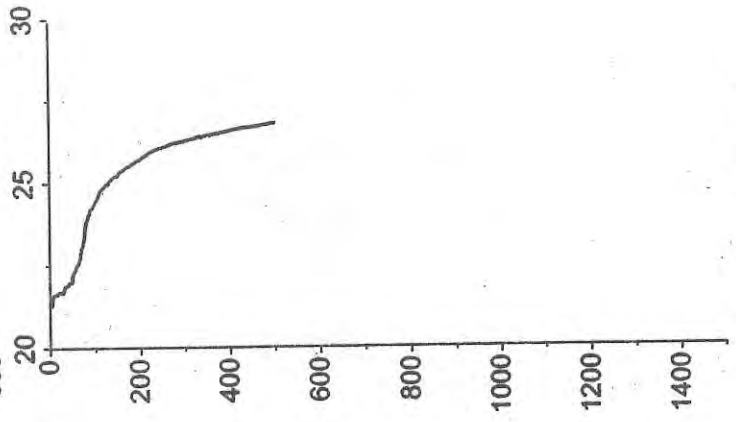
Station No. 23

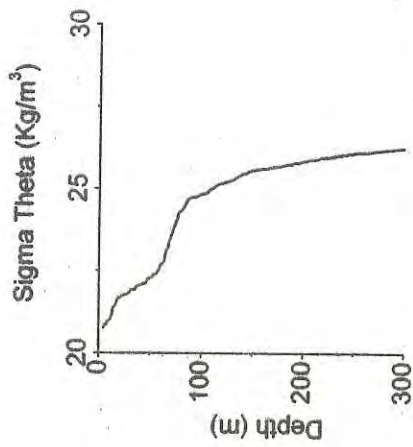


Station No. 22

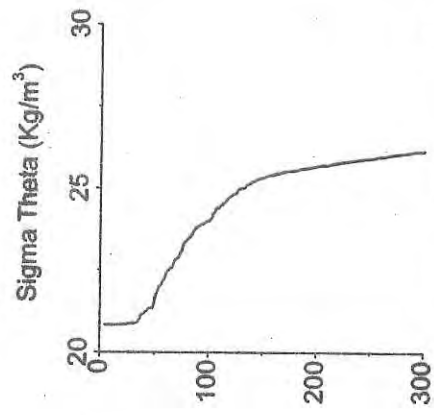


Station No. 21

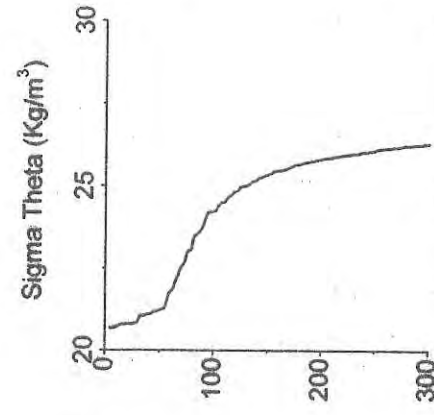




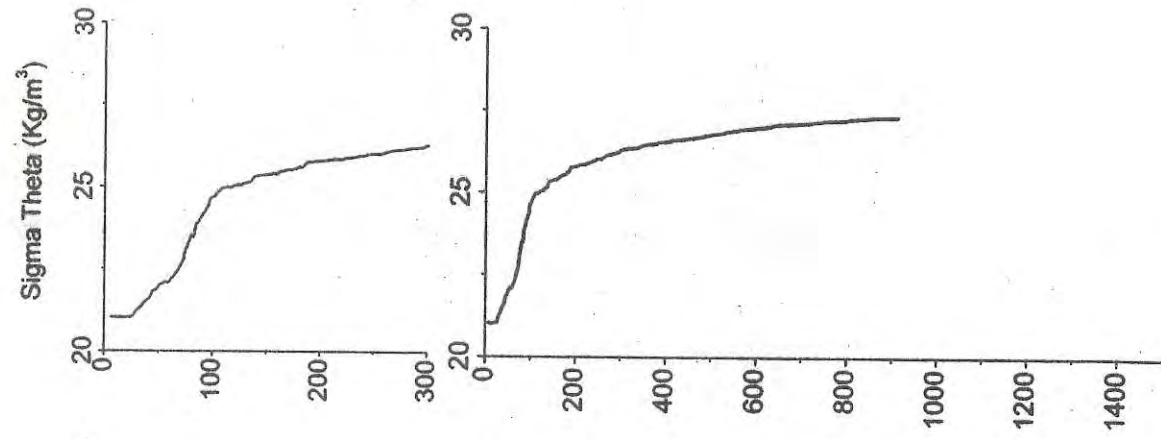
Station No. 25



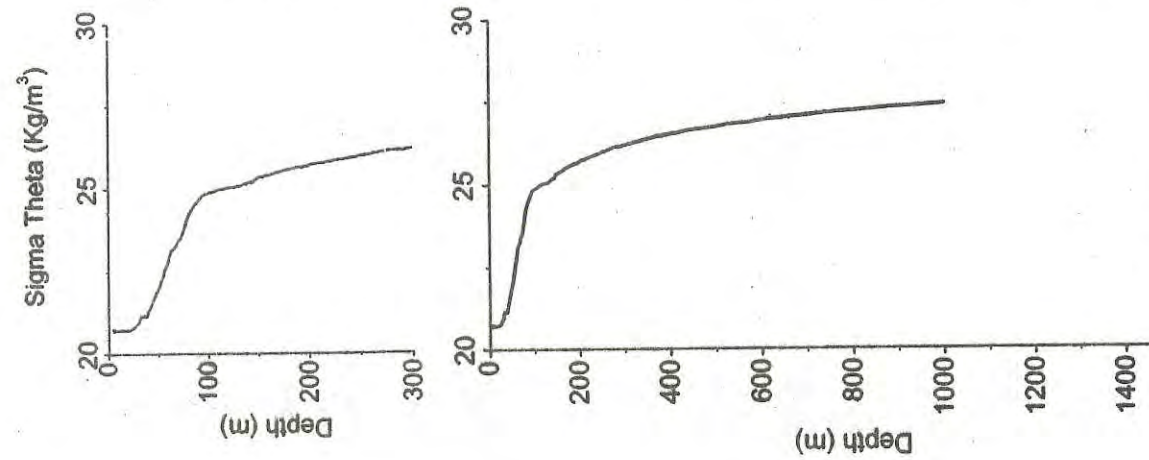
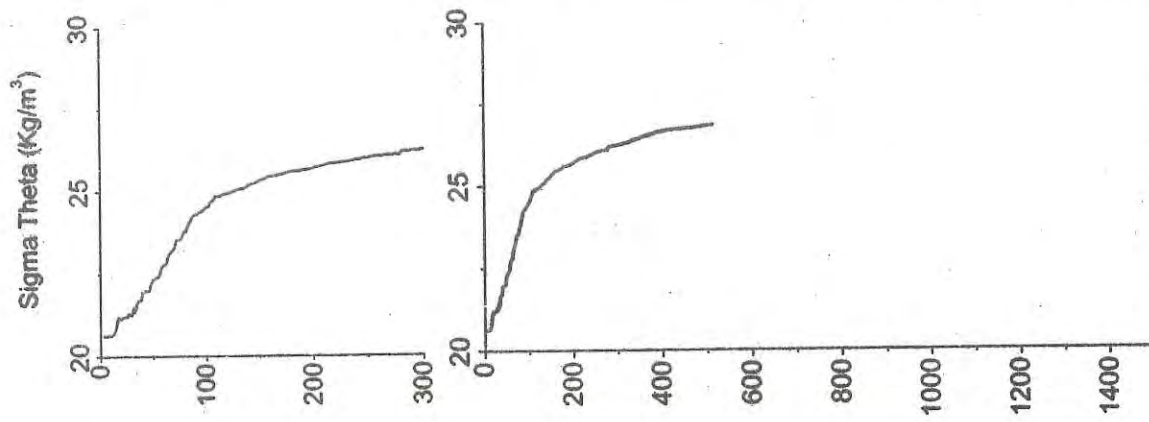
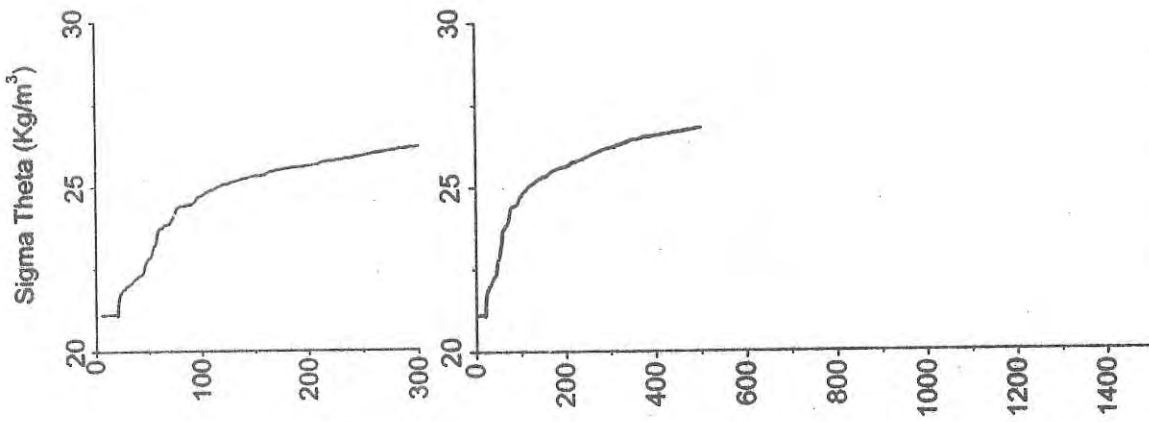
Station No. 26

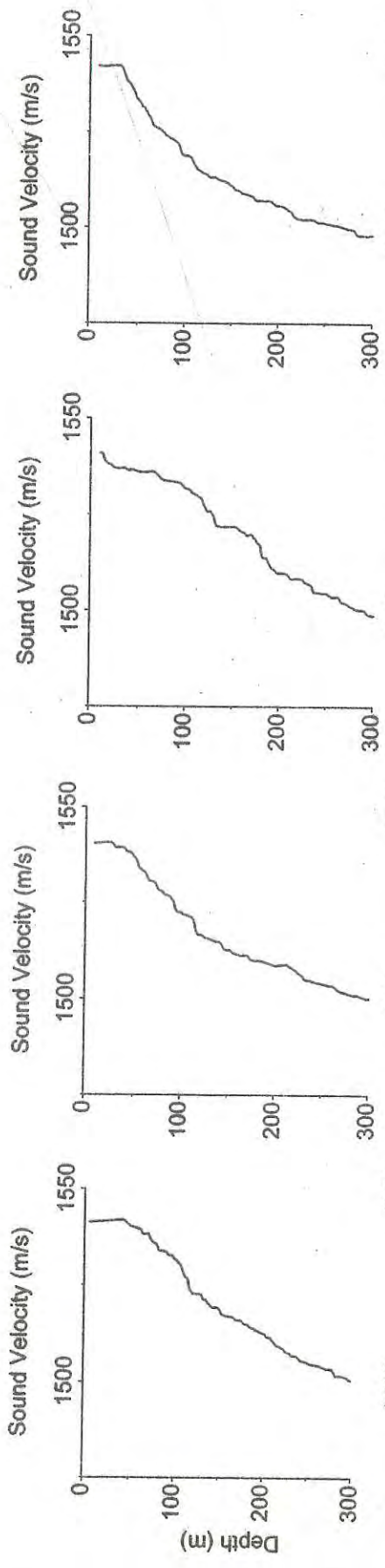


Station No. 27

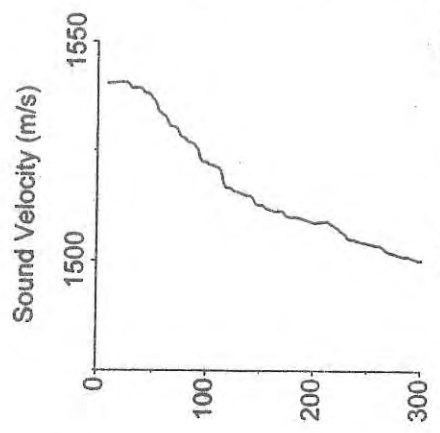


Station No. 28

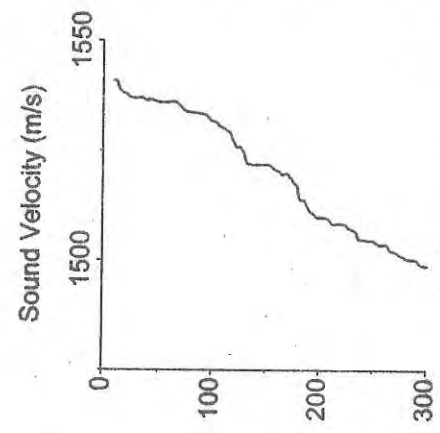




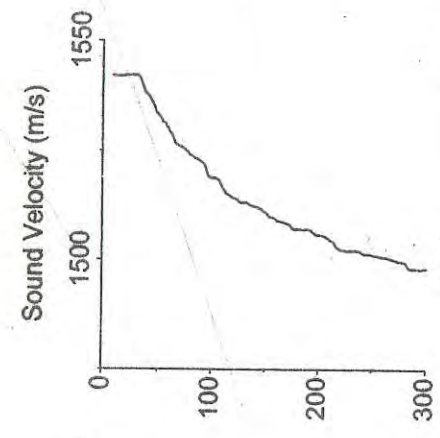
Station No. 1



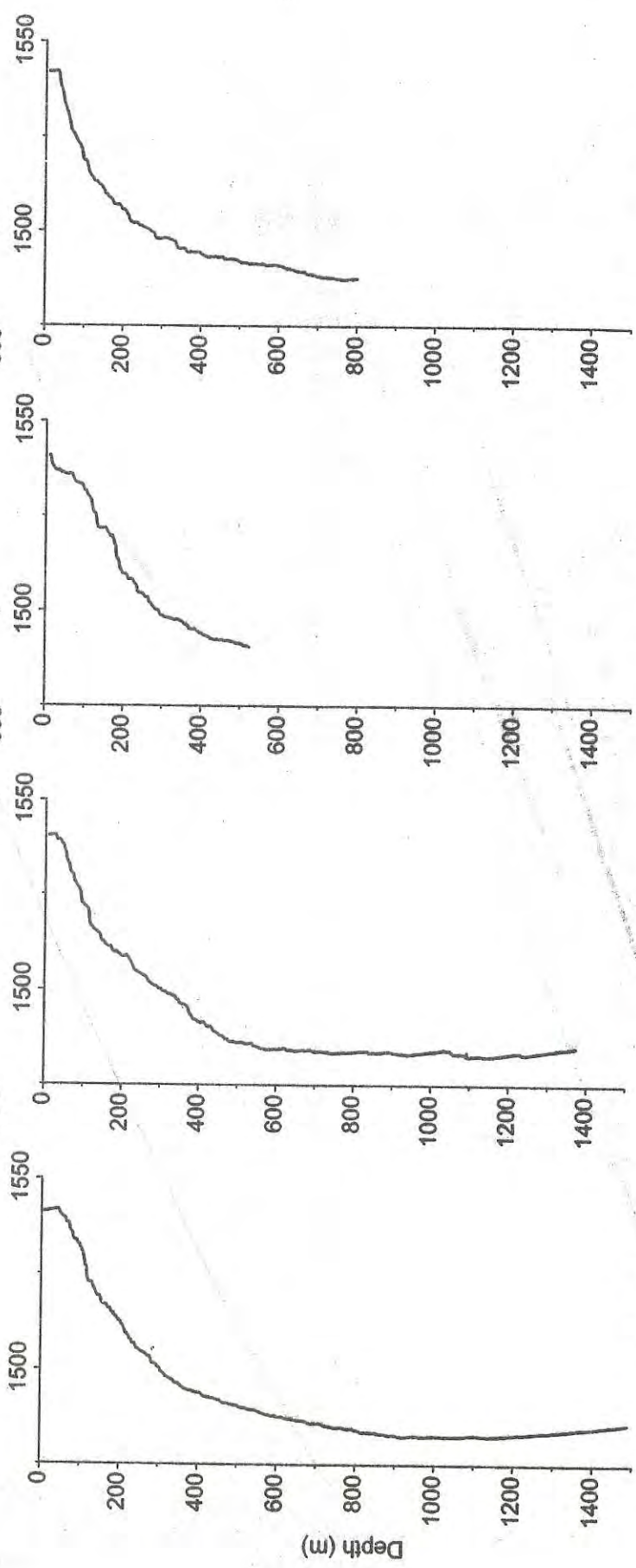
Station No. 2



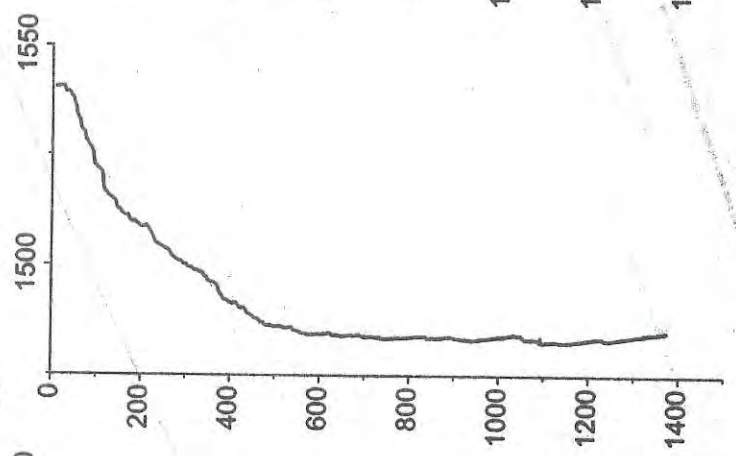
Station No. 3



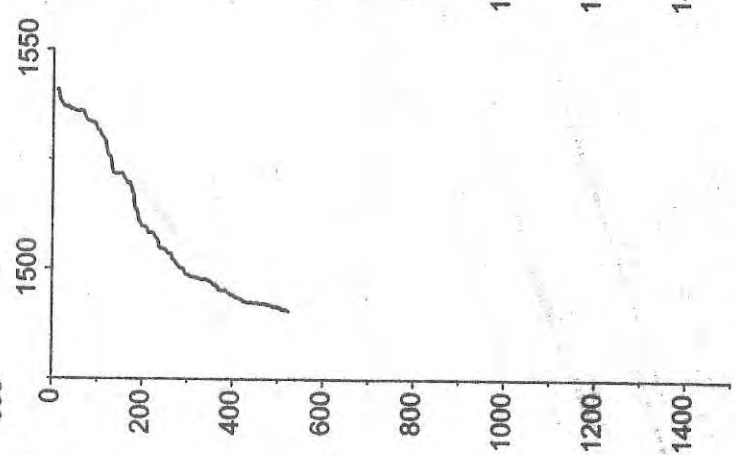
Station No. 4



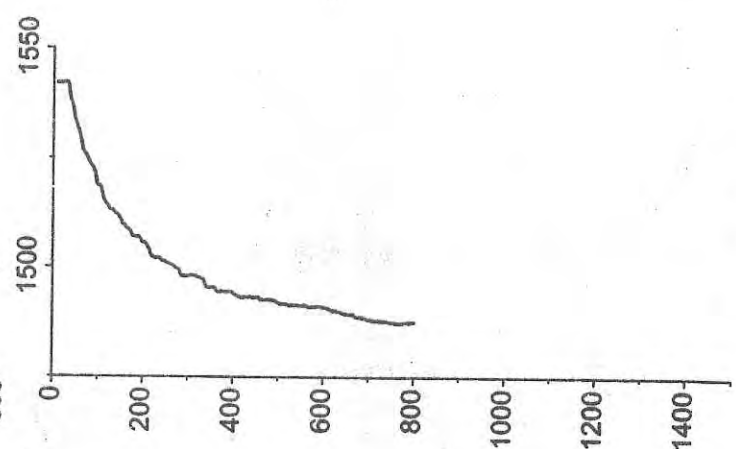
Station No. 1



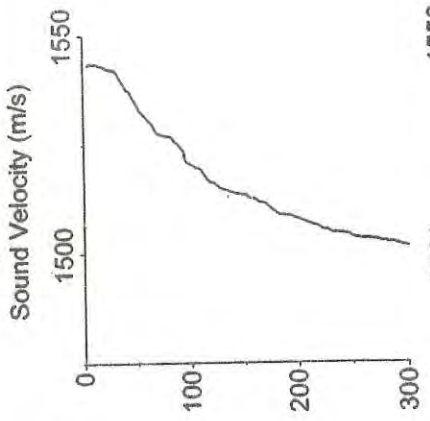
Station No. 2



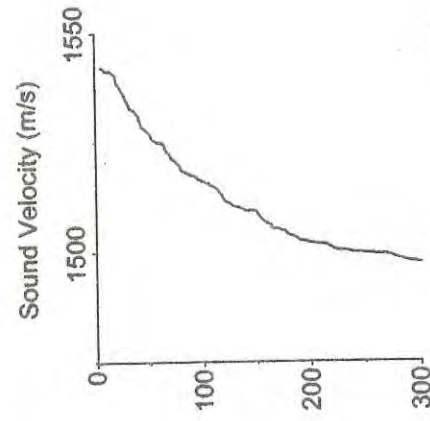
Station No. 3



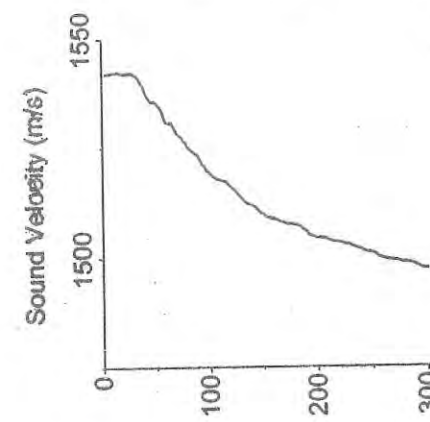
Station No. 4



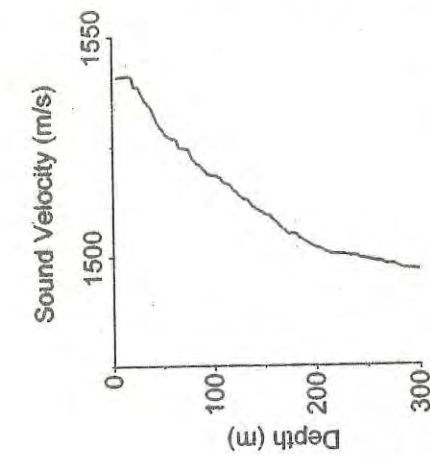
Station No. 8



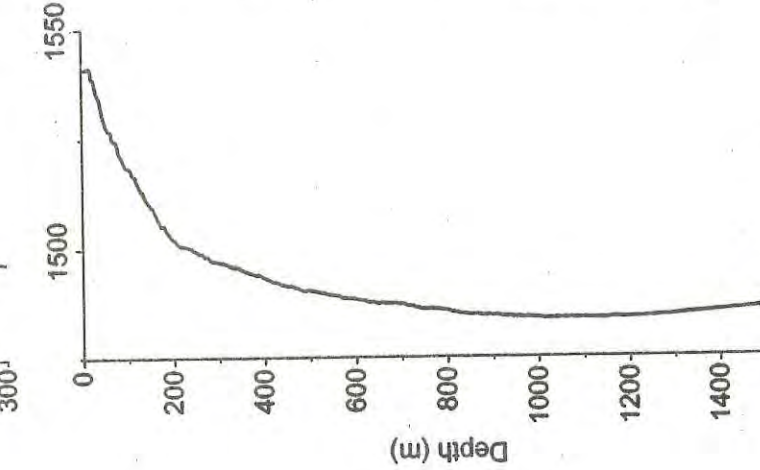
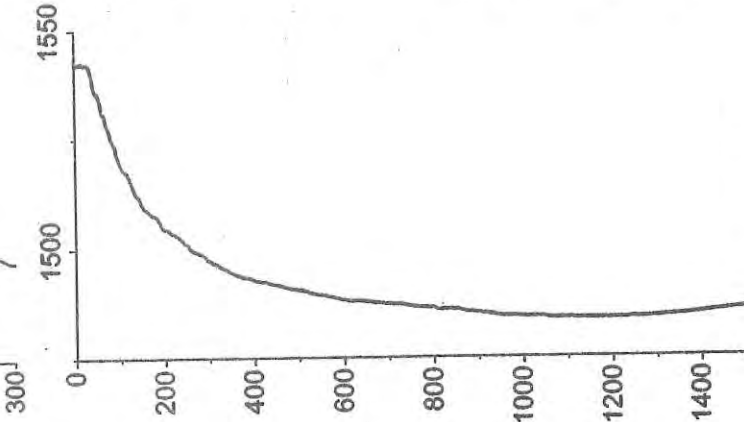
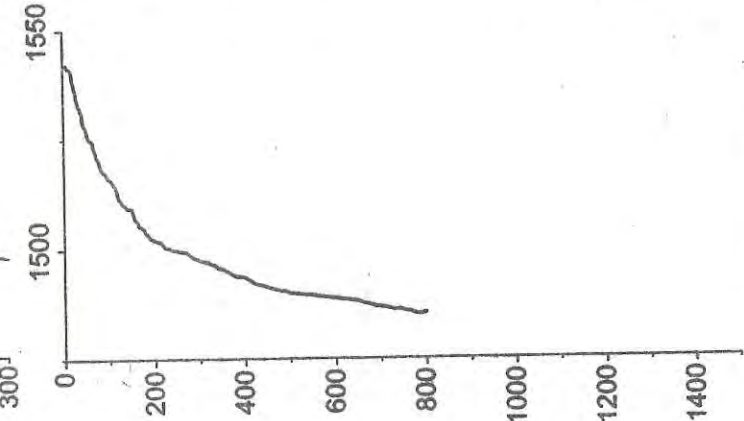
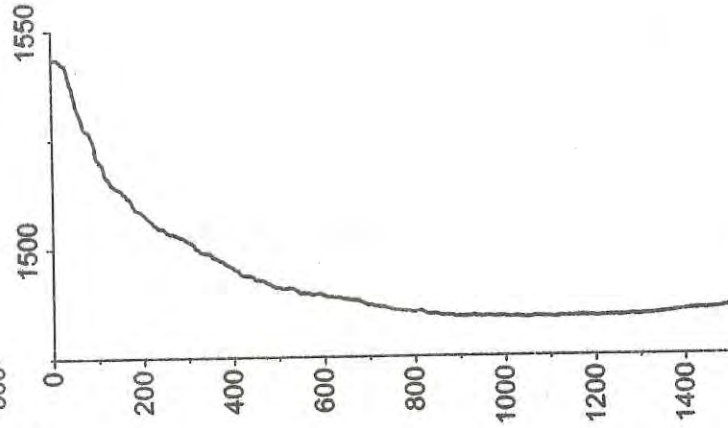
Station No. 7

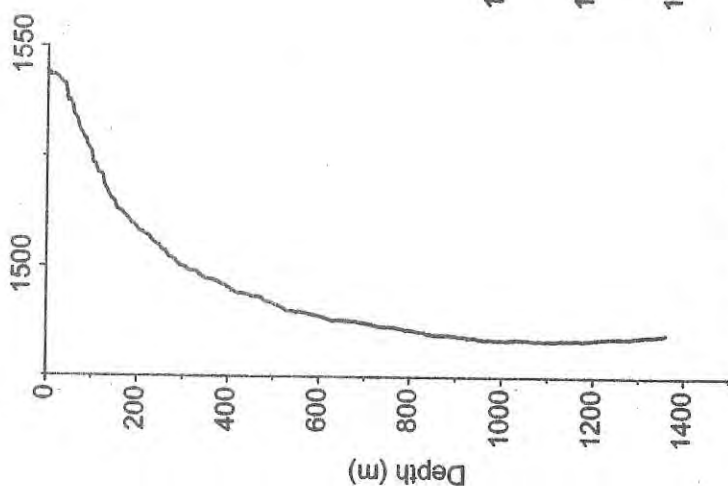
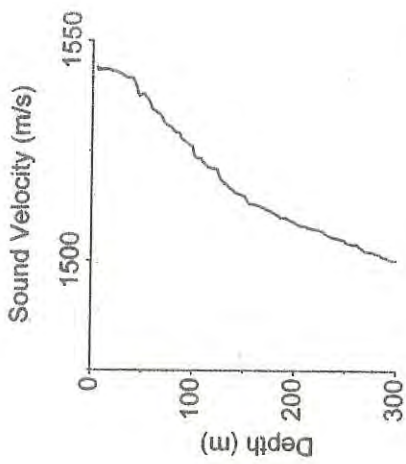


Station No. 6

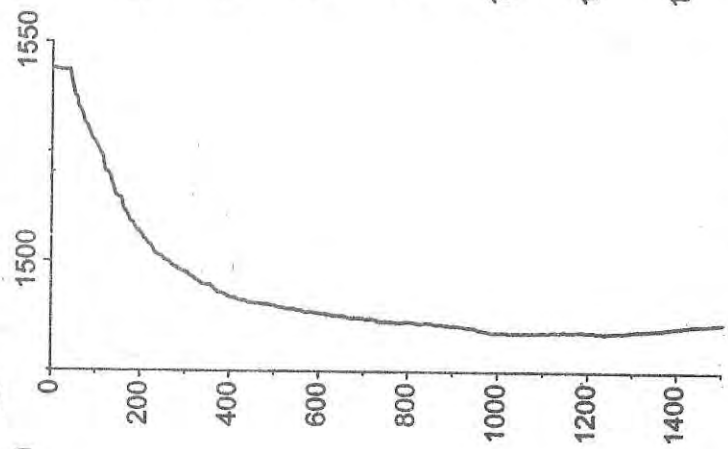
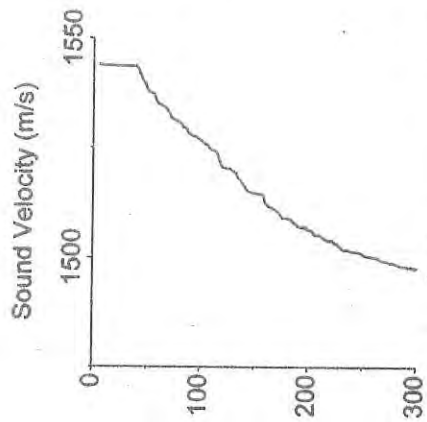


Station No. 5

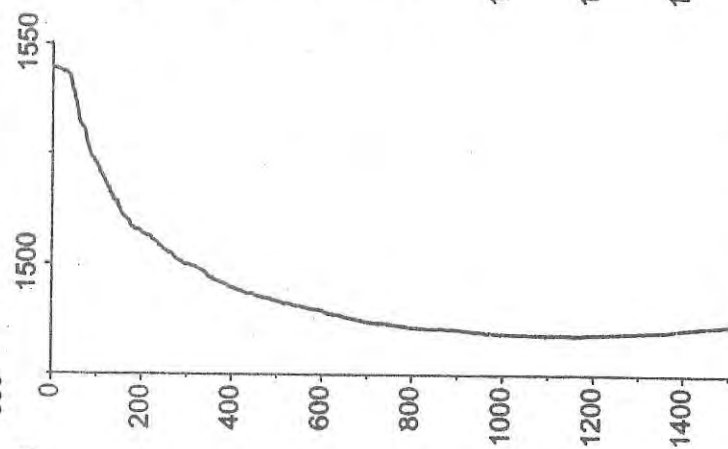
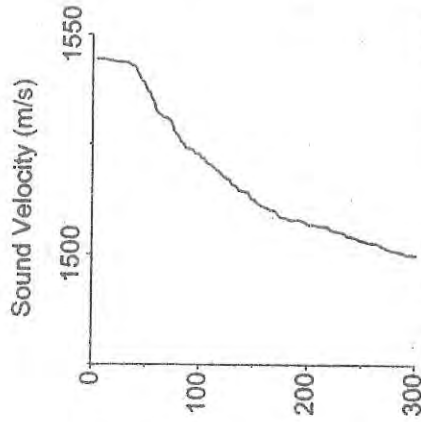




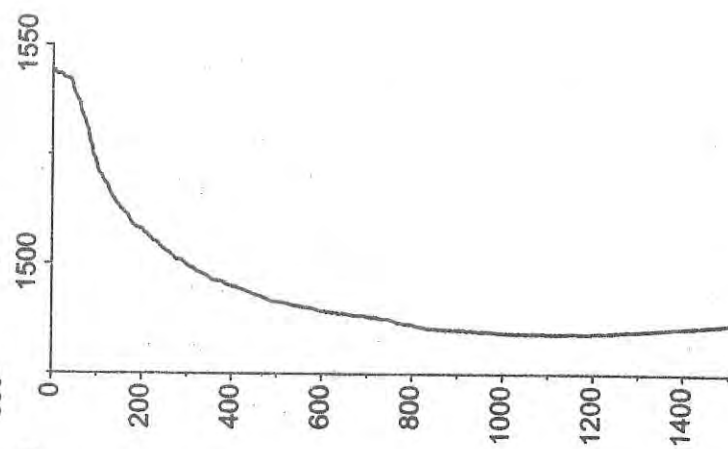
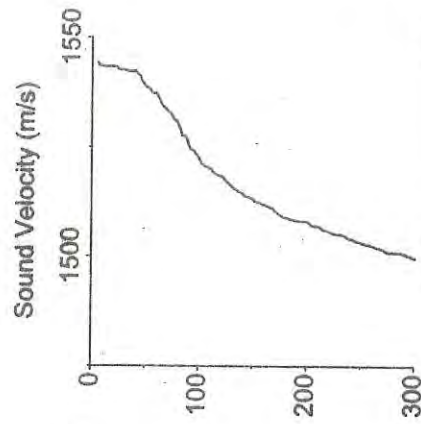
Station No.9



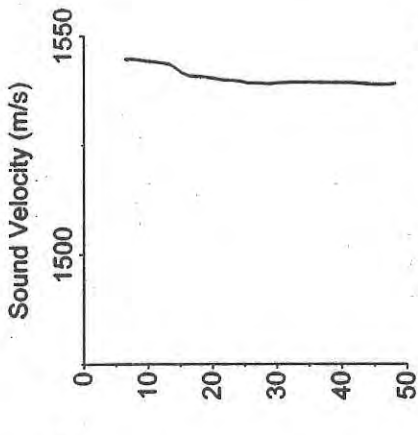
Station No. 10



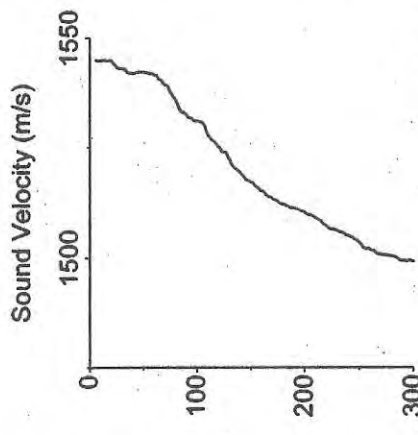
Station No. 11



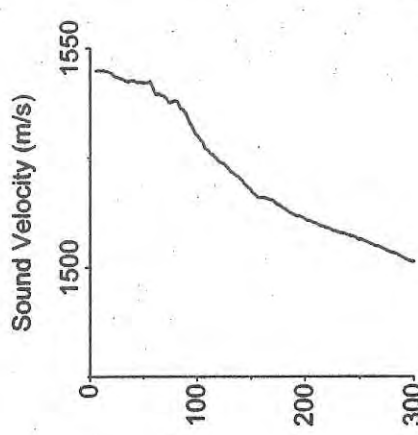
Station No. 12



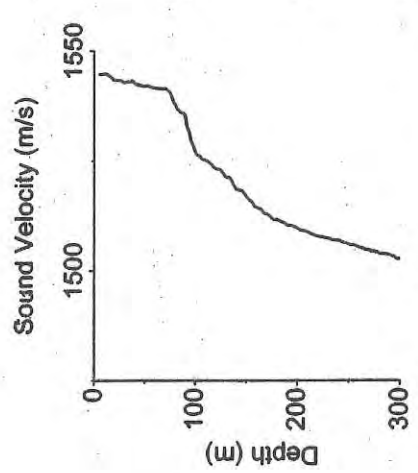
Station No. 16



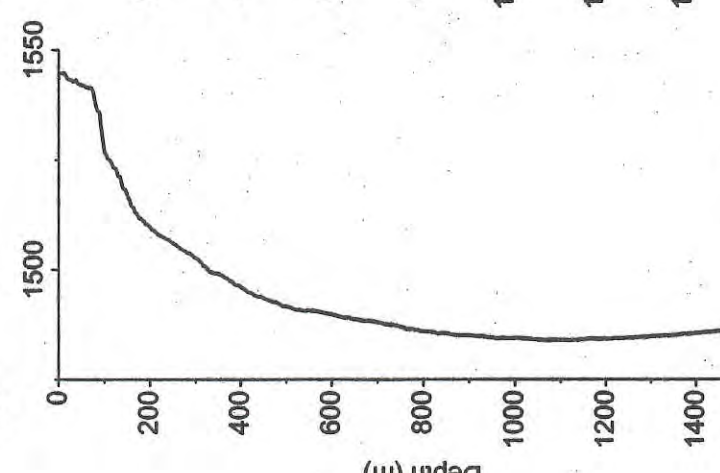
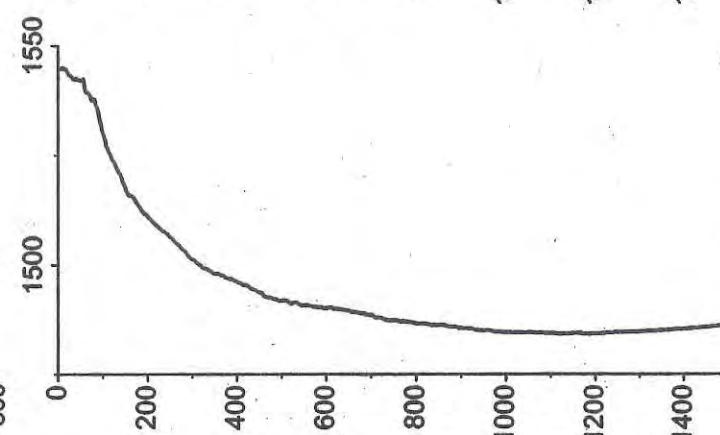
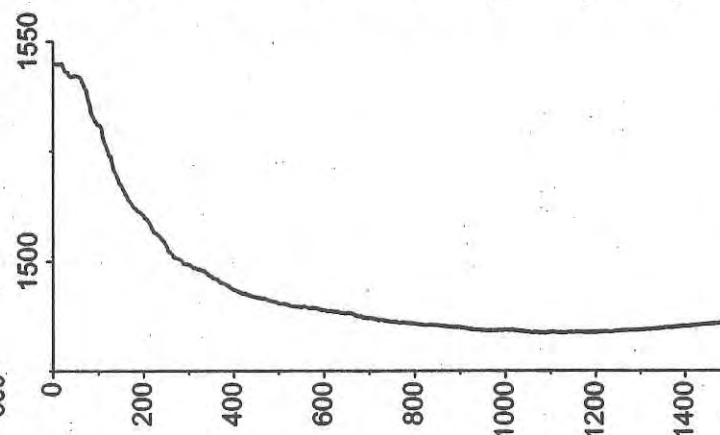
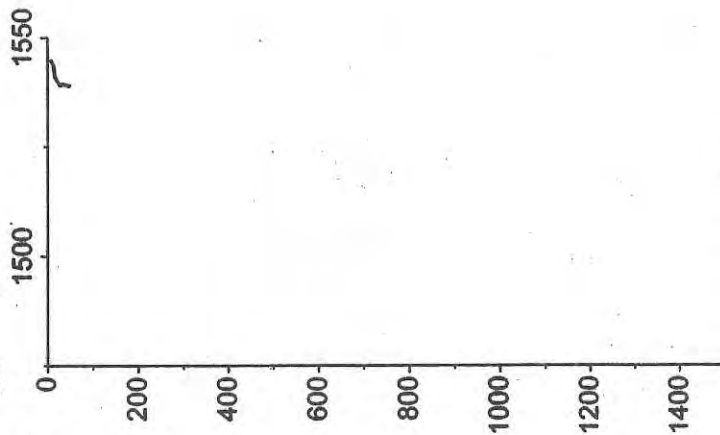
Station No. 15

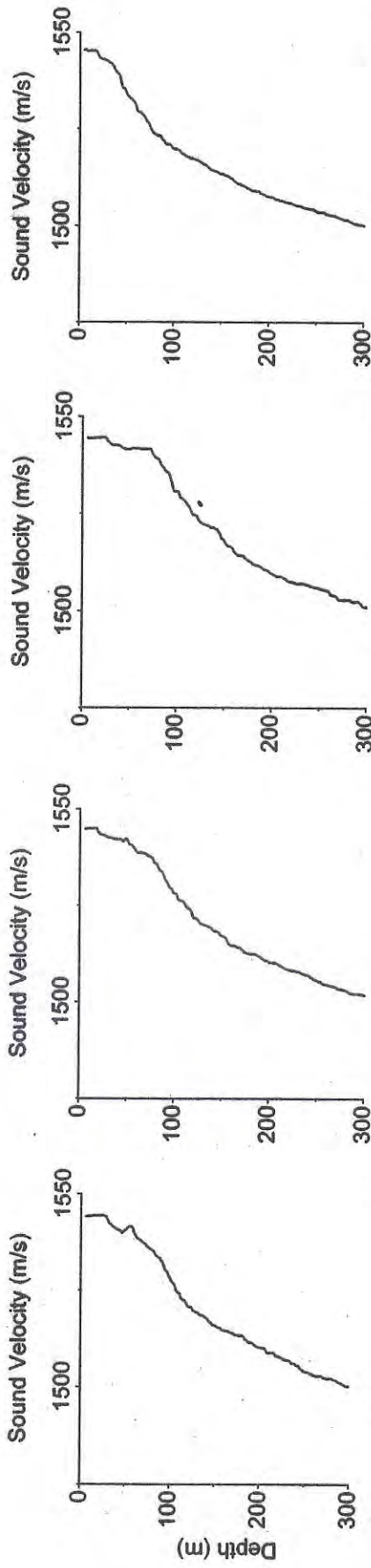


Station No. 14

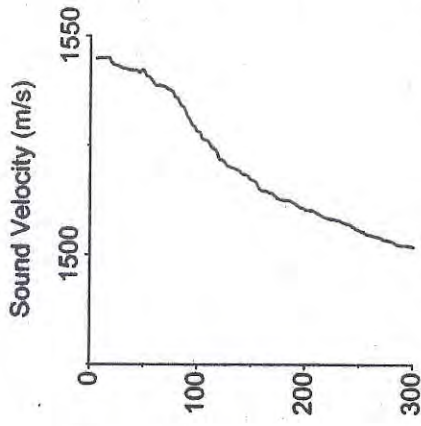


Station No. 13

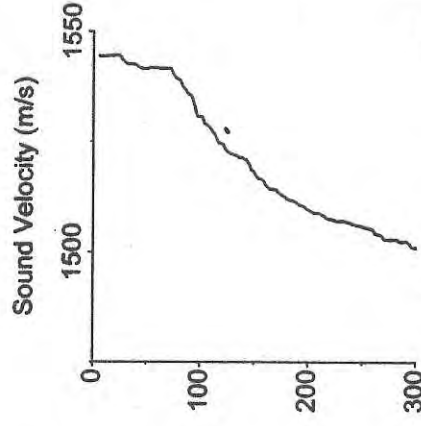




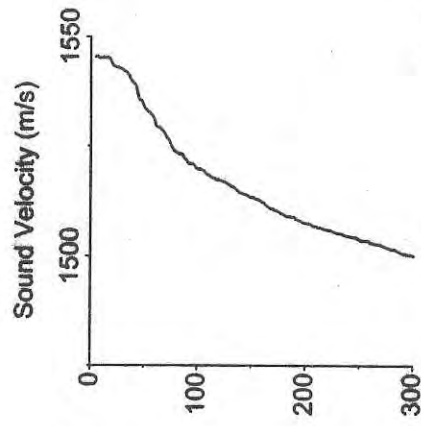
Station No. 17



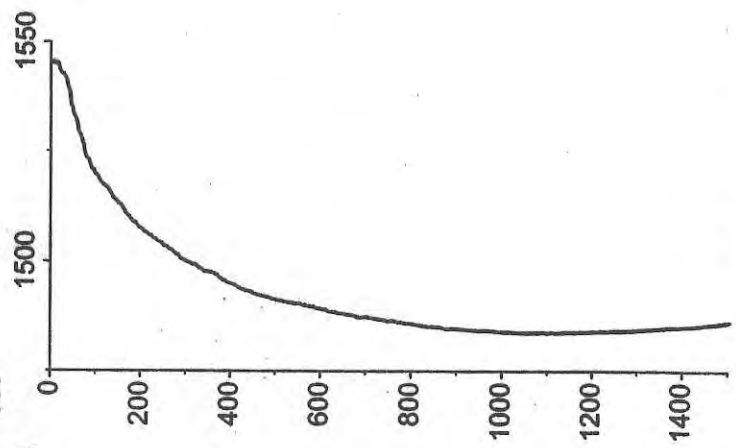
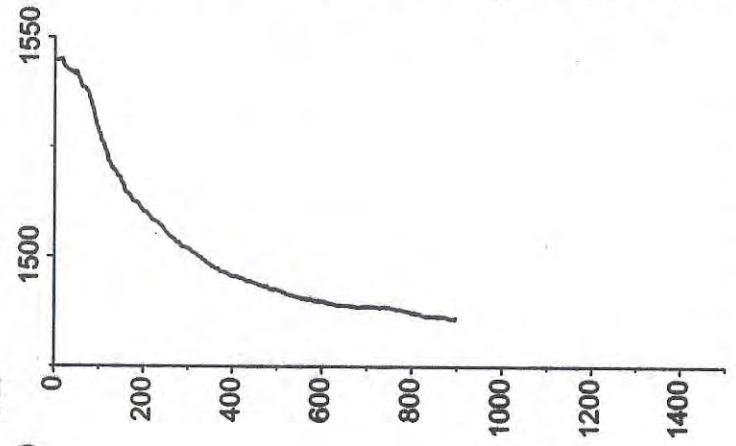
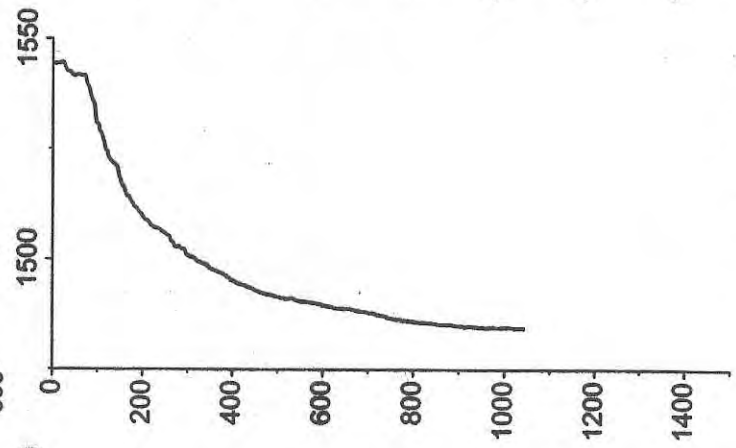
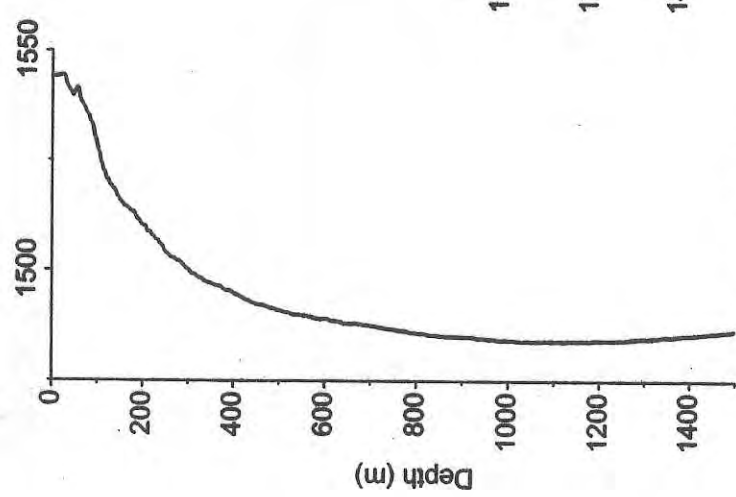
Station No. 18

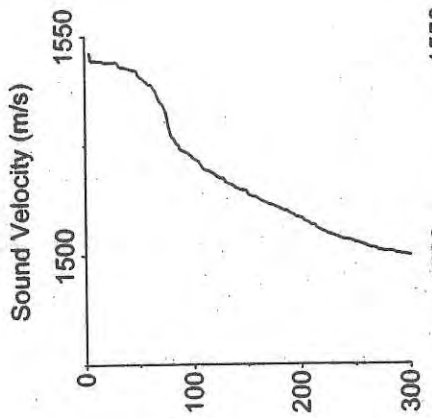


Station No. 19

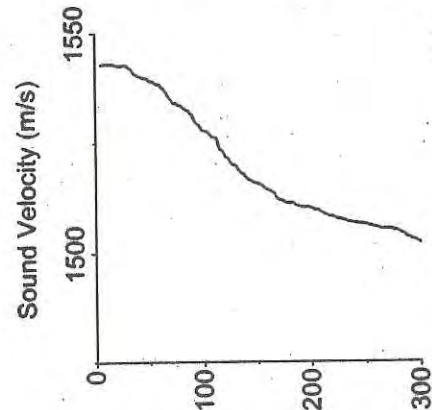


Station No. 20

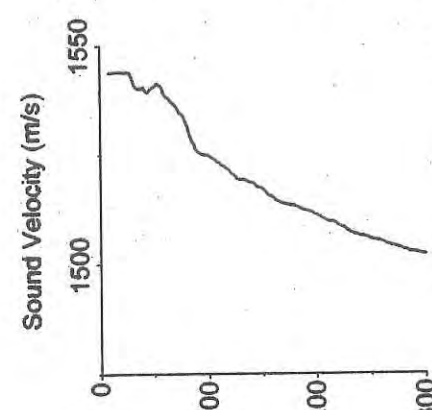




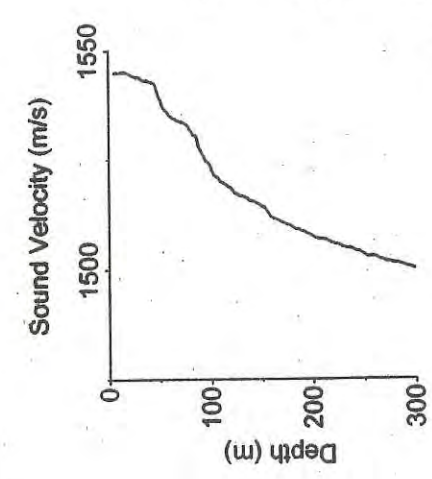
Station No. 24



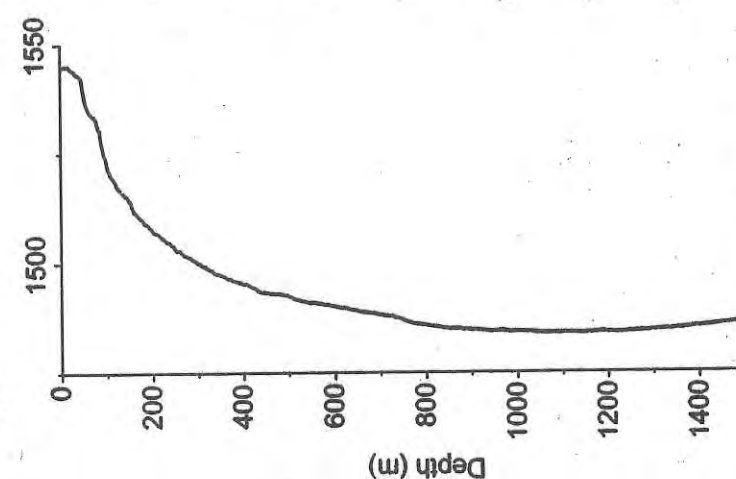
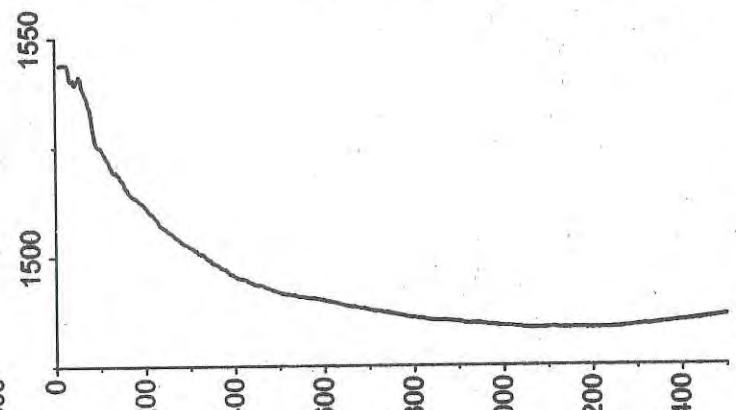
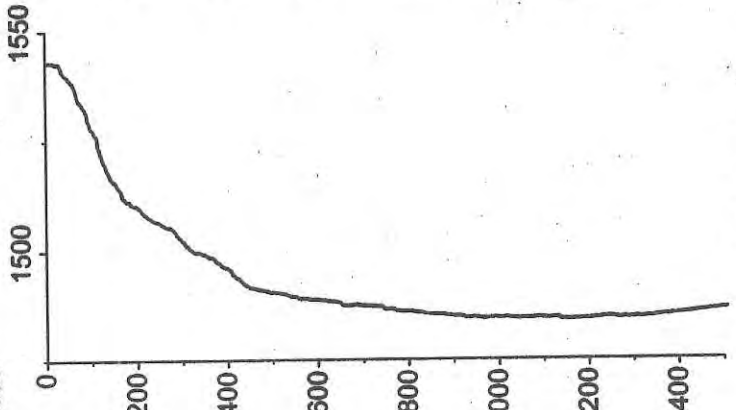
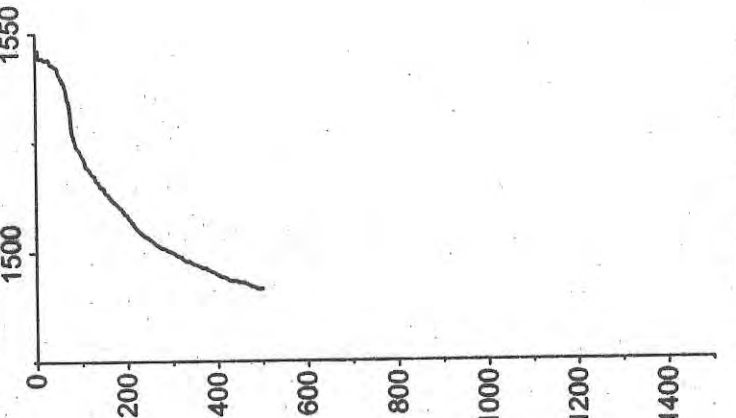
Station No. 23

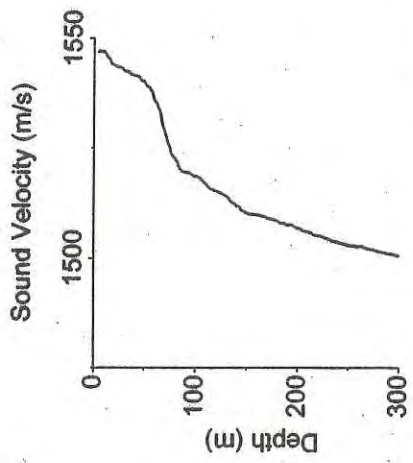


Station No. 22

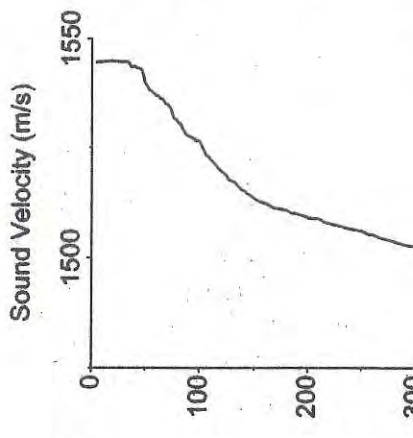


Station No. 21

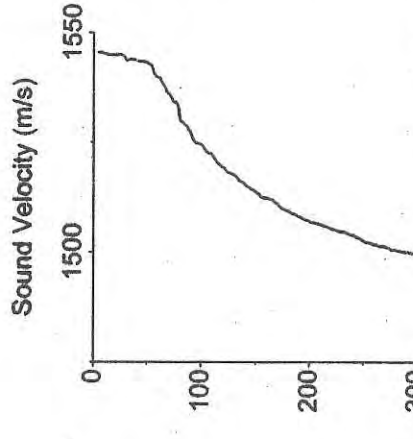




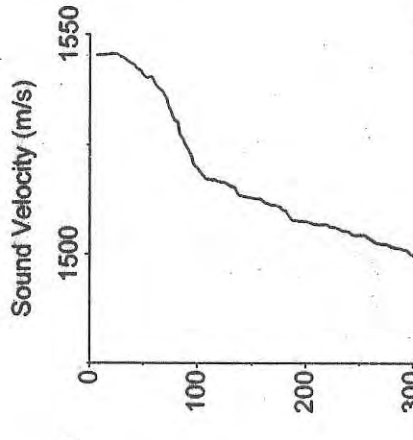
Station No. 25



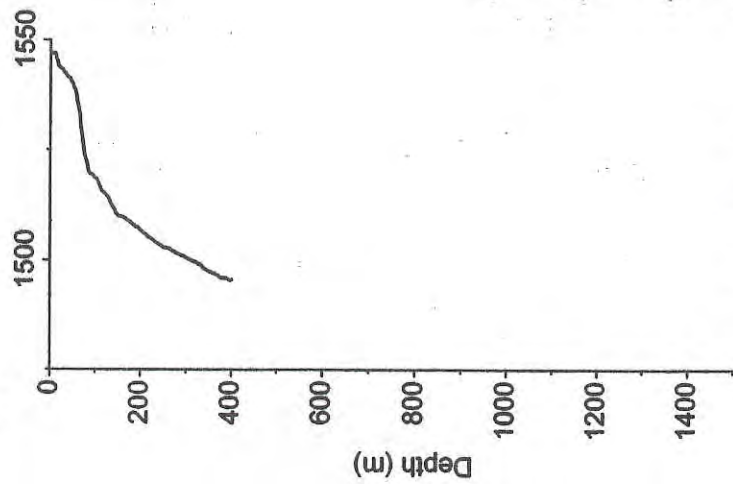
Station No. 26



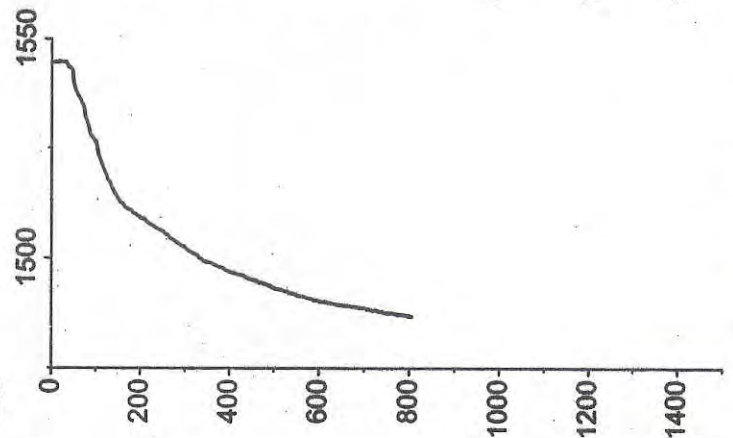
Station No. 27



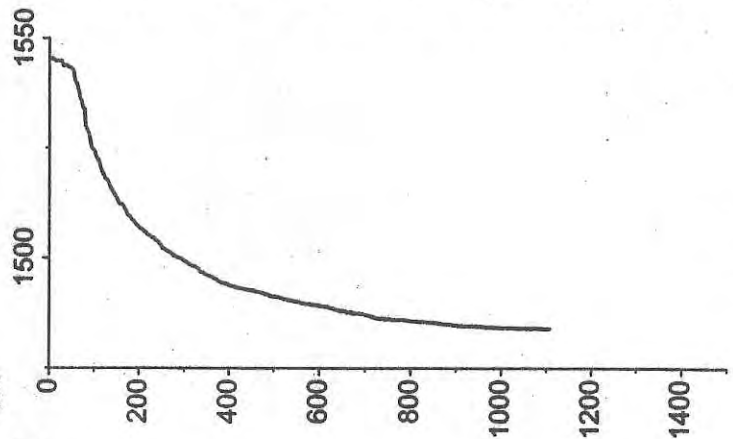
Station No. 28



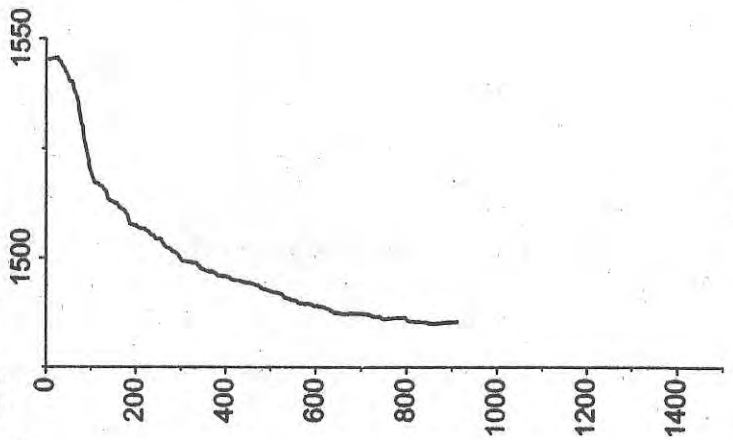
Station No. 25



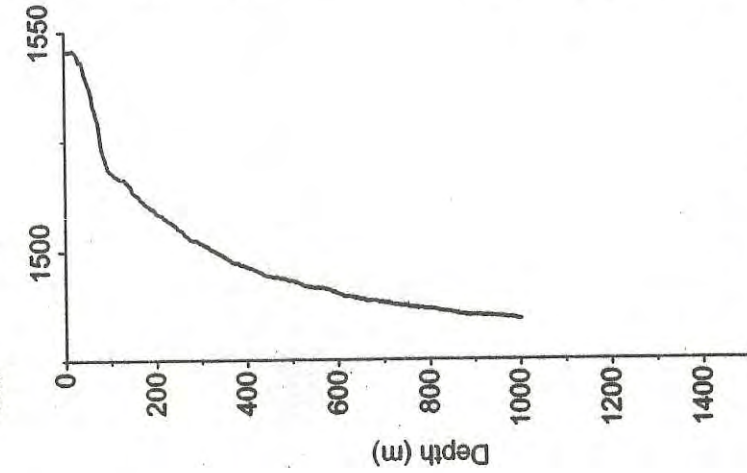
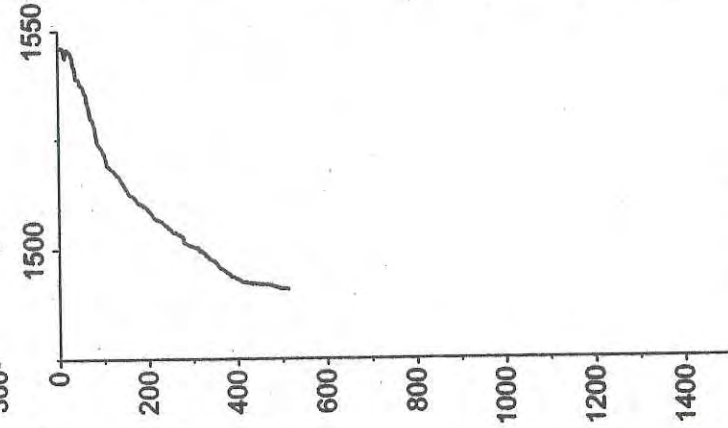
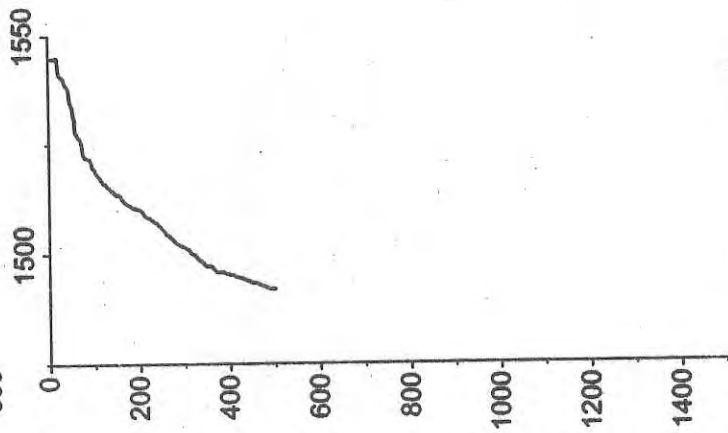
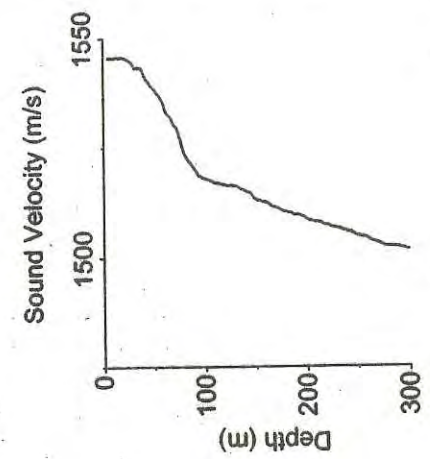
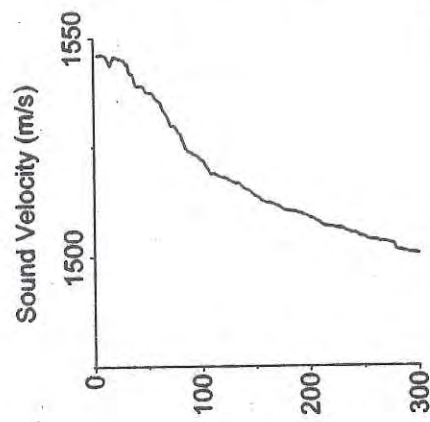
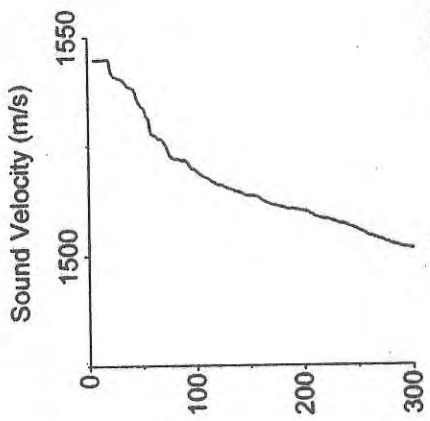
Station No. 26



Station No. 27



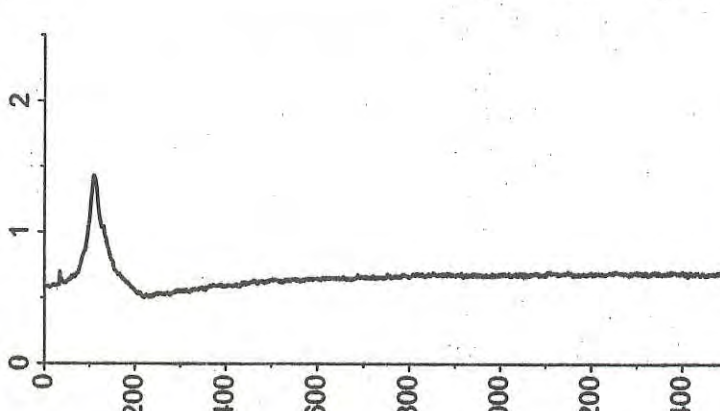
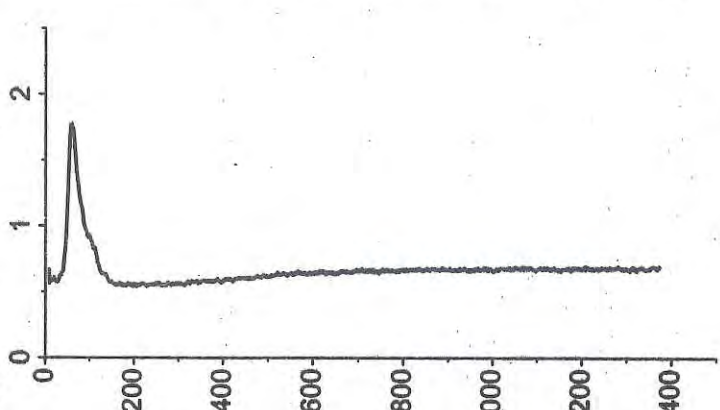
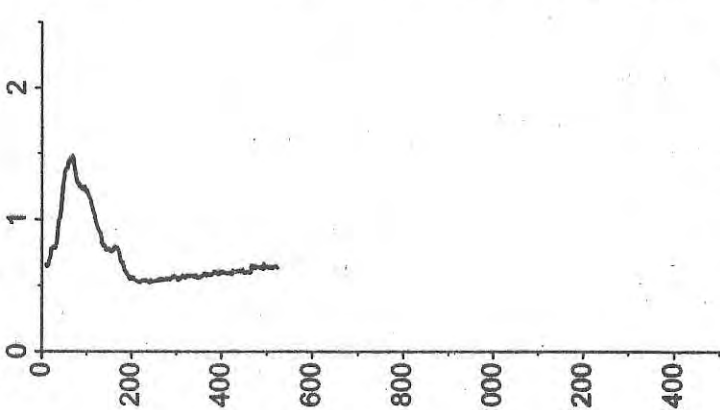
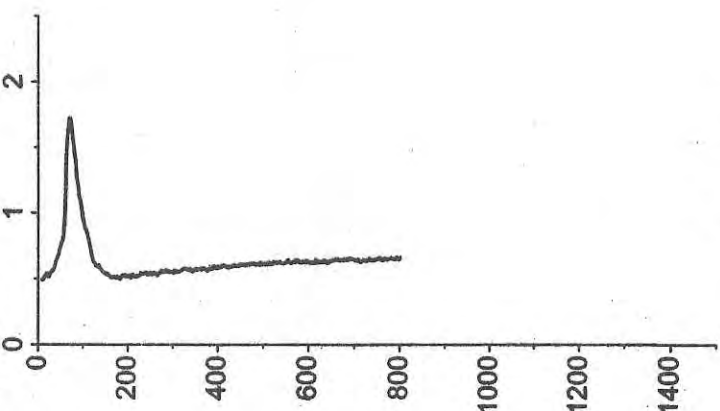
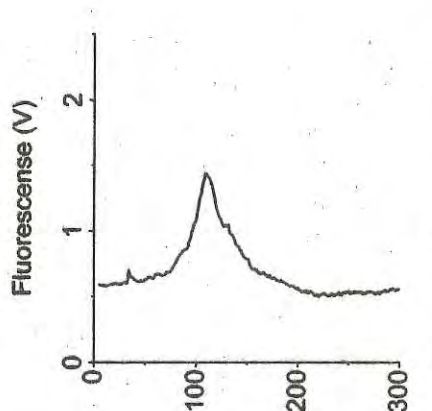
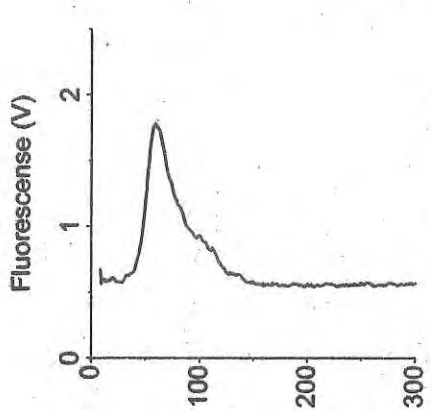
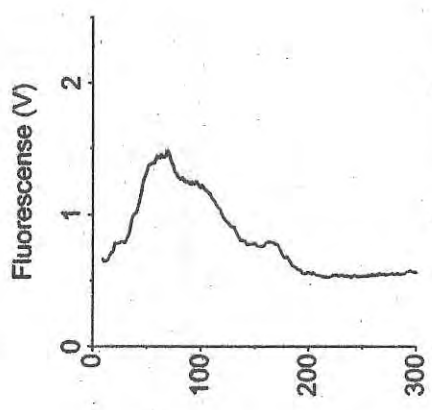
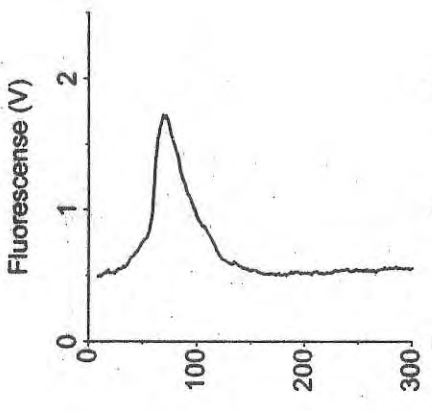
Station No. 28



Station No. 31

Station No. 30

Station No. 29

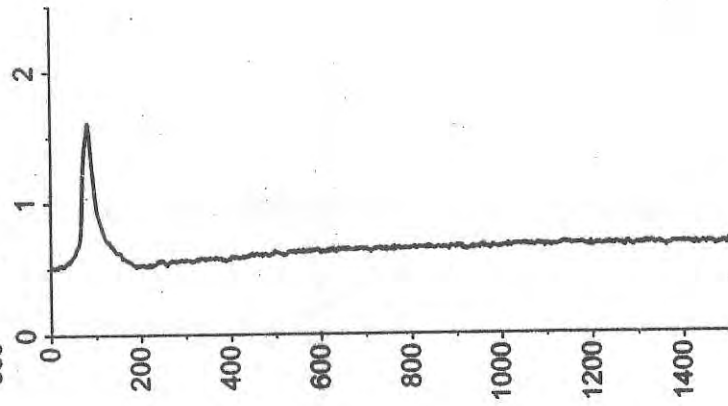
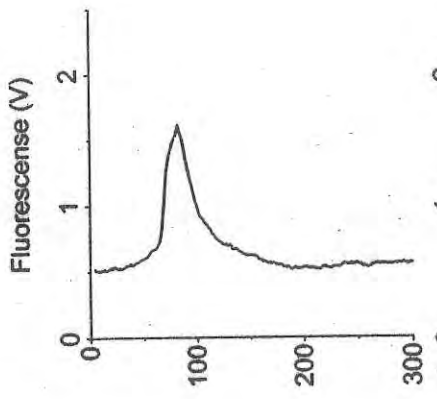


Station No. 4

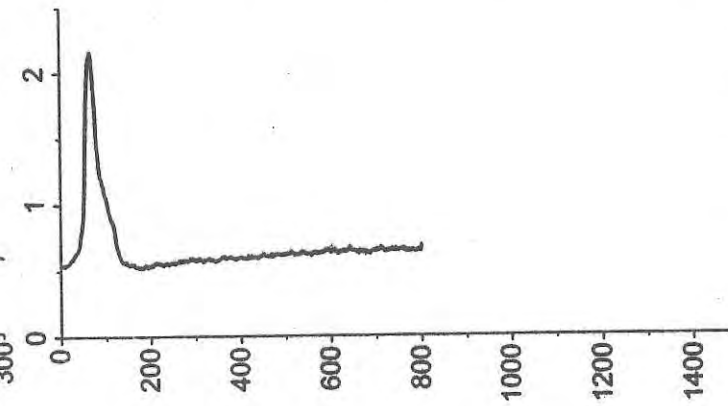
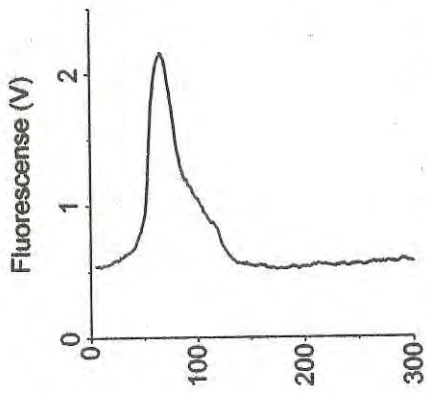
Station No. 3

Station No. 2

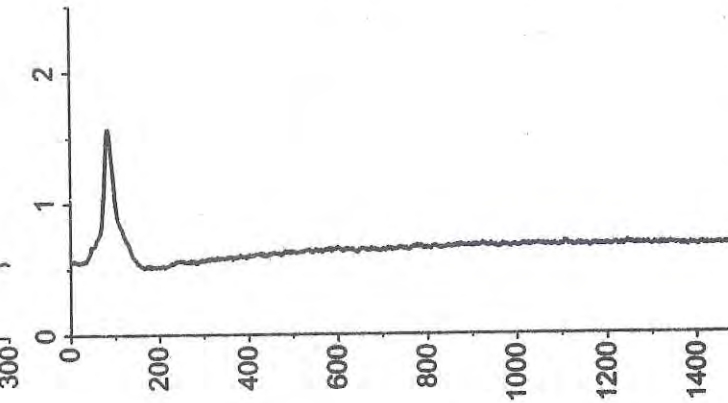
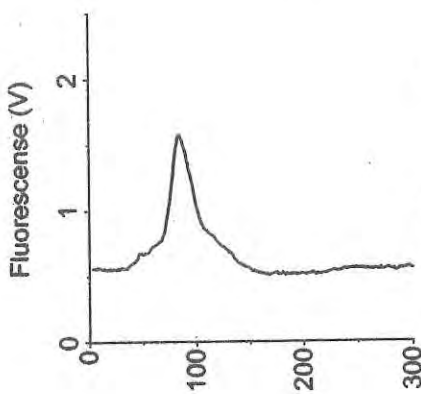
Station No. 1



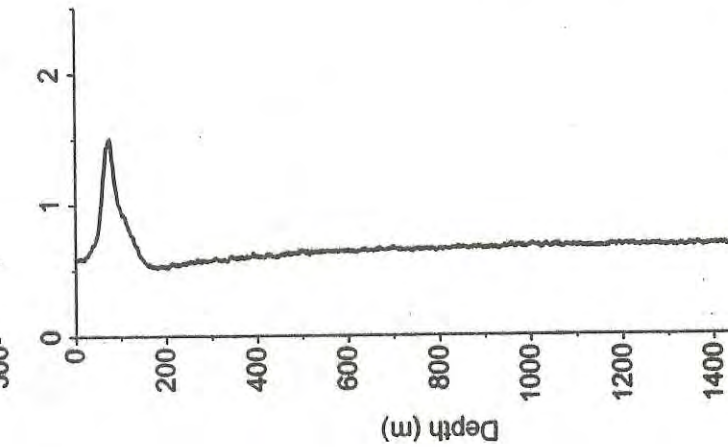
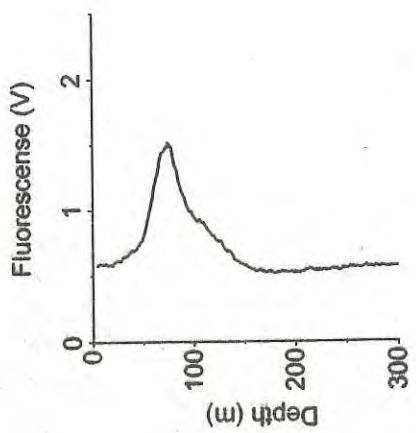
Station No. 8



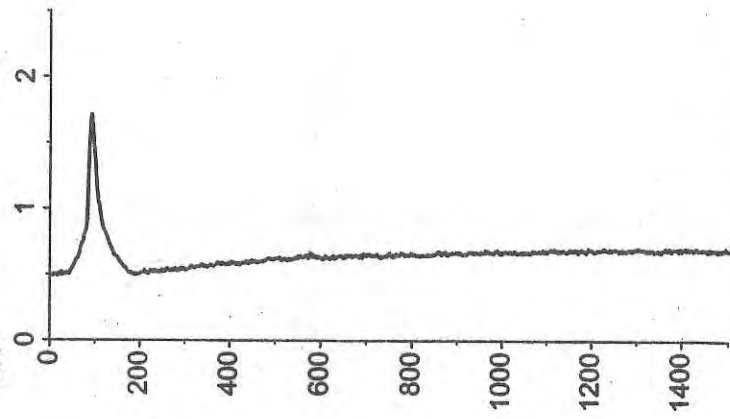
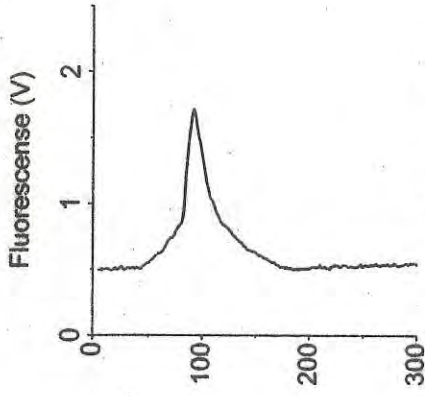
Station No. 7



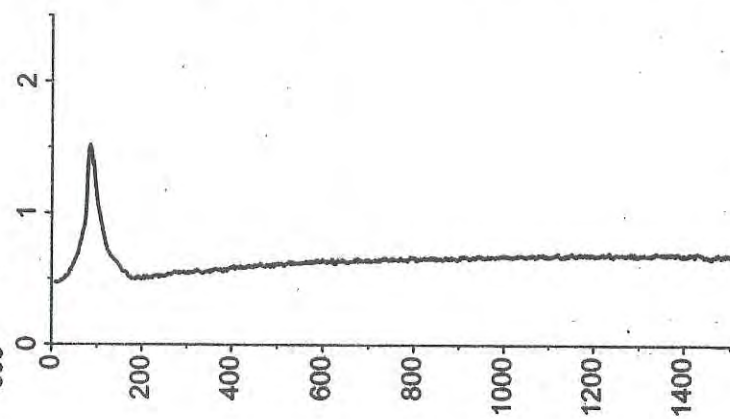
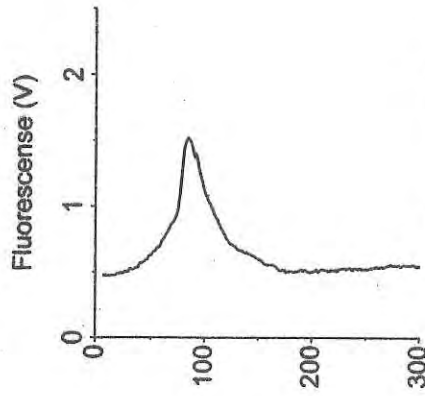
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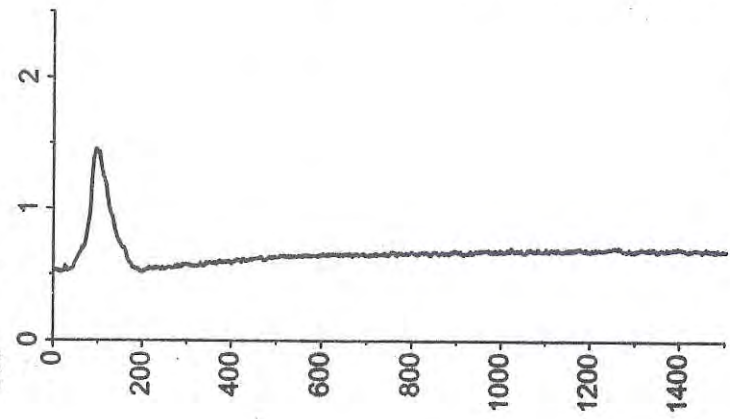
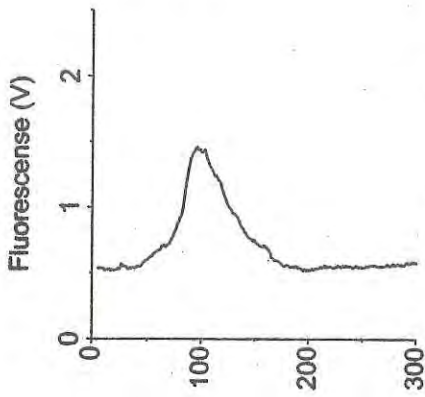
Station No. 5



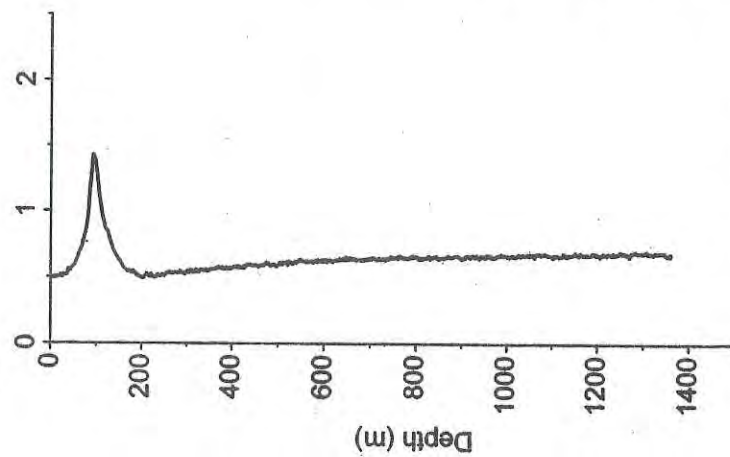
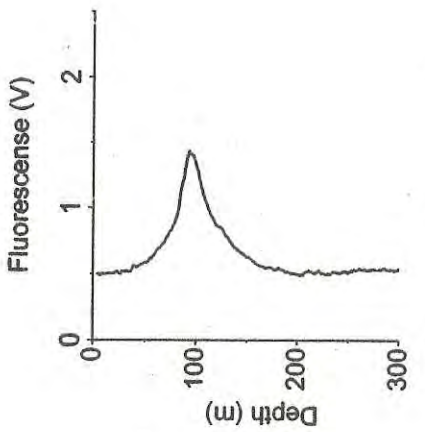
Station No. 12



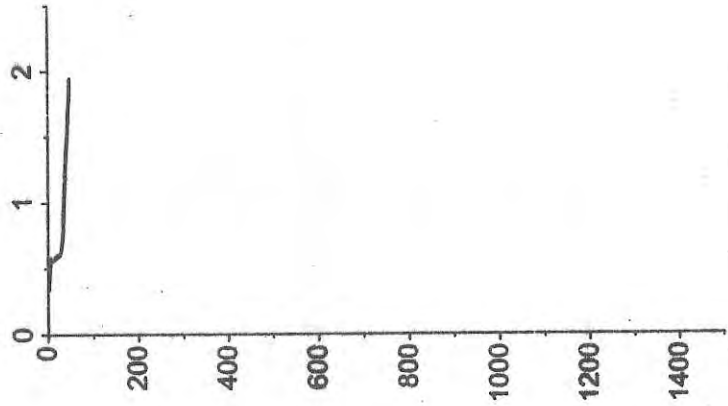
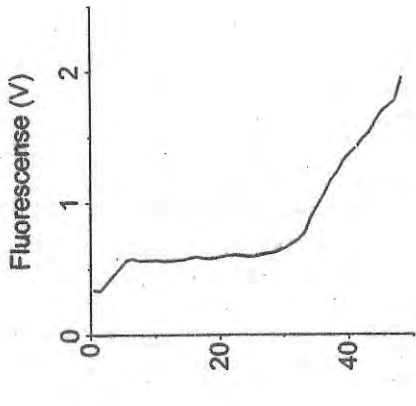
Station No. 11



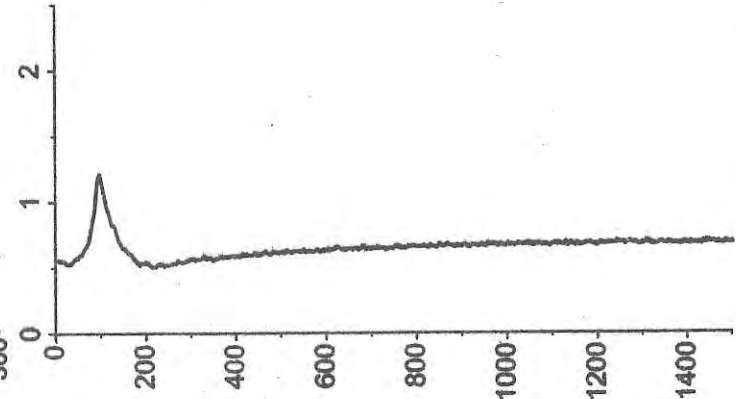
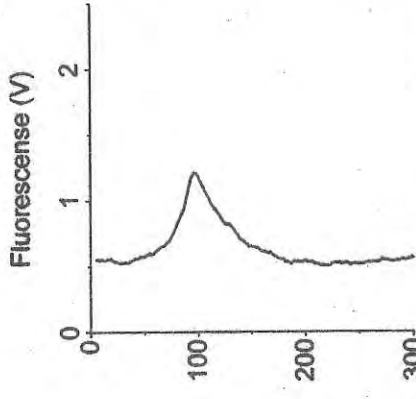
Station No. 10



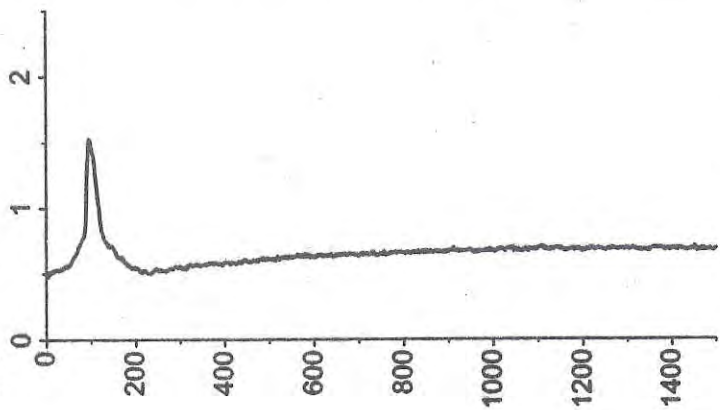
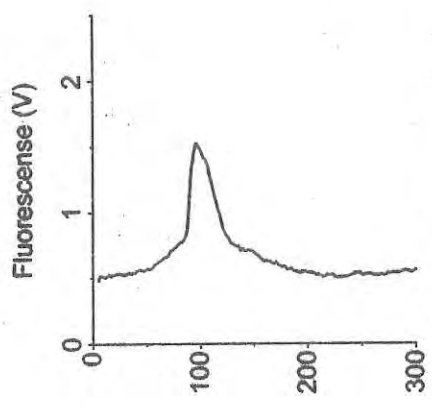
Station No. 9



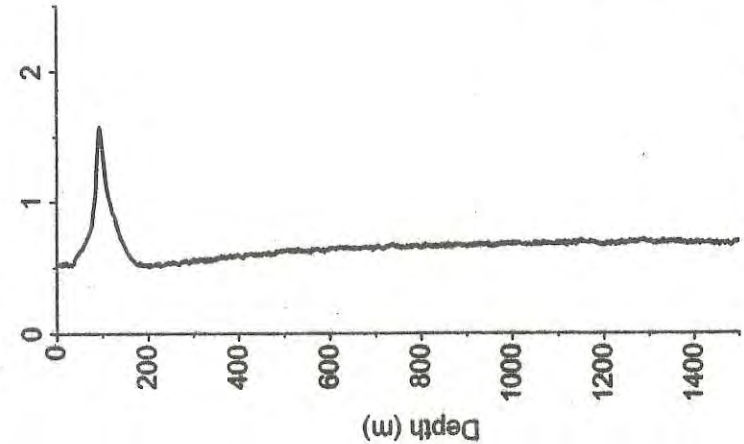
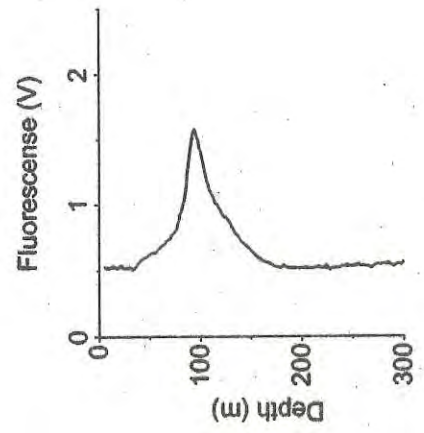
Station No. 16



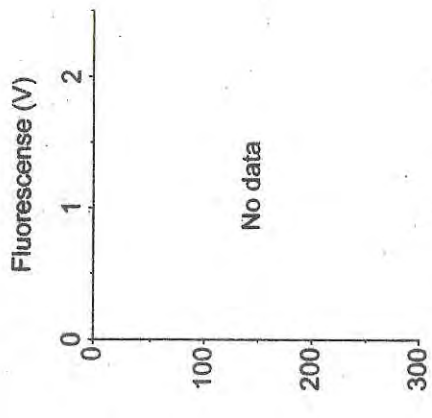
Station No. 15



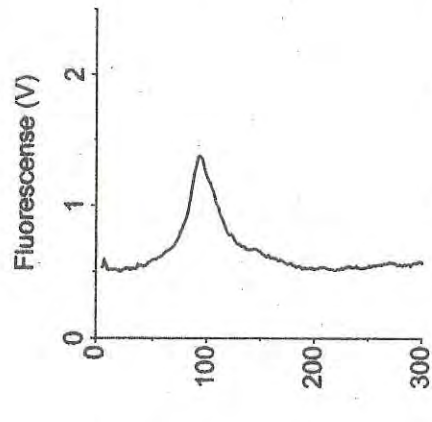
Station No. 14



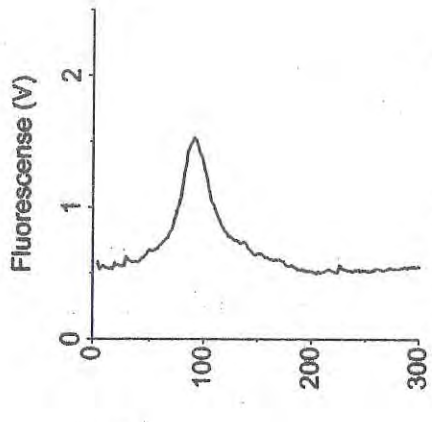
Station No. 13



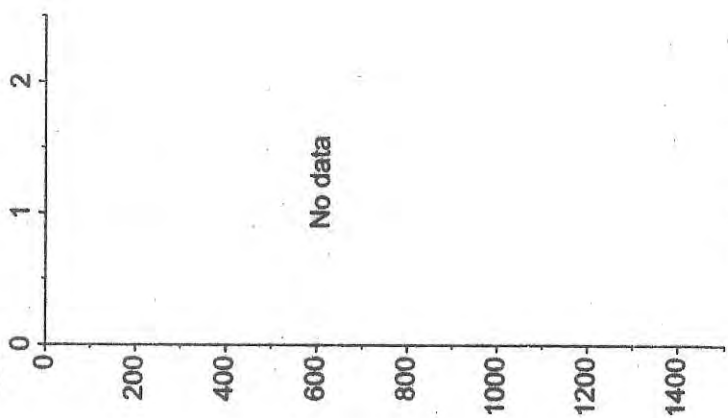
Station No. 17



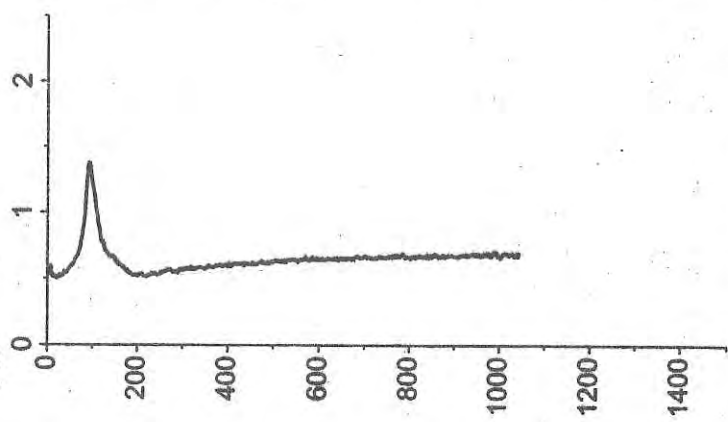
Station No. 18



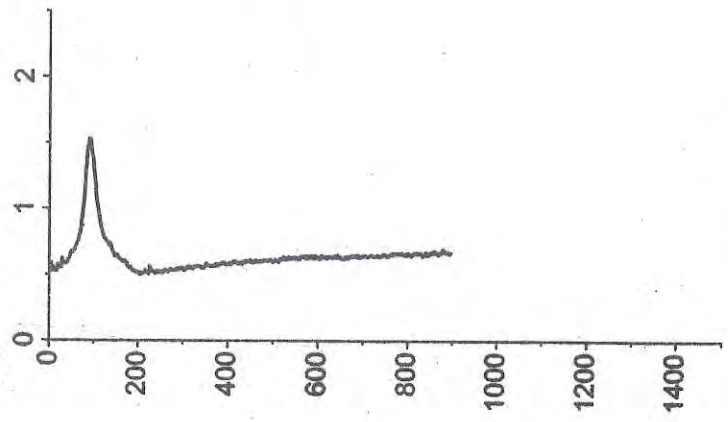
Station No. 19



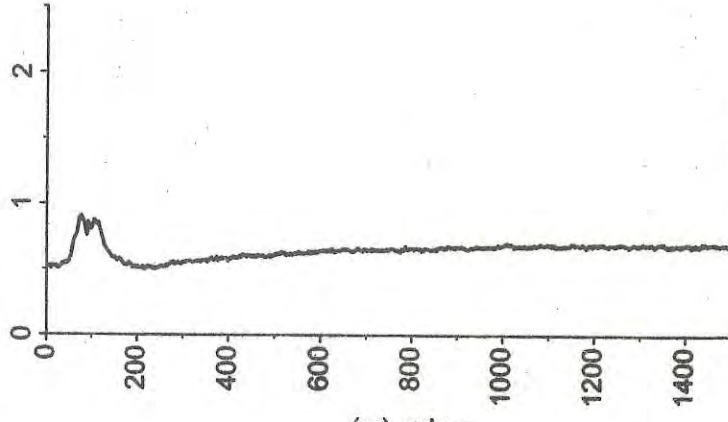
Station No. 20



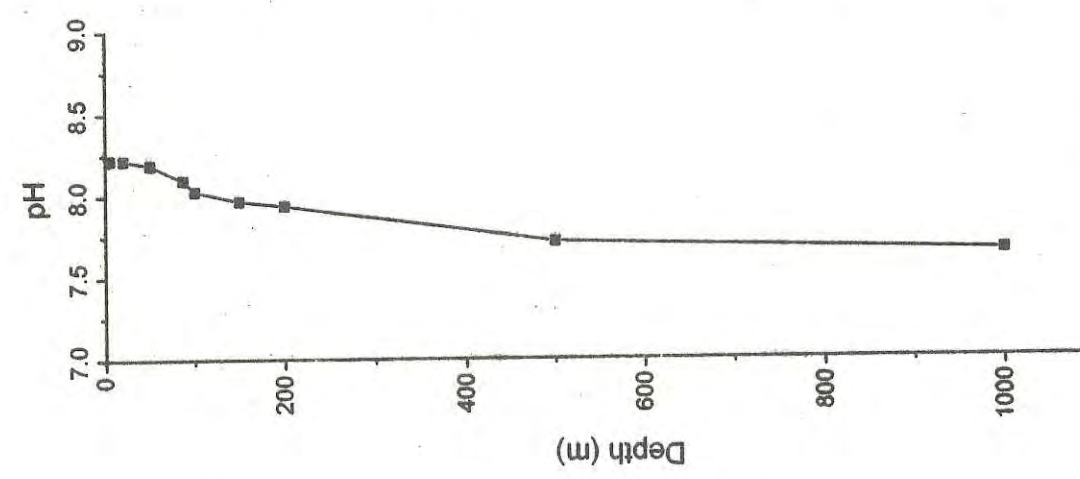
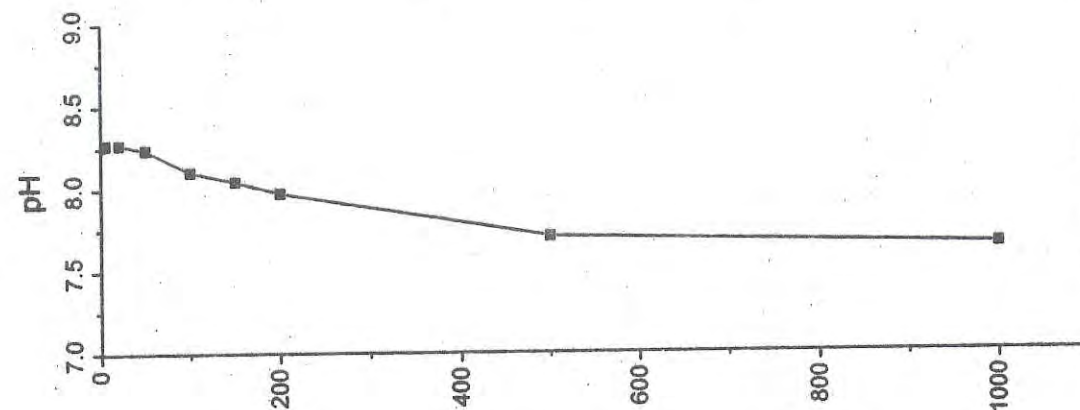
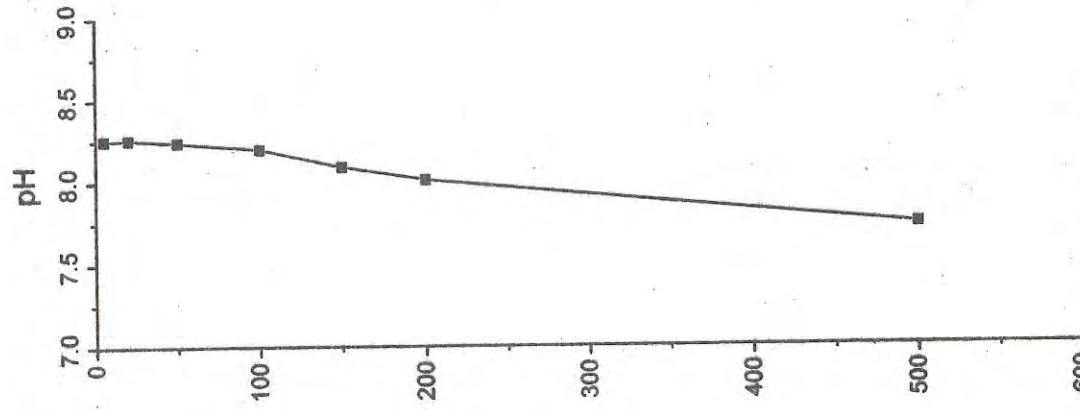
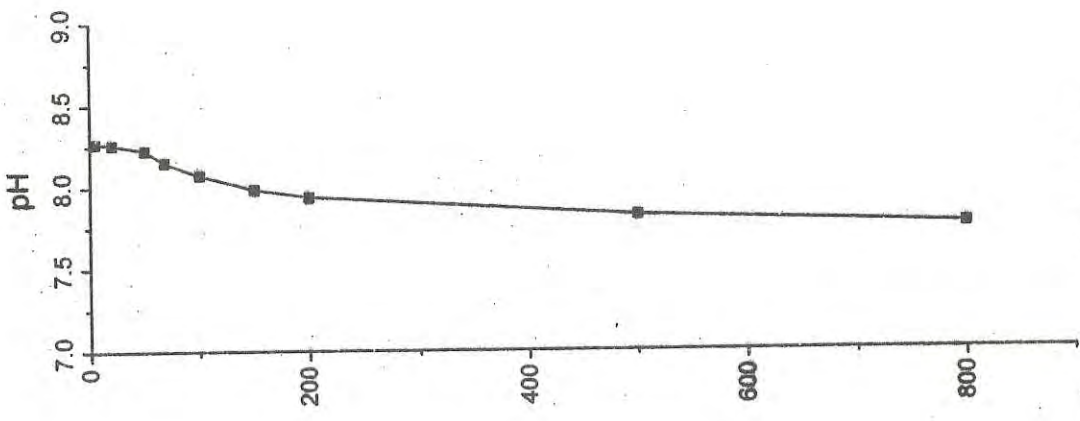
Station No. 17



Station No. 18



Station No. 19

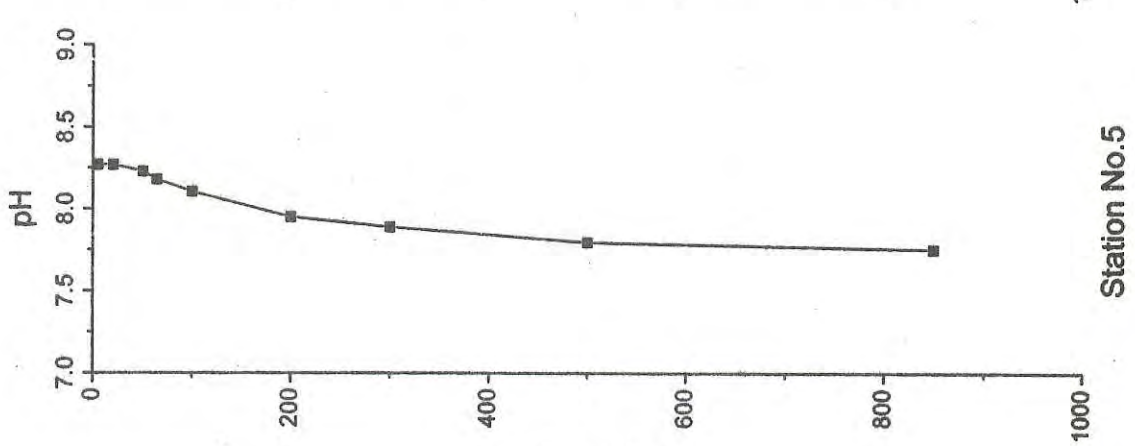
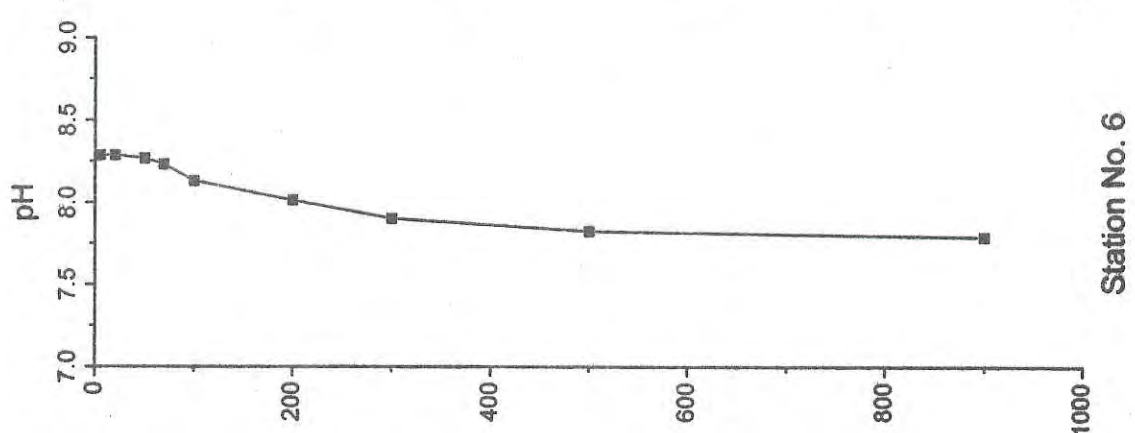
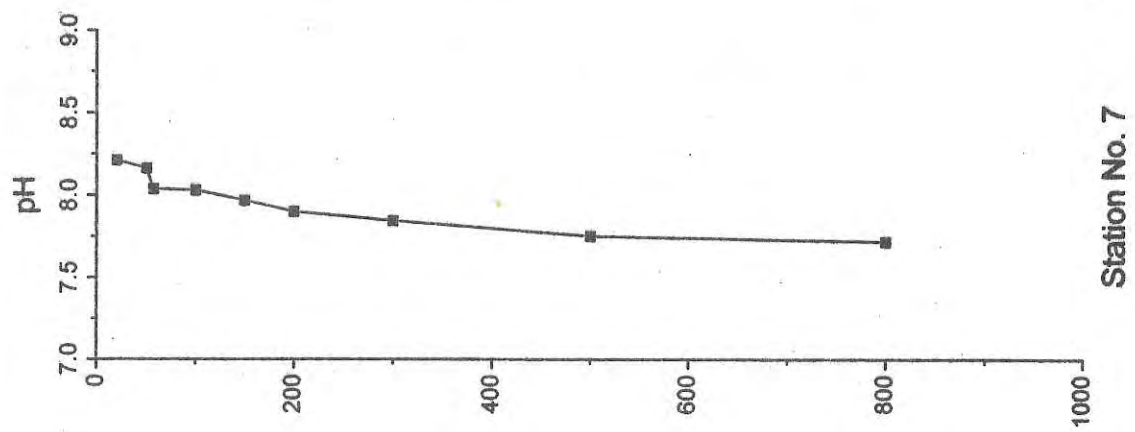
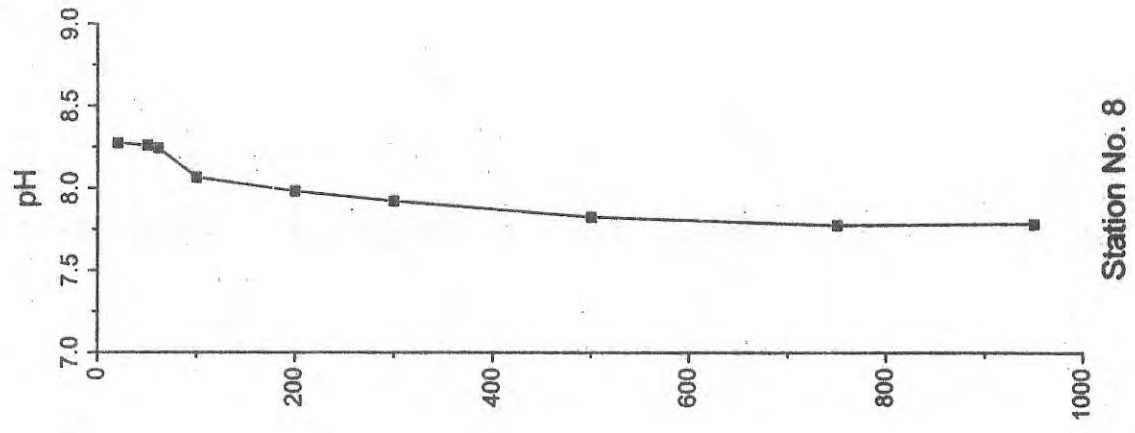


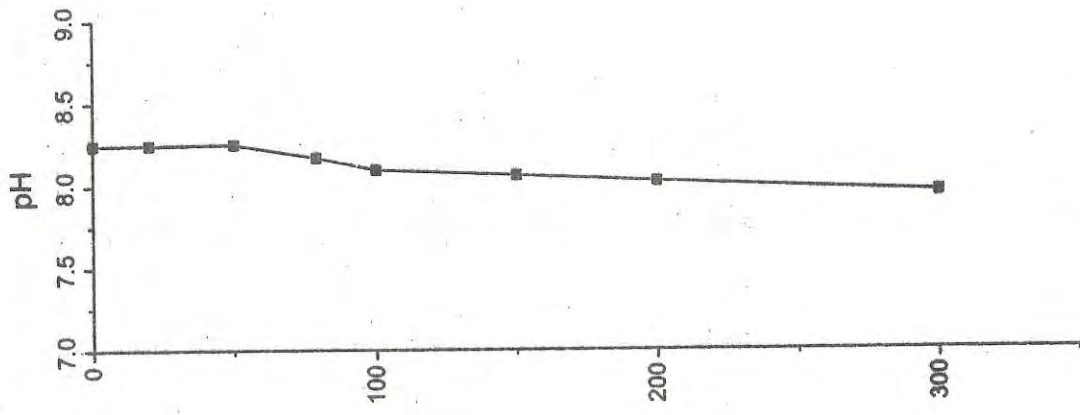
Station No. 4

Station No. 3

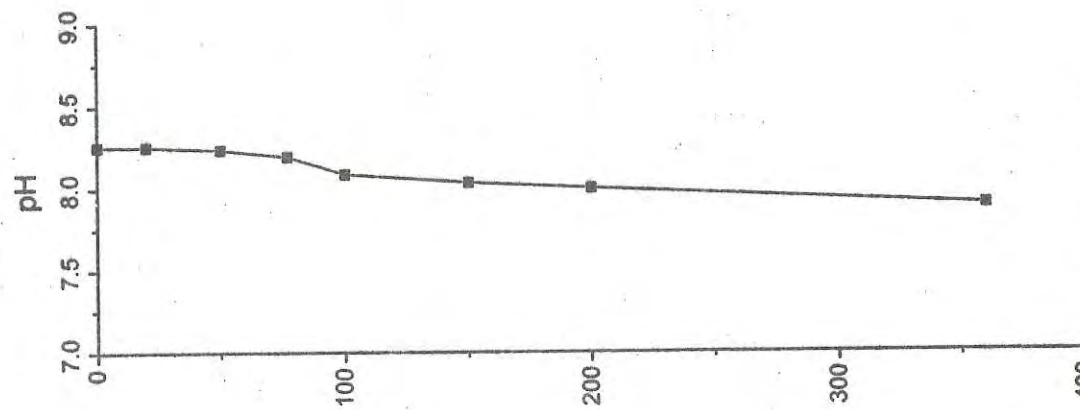
Station No. 2

Station No. 1

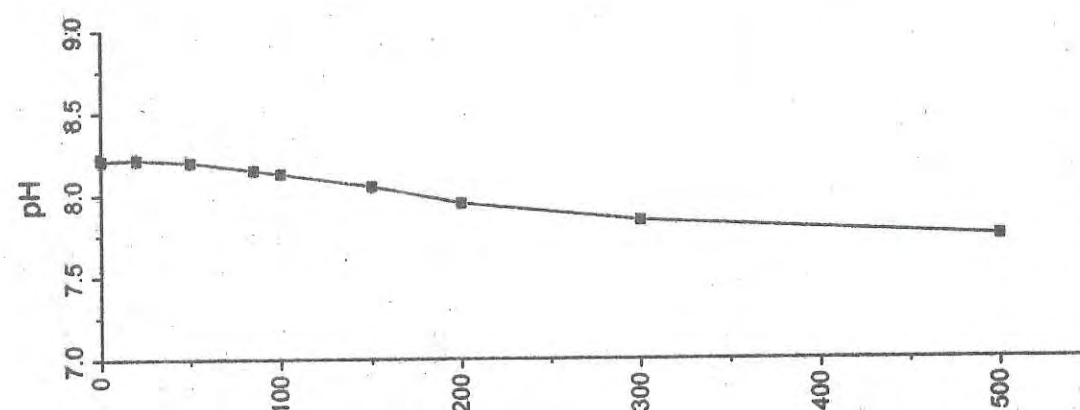




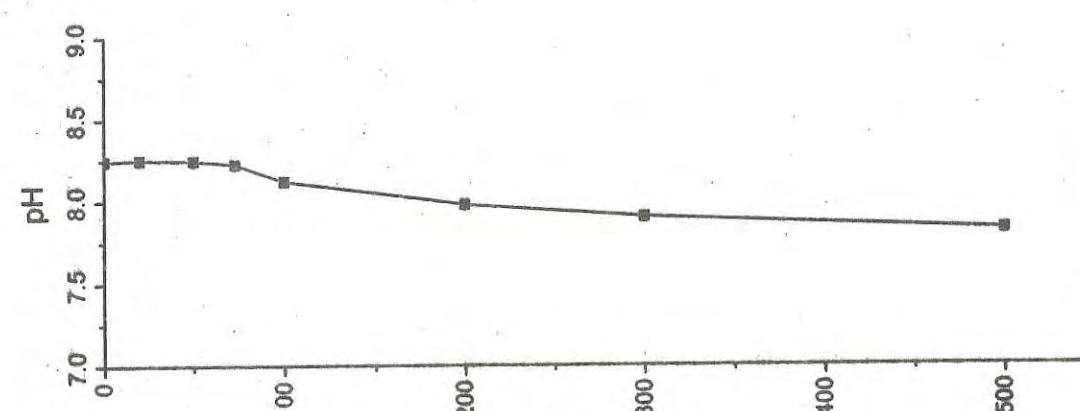
Station No. 12



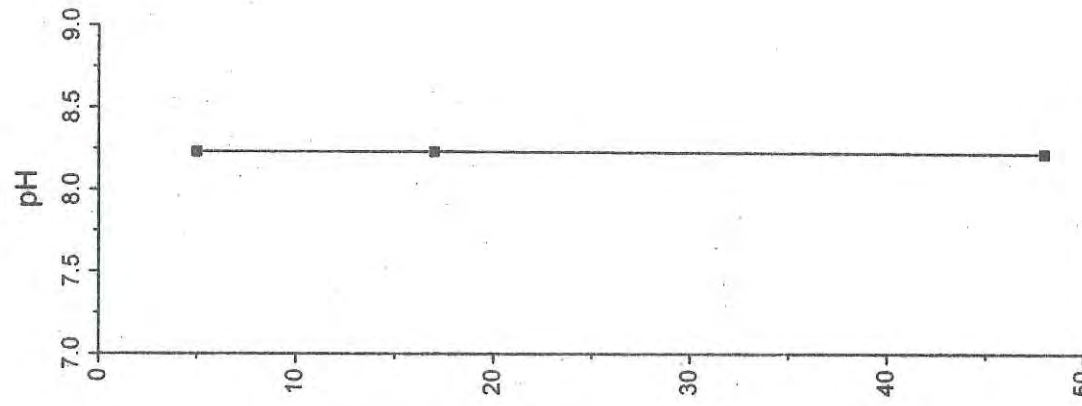
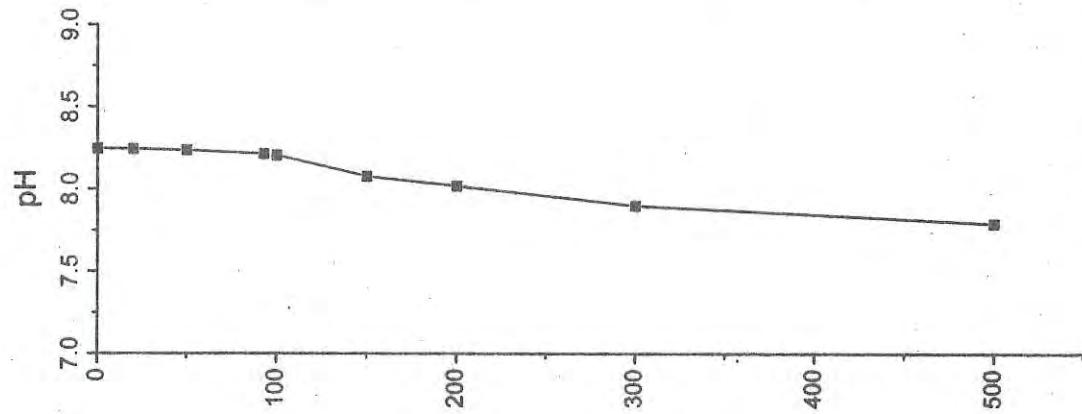
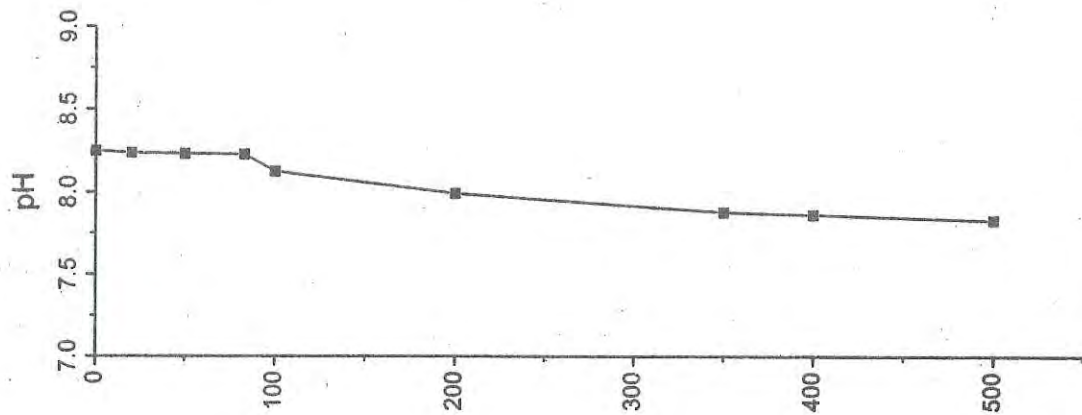
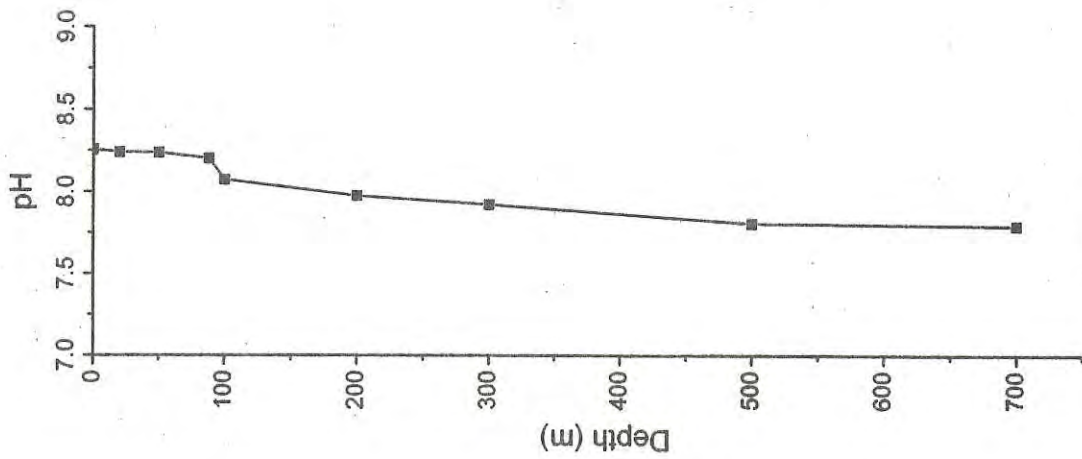
Station No. 11

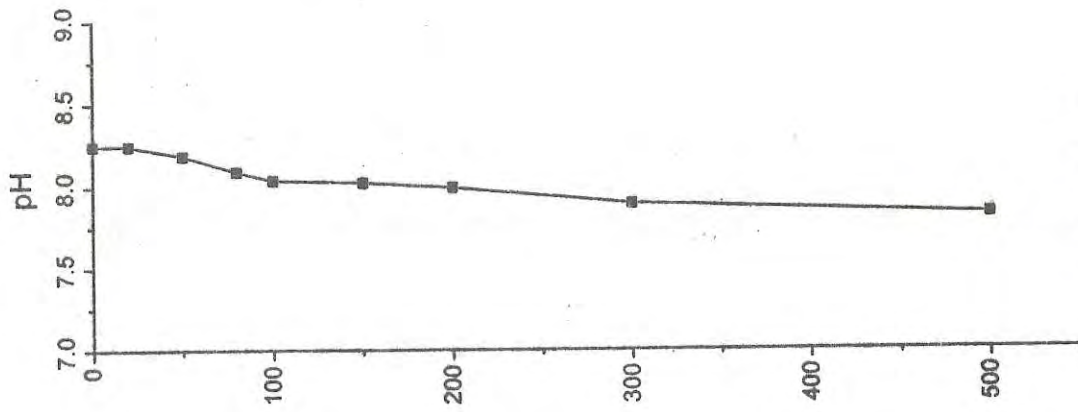


Station No. 10

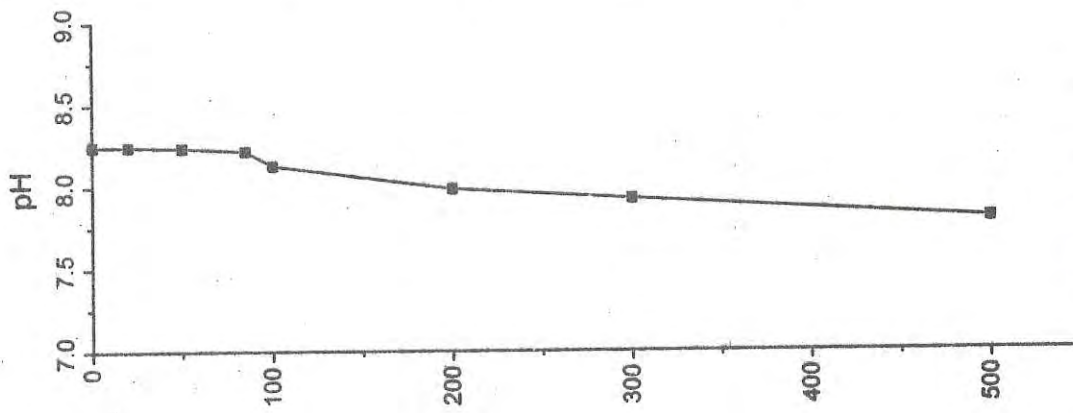


Station No. 9

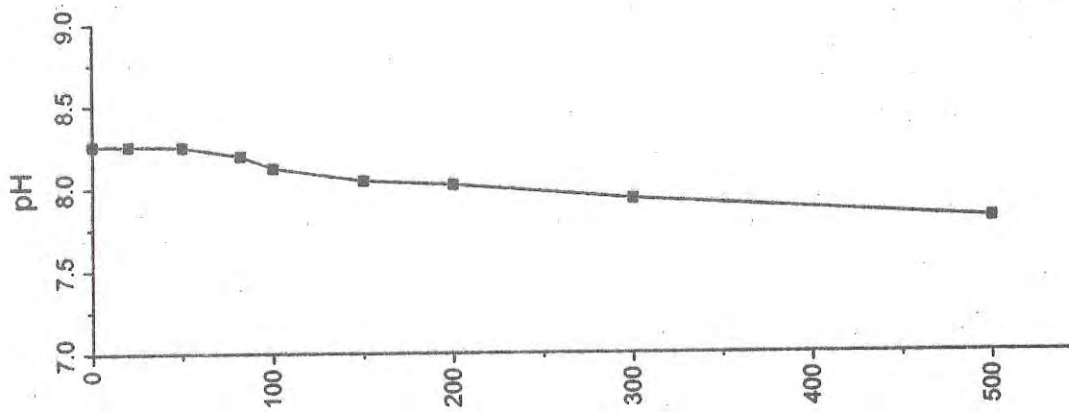




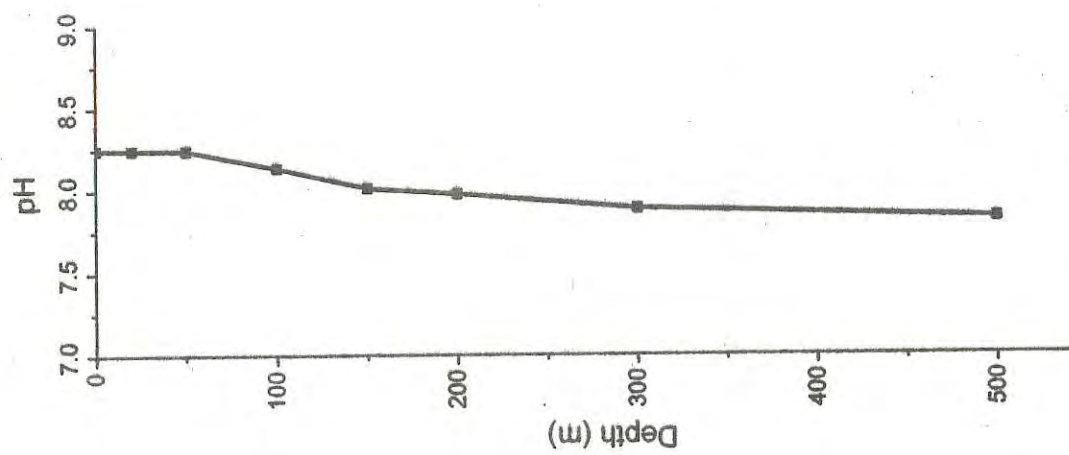
Station No. 20



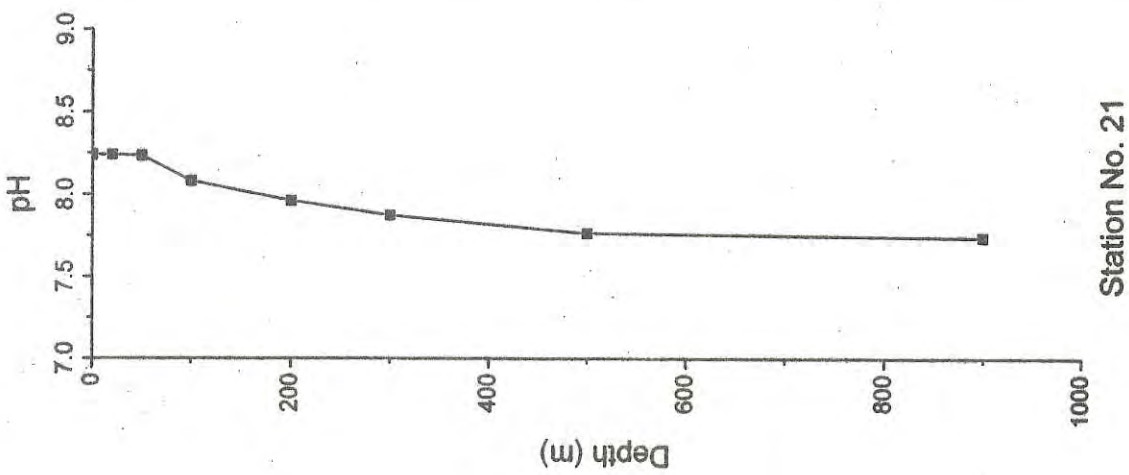
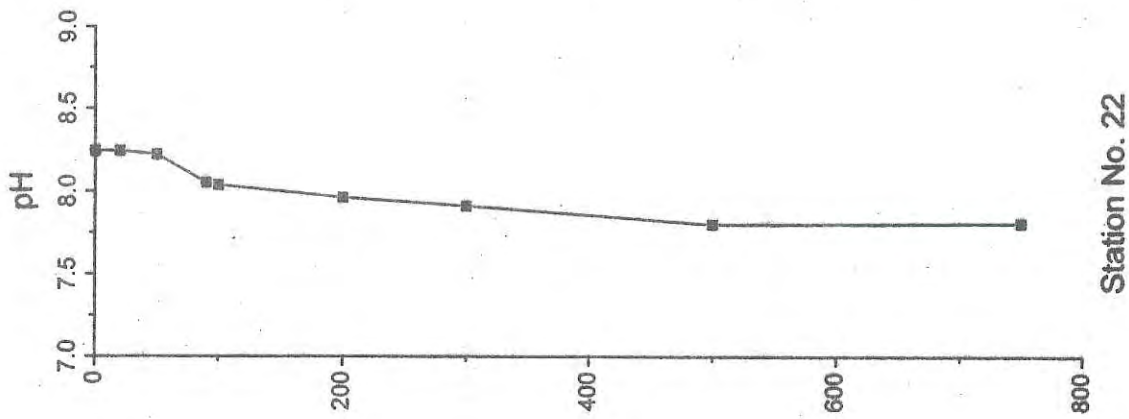
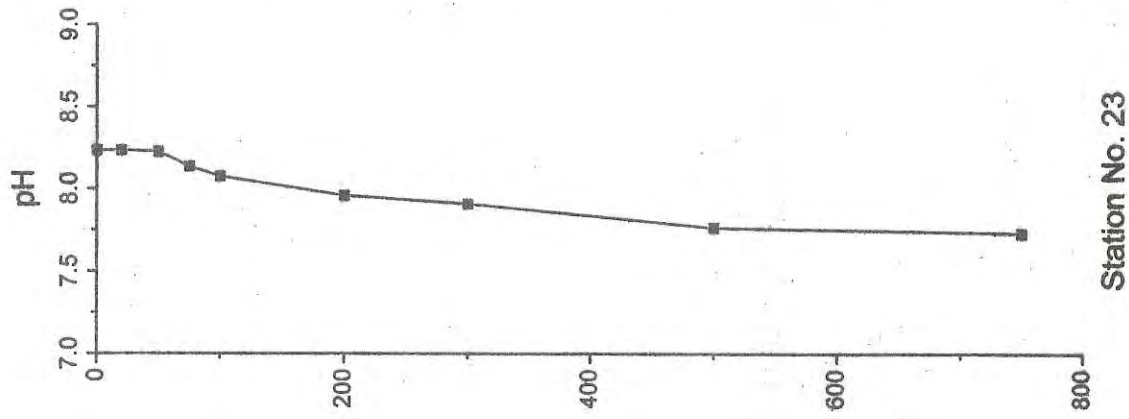
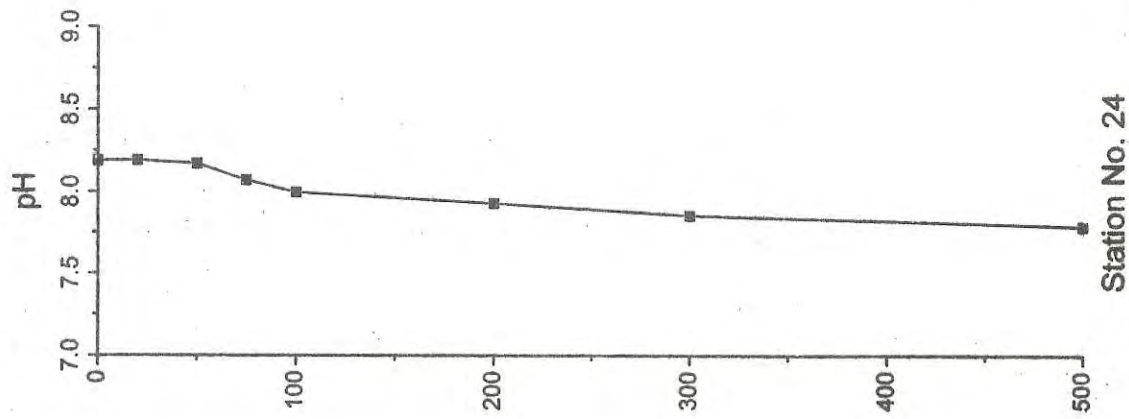
Station No. 19

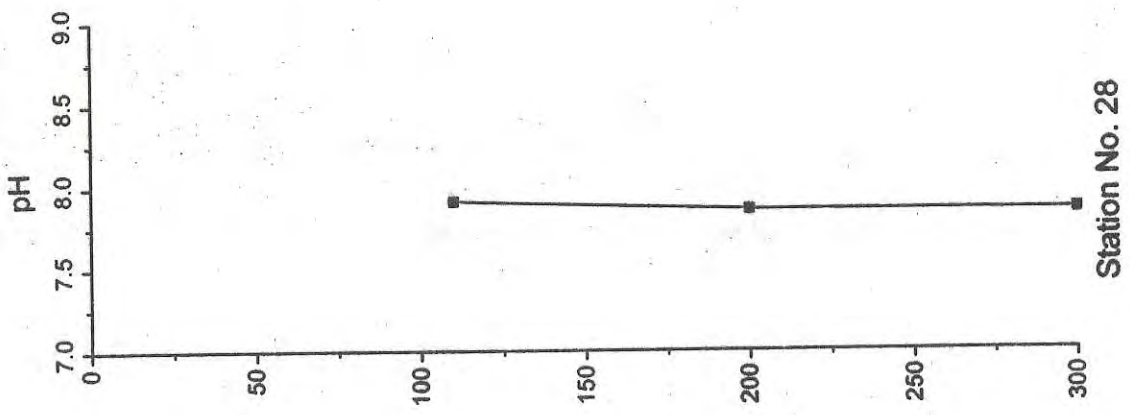


Station No. 18

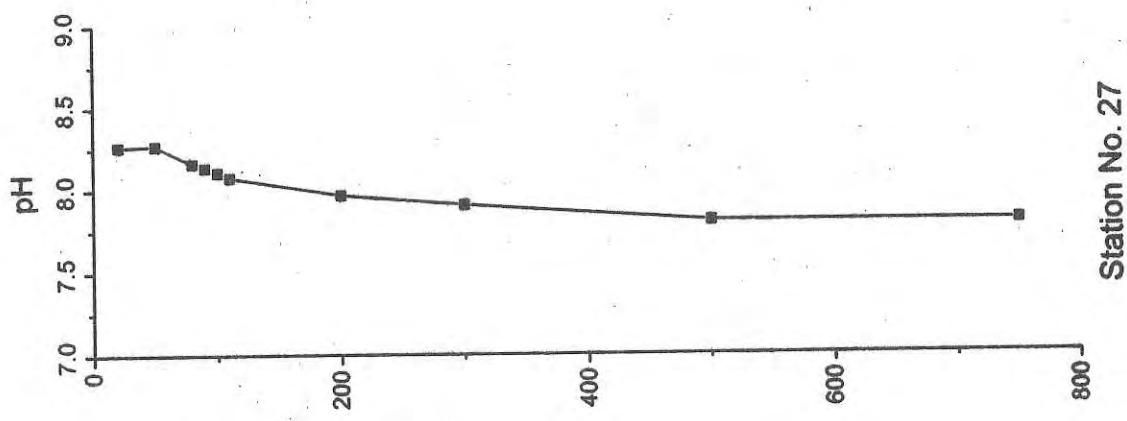


Station No. 17

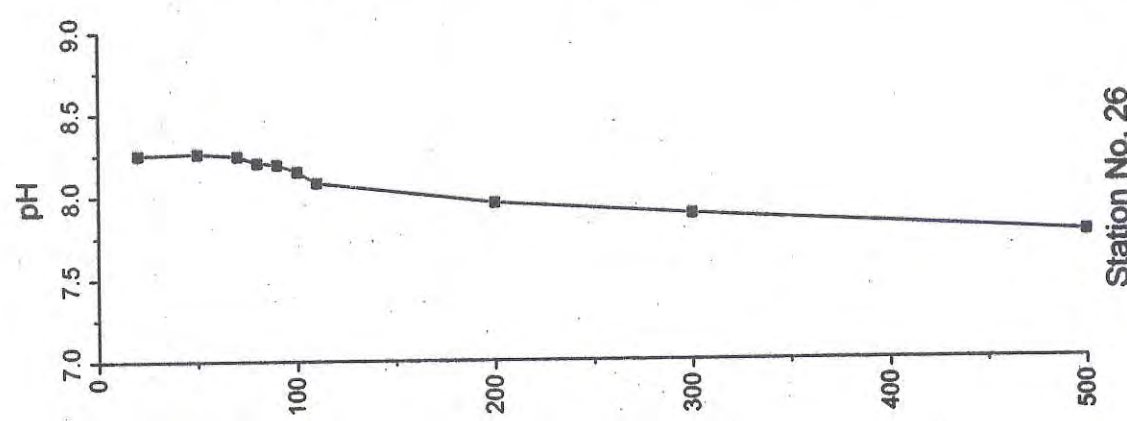




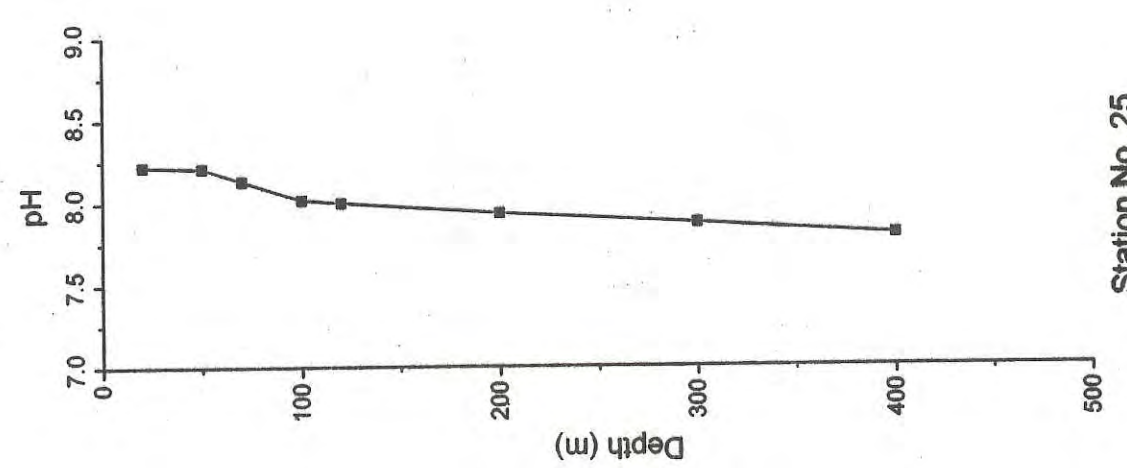
Station No. 28



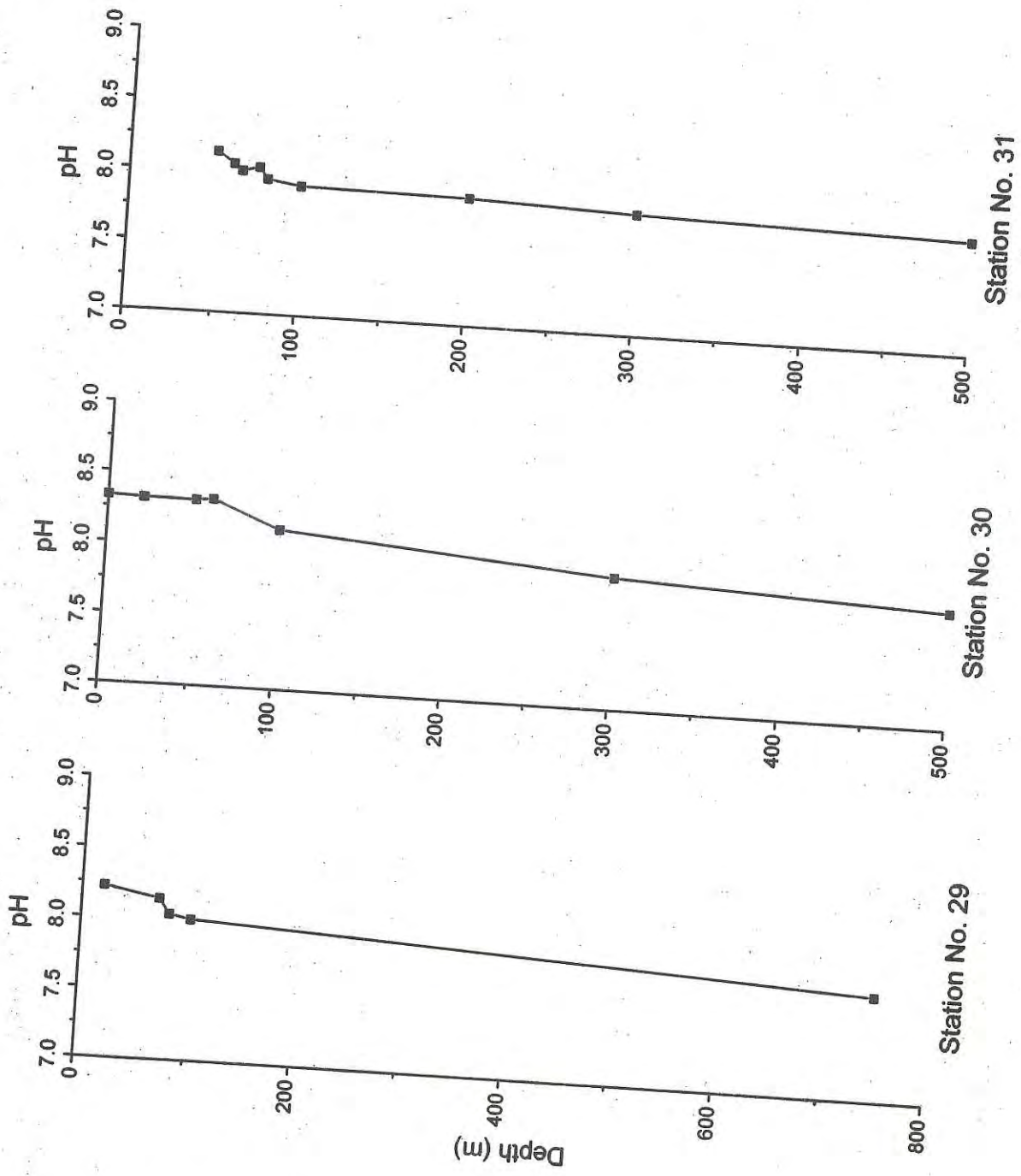
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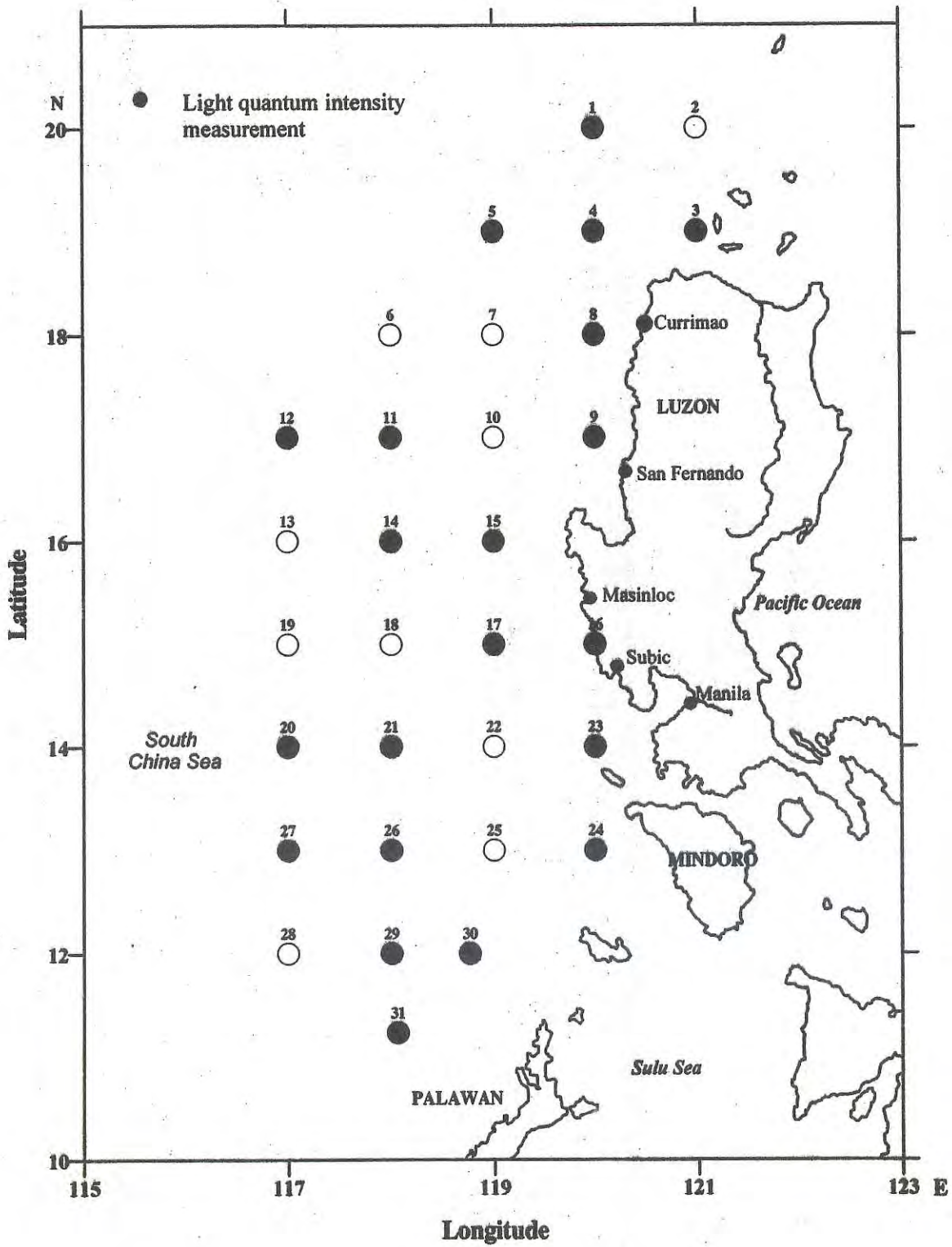


Station No. 26

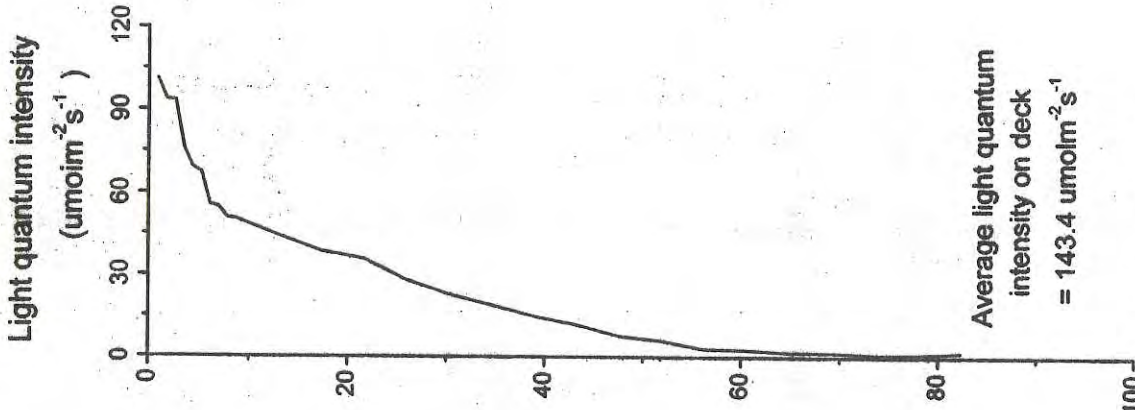
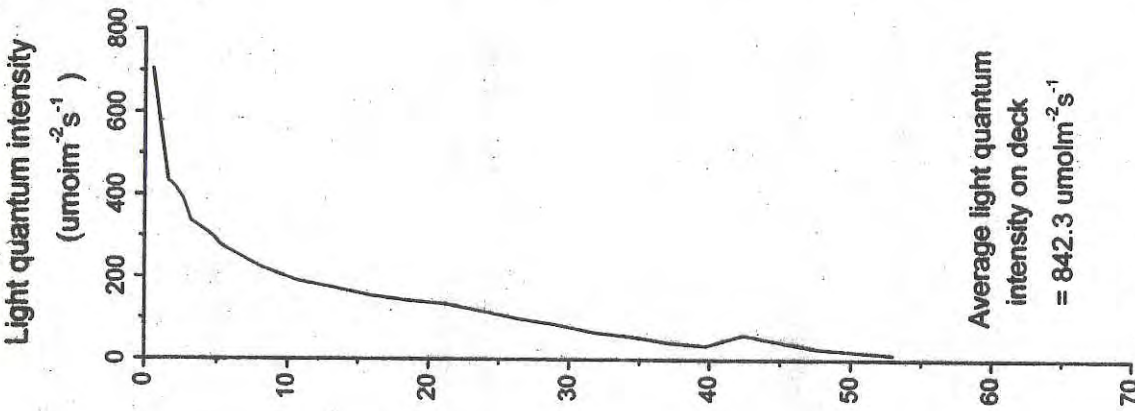
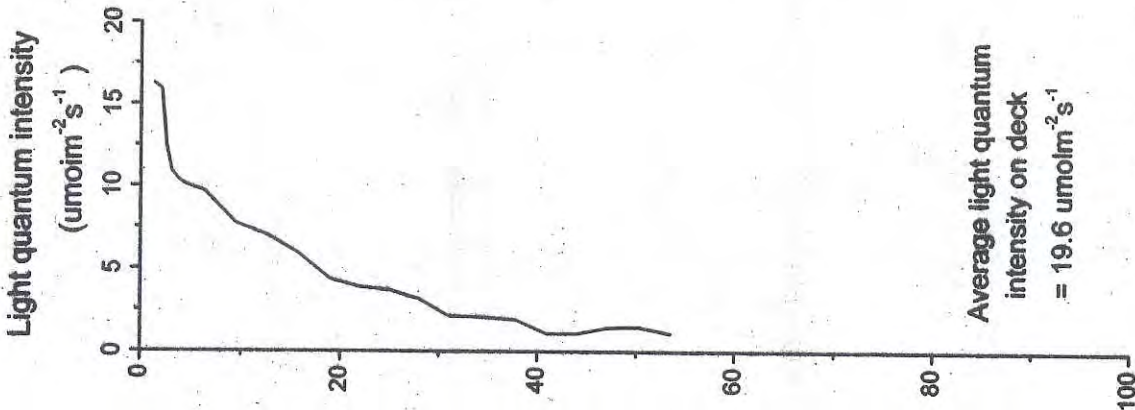
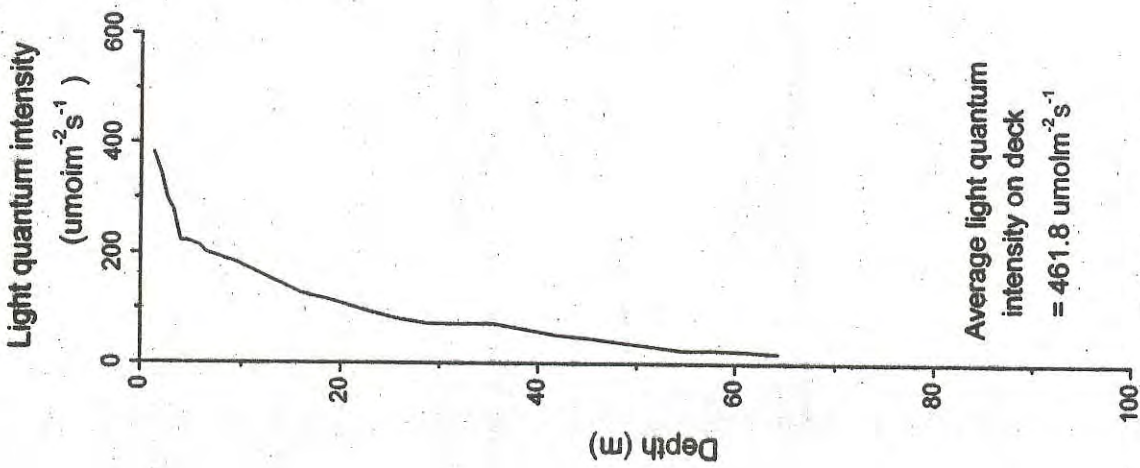


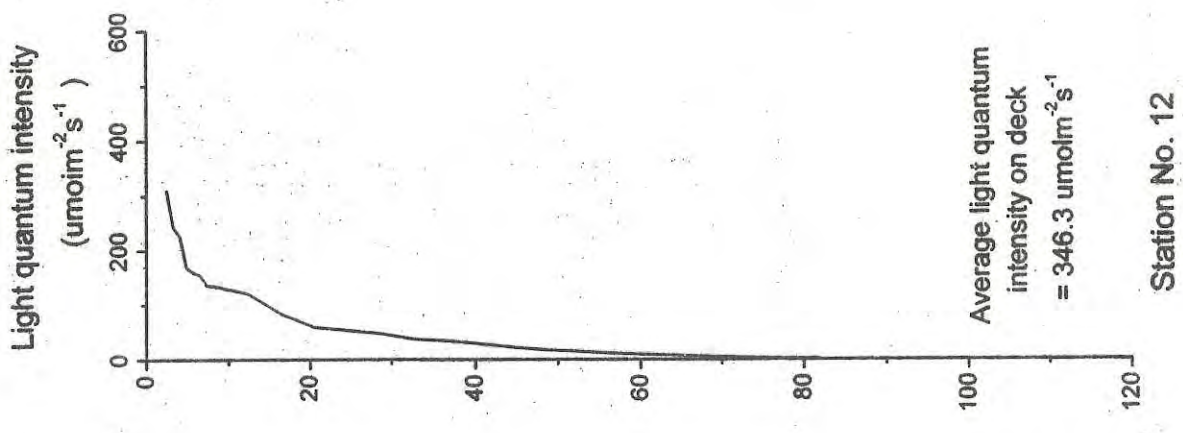
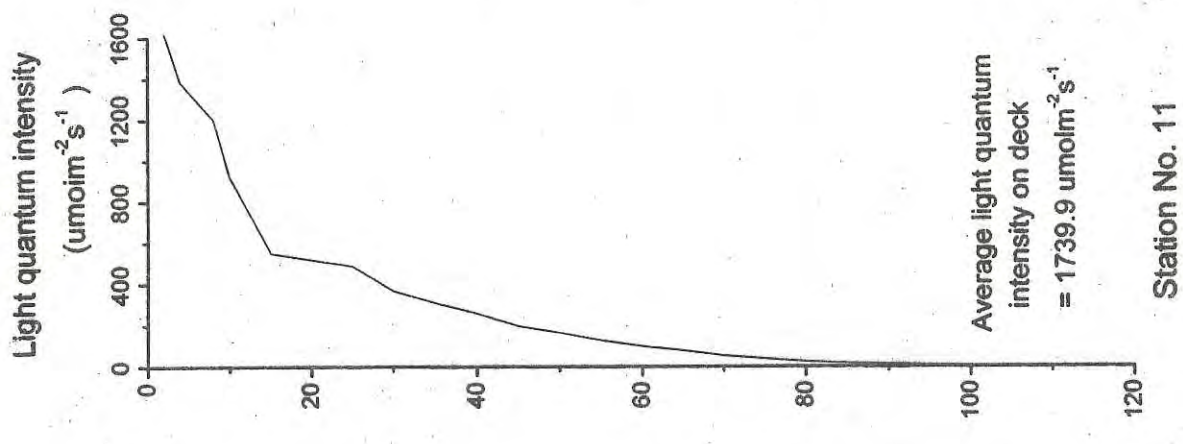
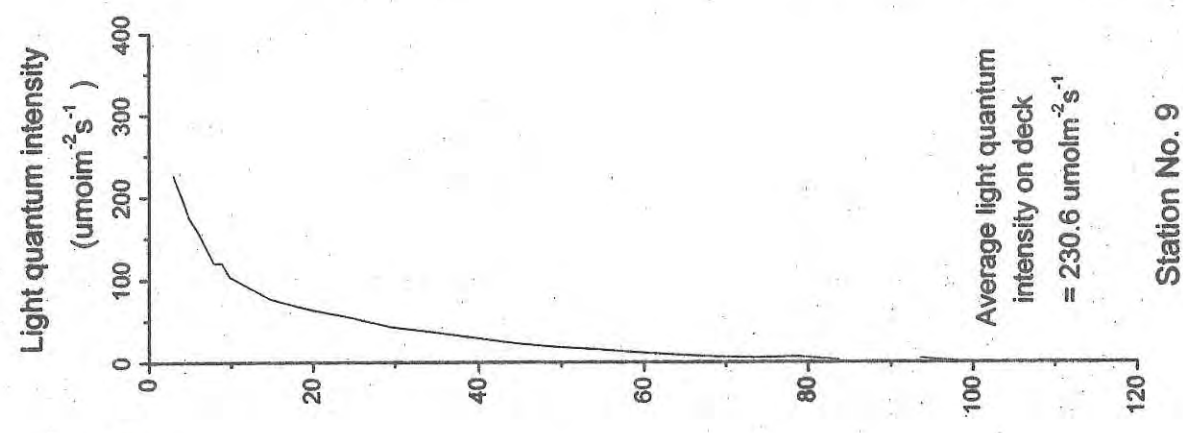
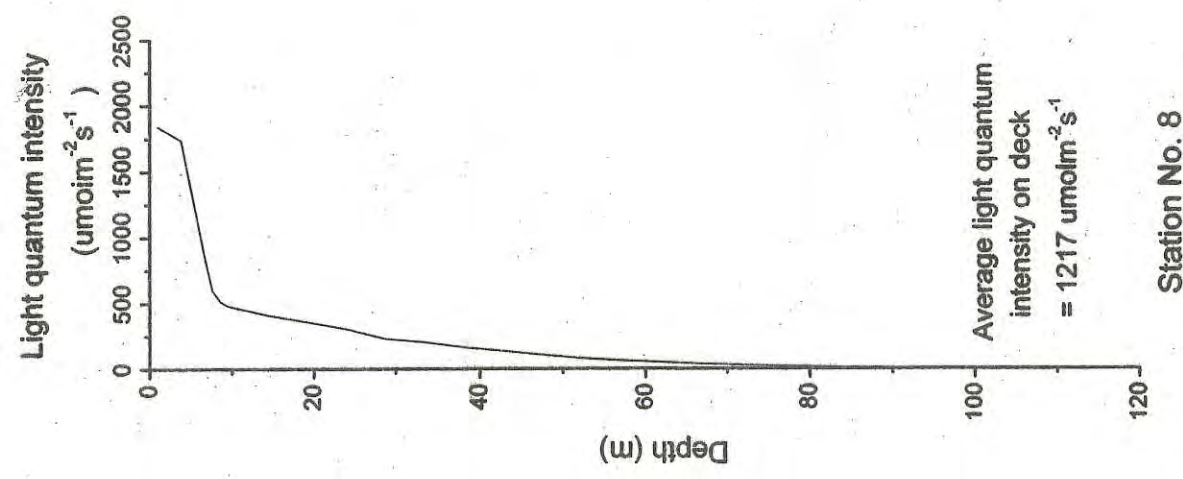
Station No. 25

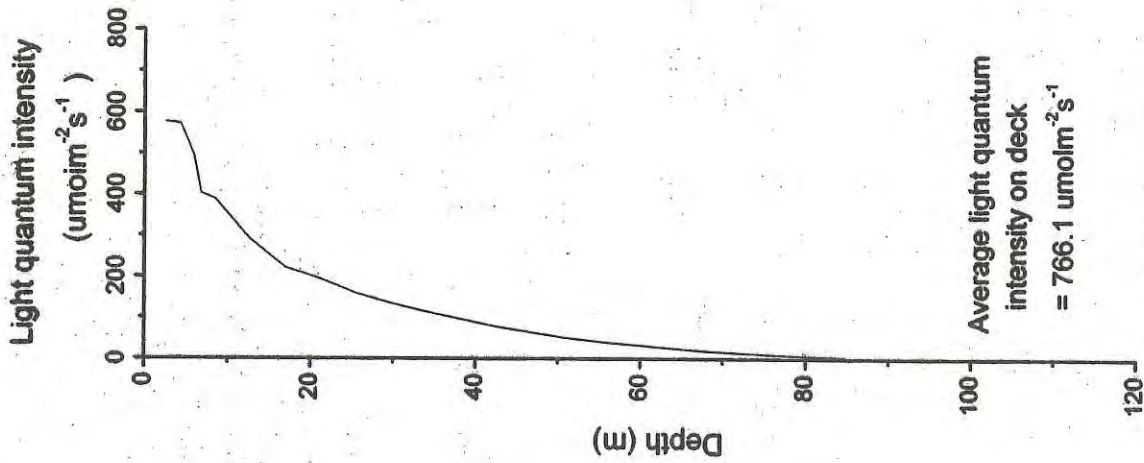




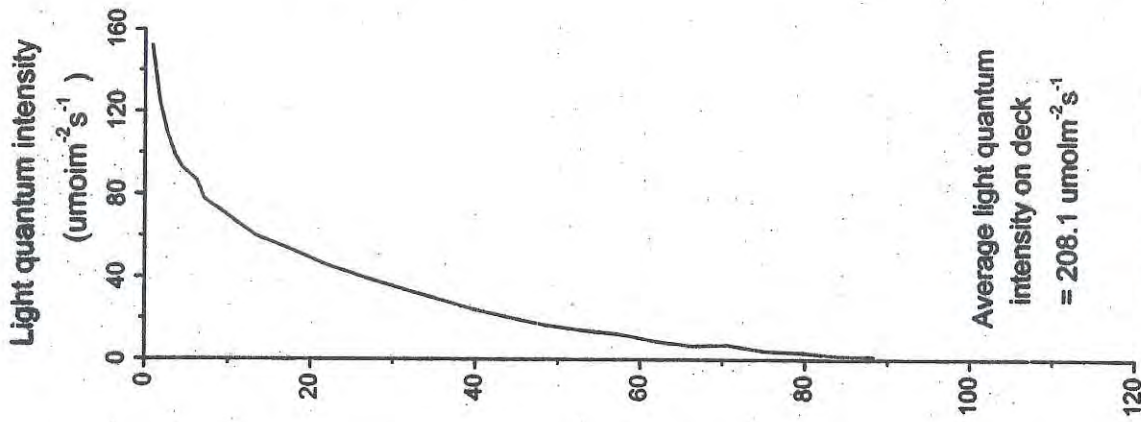
**Fig. 3 Light quantum Intensity Measurement
SEAFDEC Collaborative Research Survey , Area III ; Western Philippines**



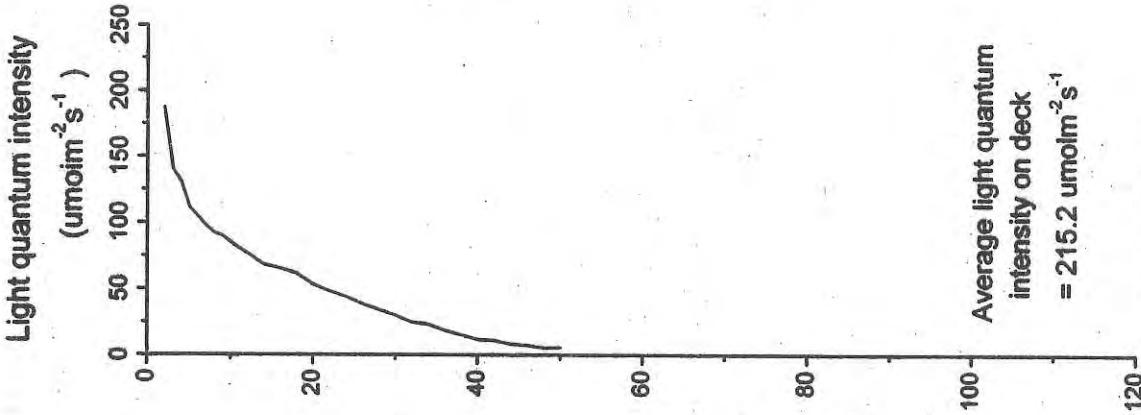




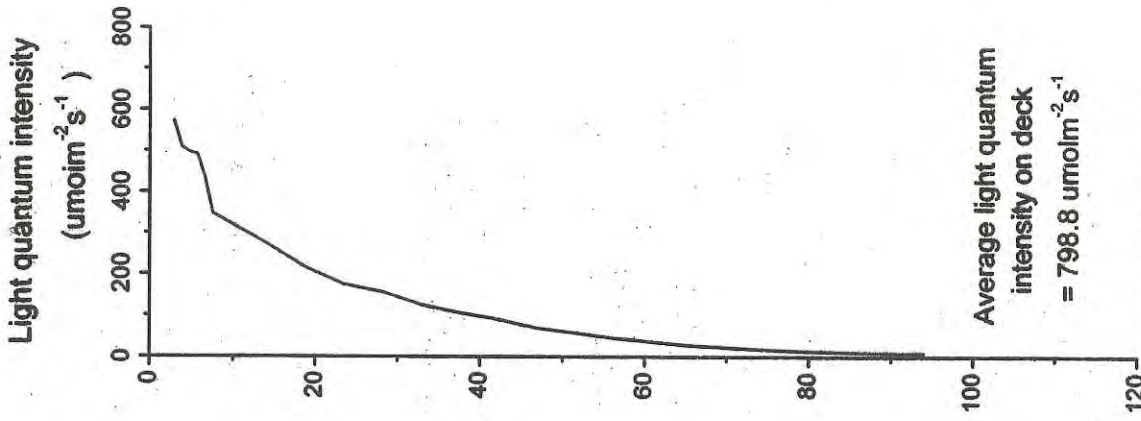
Station No. 14



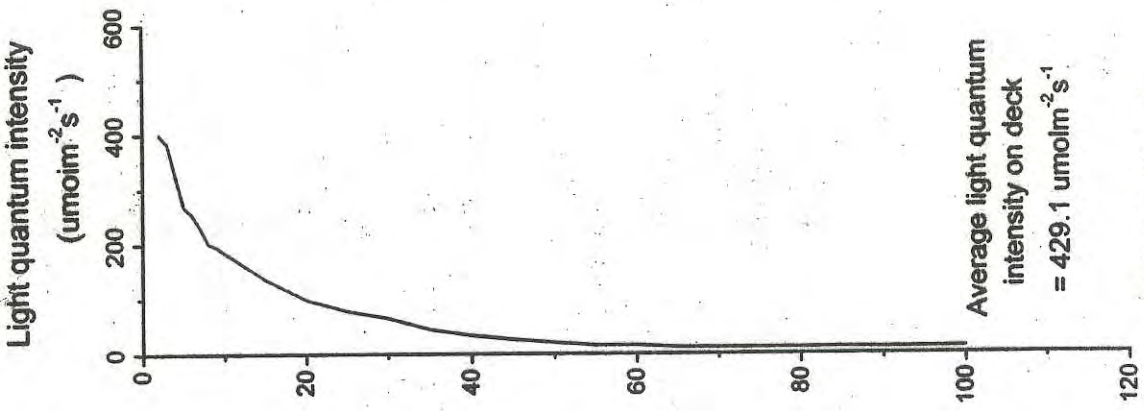
Station No. 15



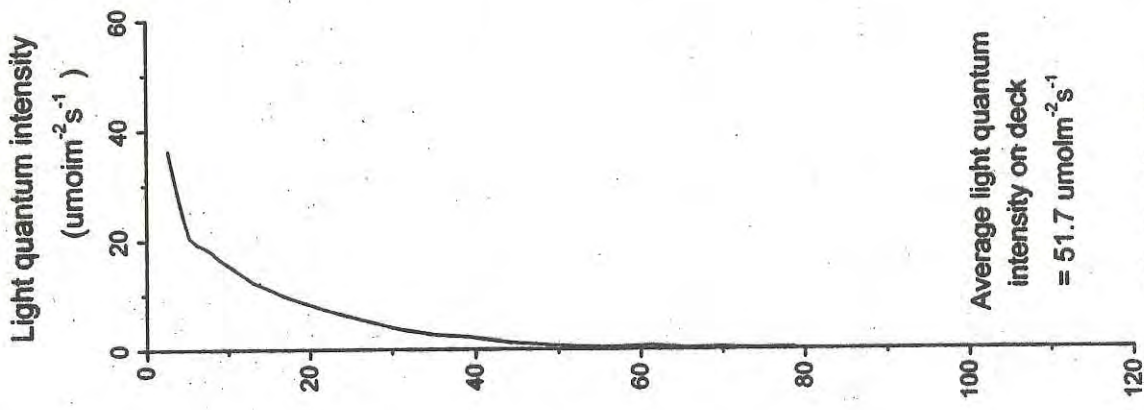
Station No. 16



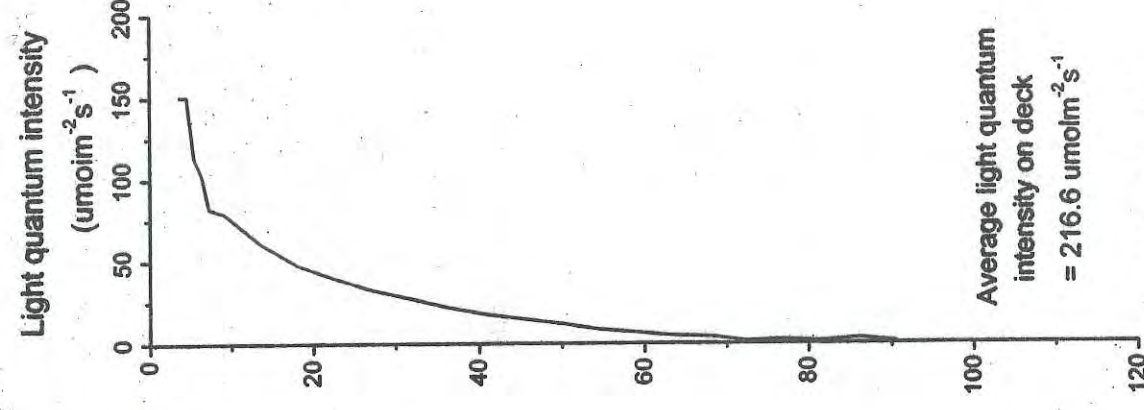
Station No. 17



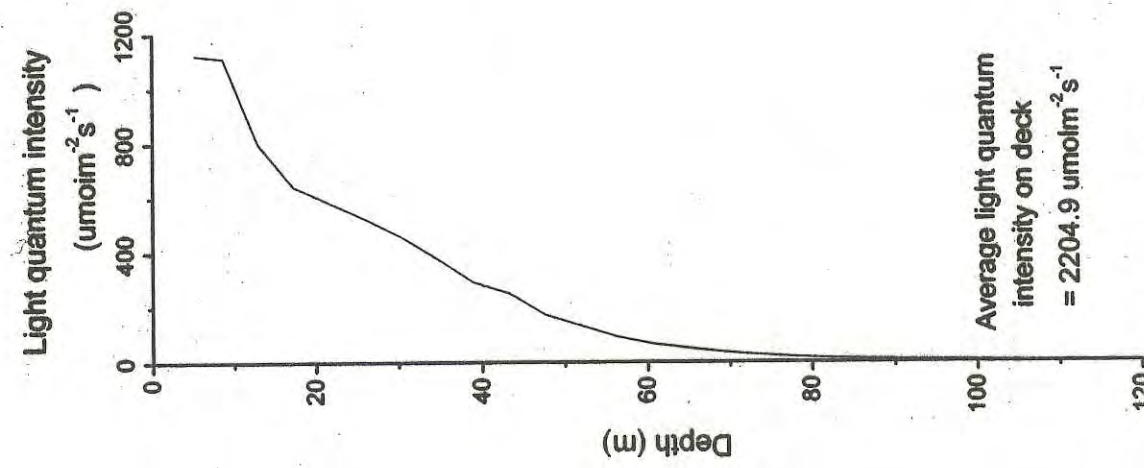
Station No. 24



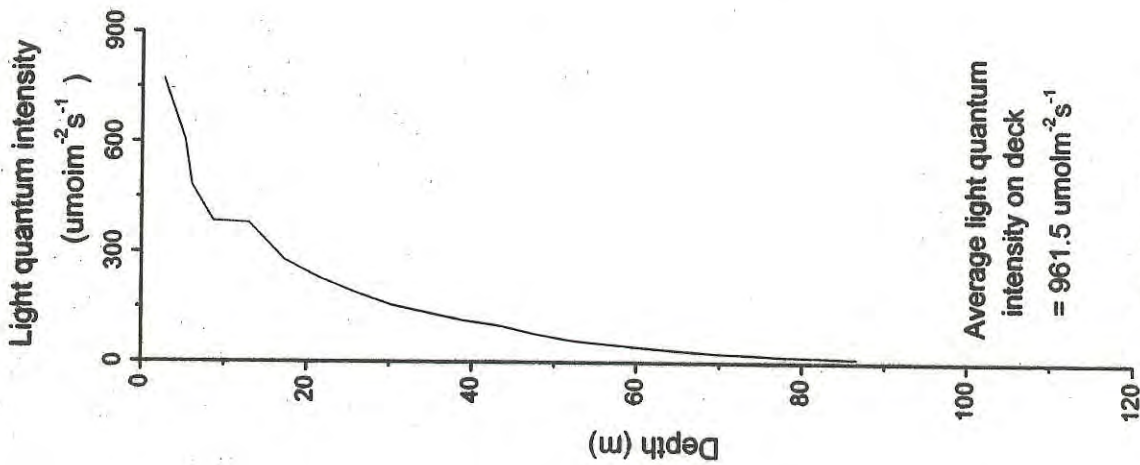
Station No. 23



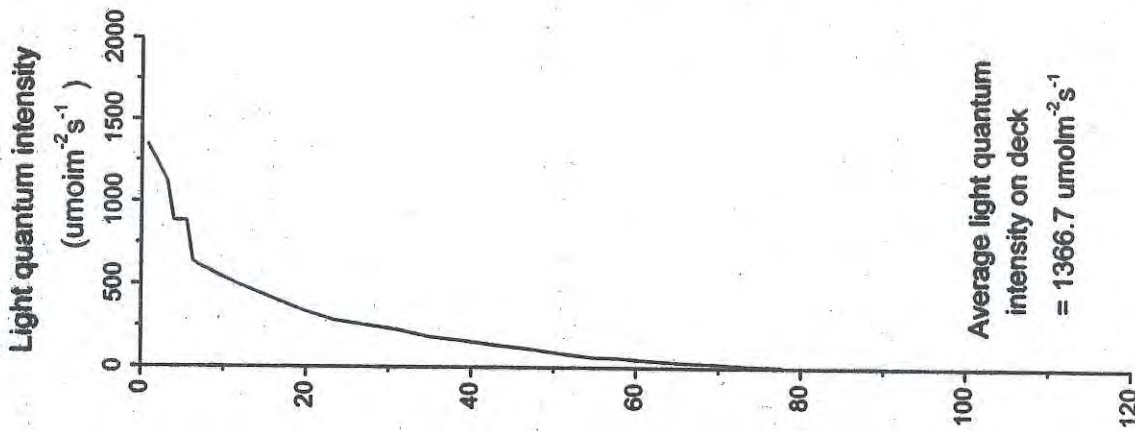
Station No. 21



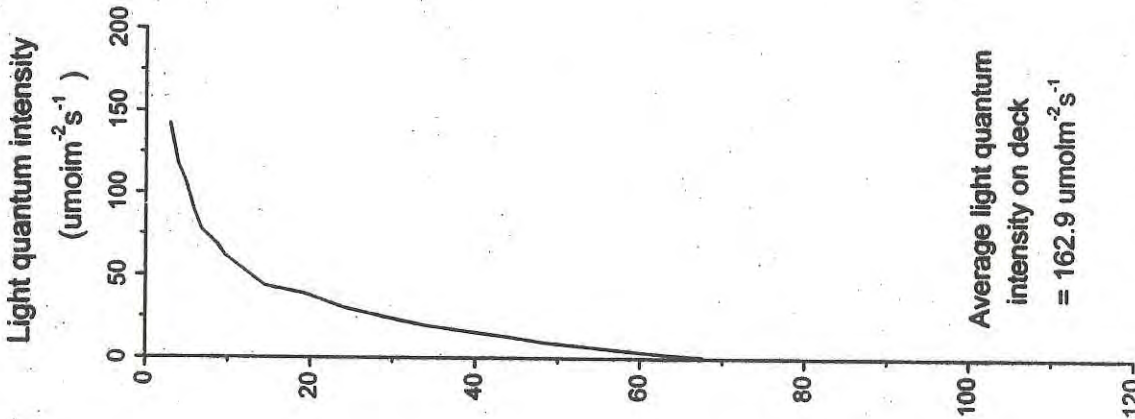
Station No. 20



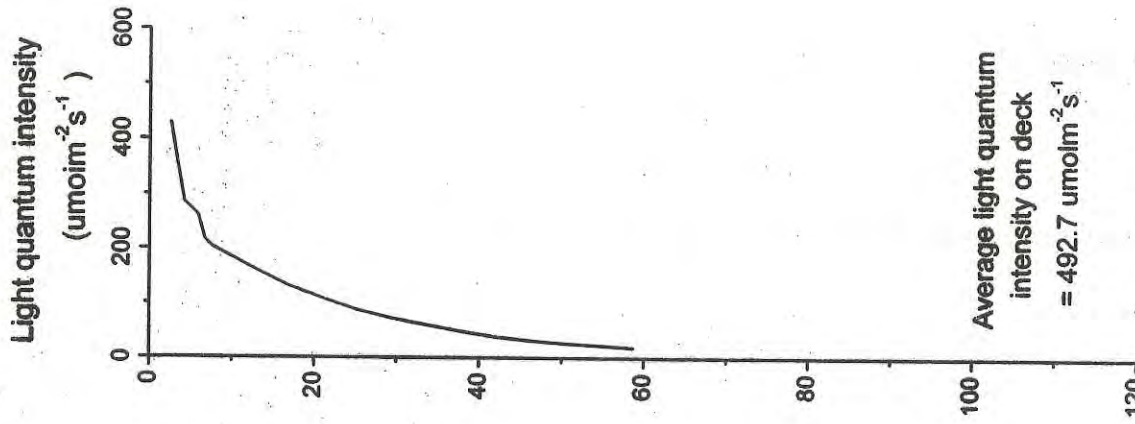
Station No. 26



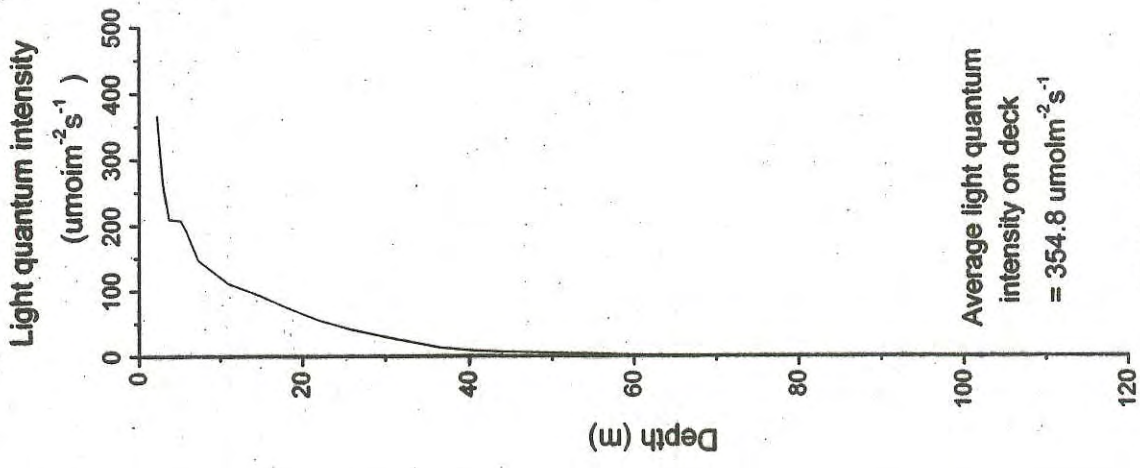
Station No. 27



Station No. 29



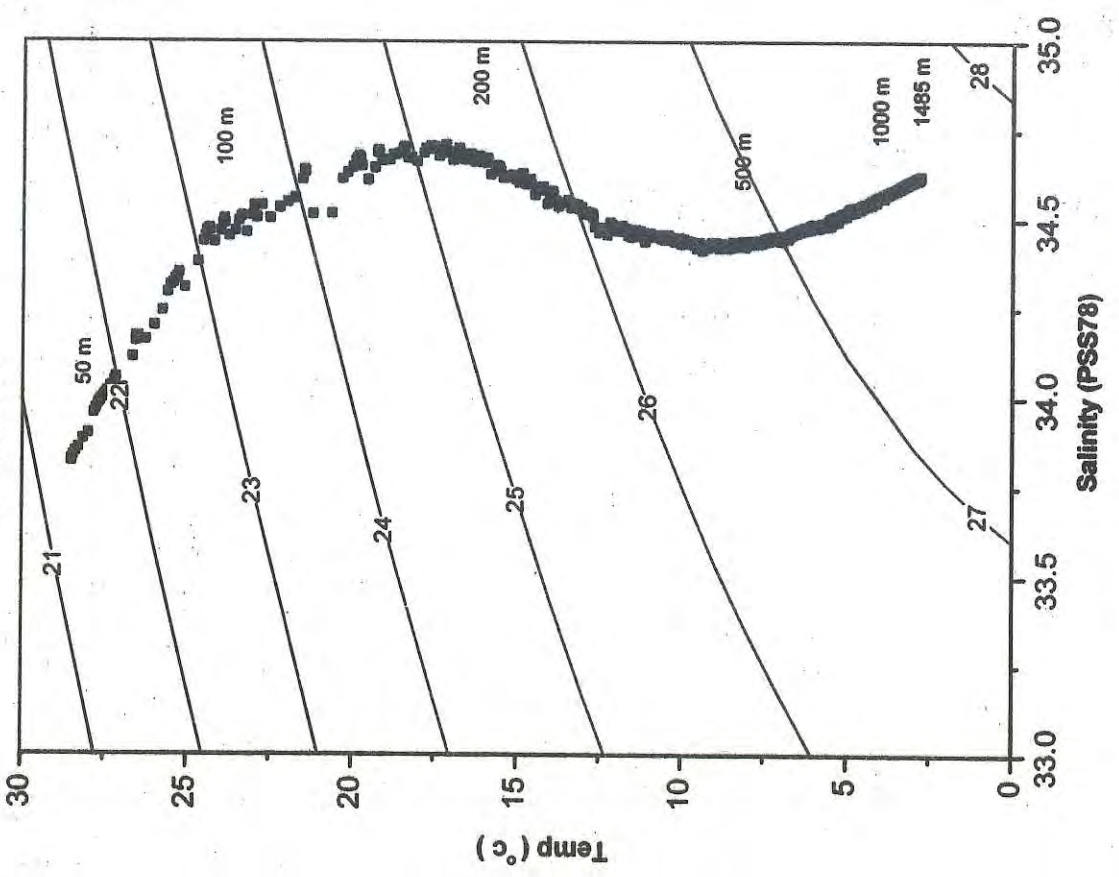
Station No. 30



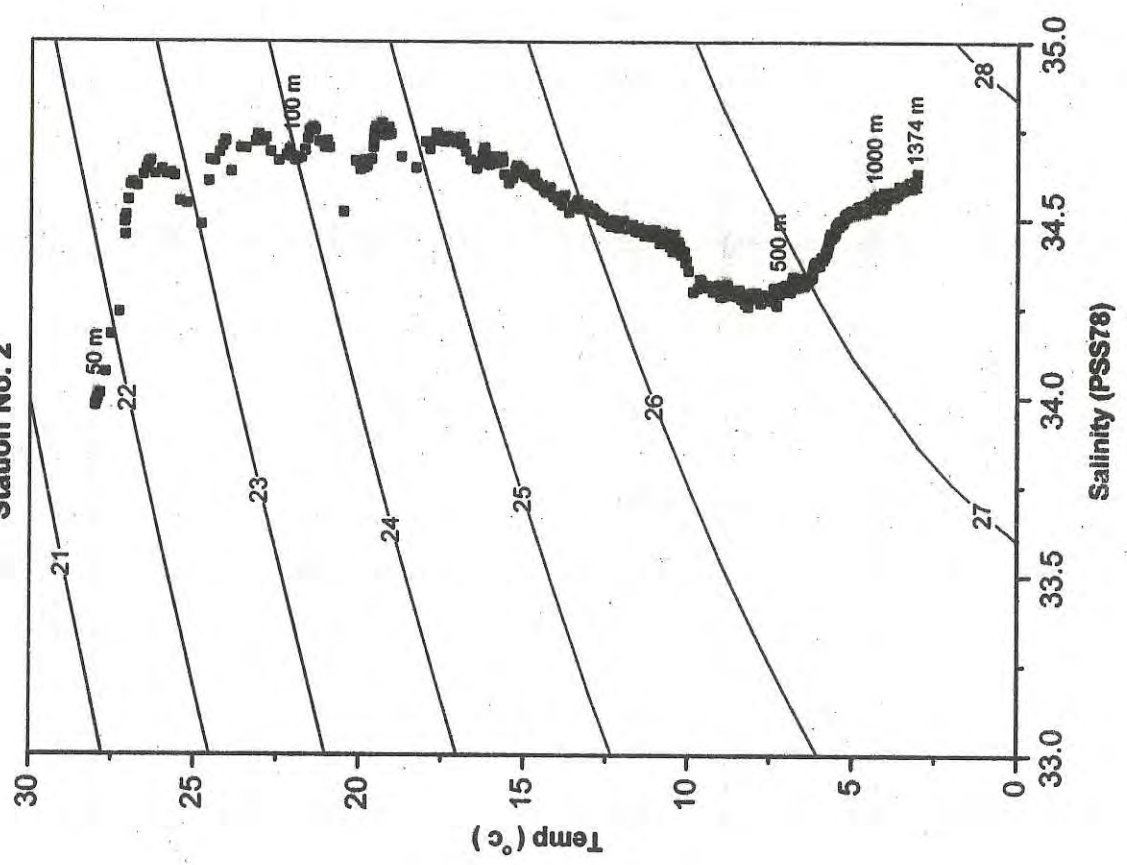
Average light quantum intensity on deck = 354.8 umolm⁻²s⁻¹

Station No. 31

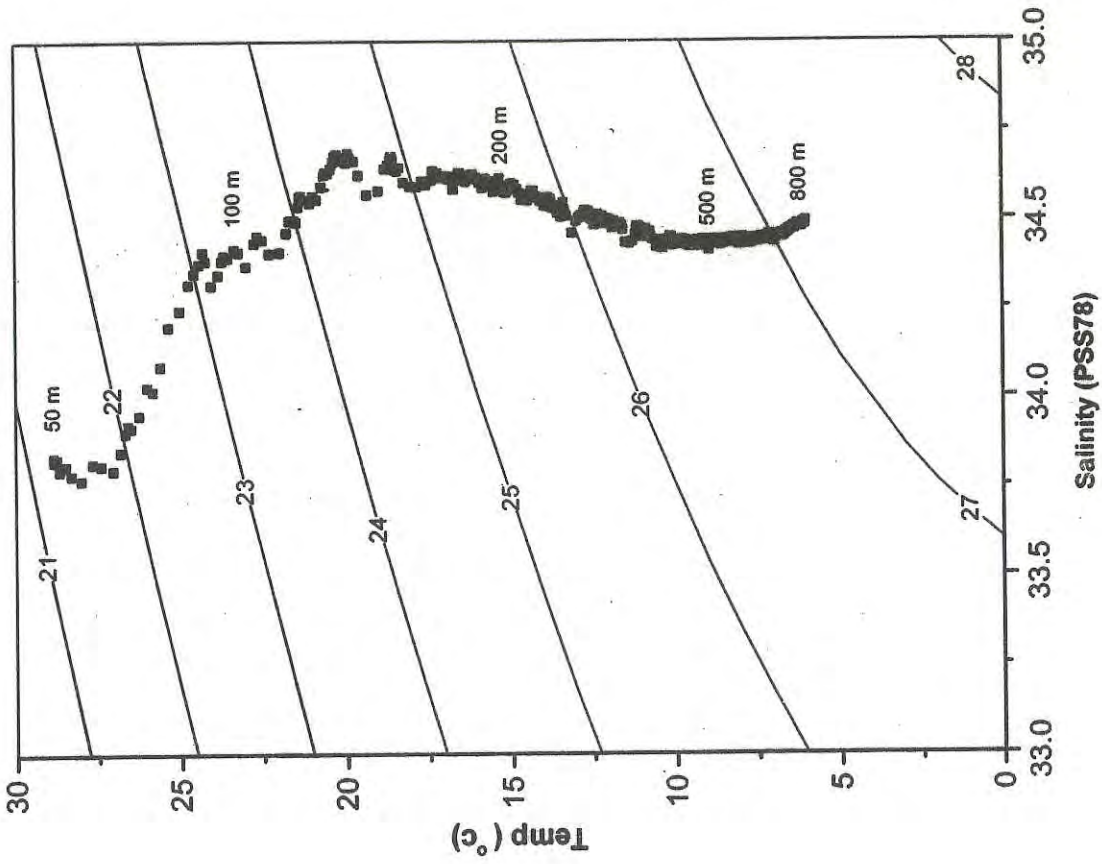
Station No.1



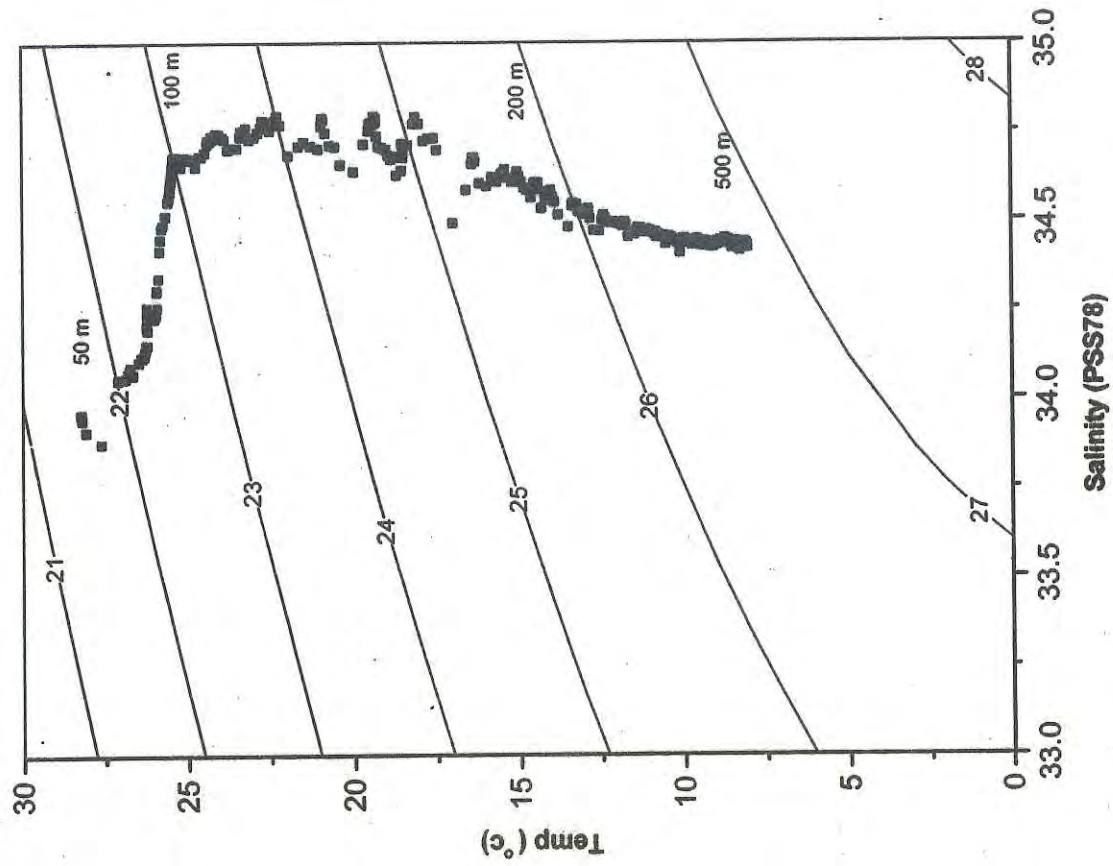
Station No.2



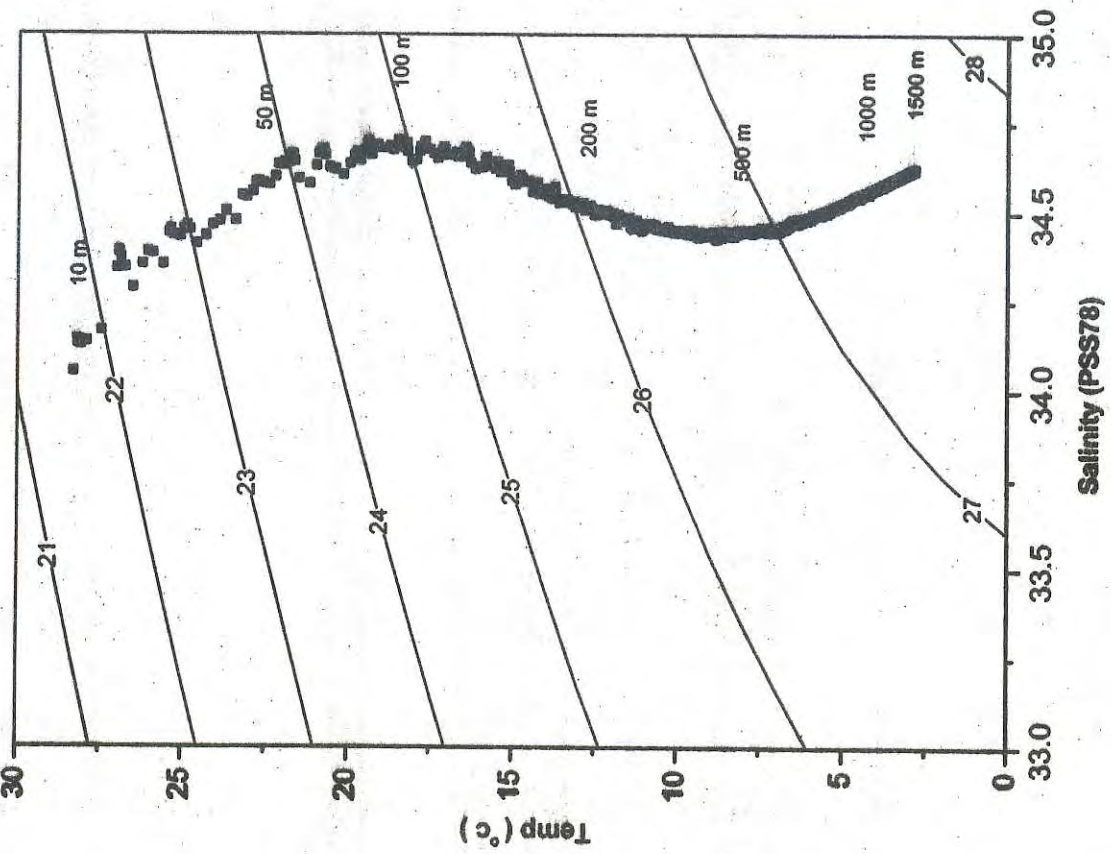
Station No. 4



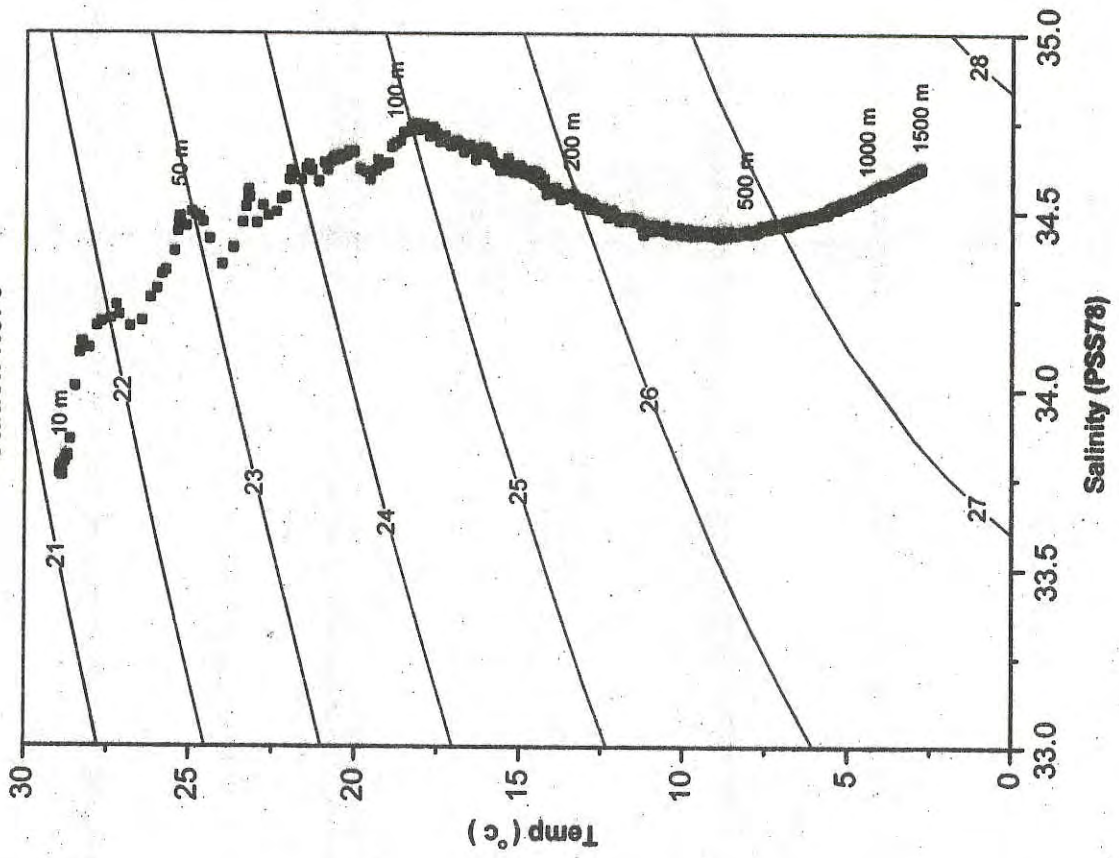
Station No. 3



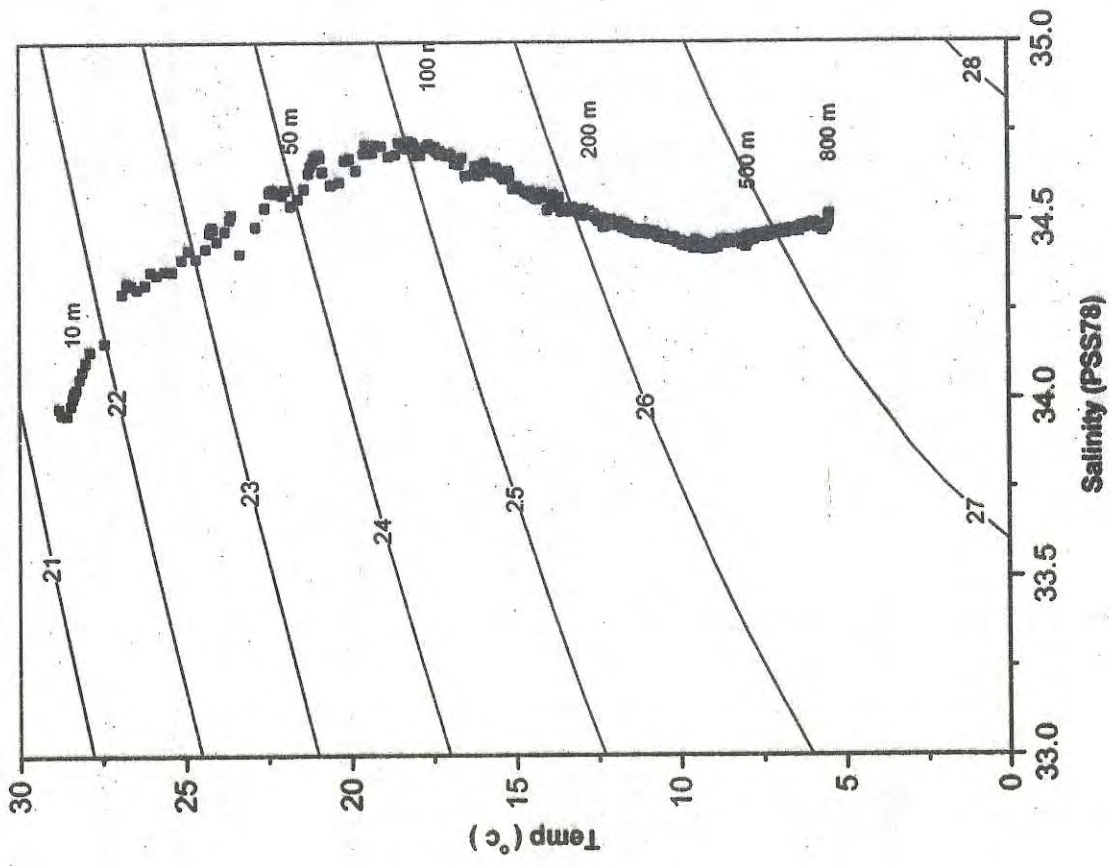
Station No.5



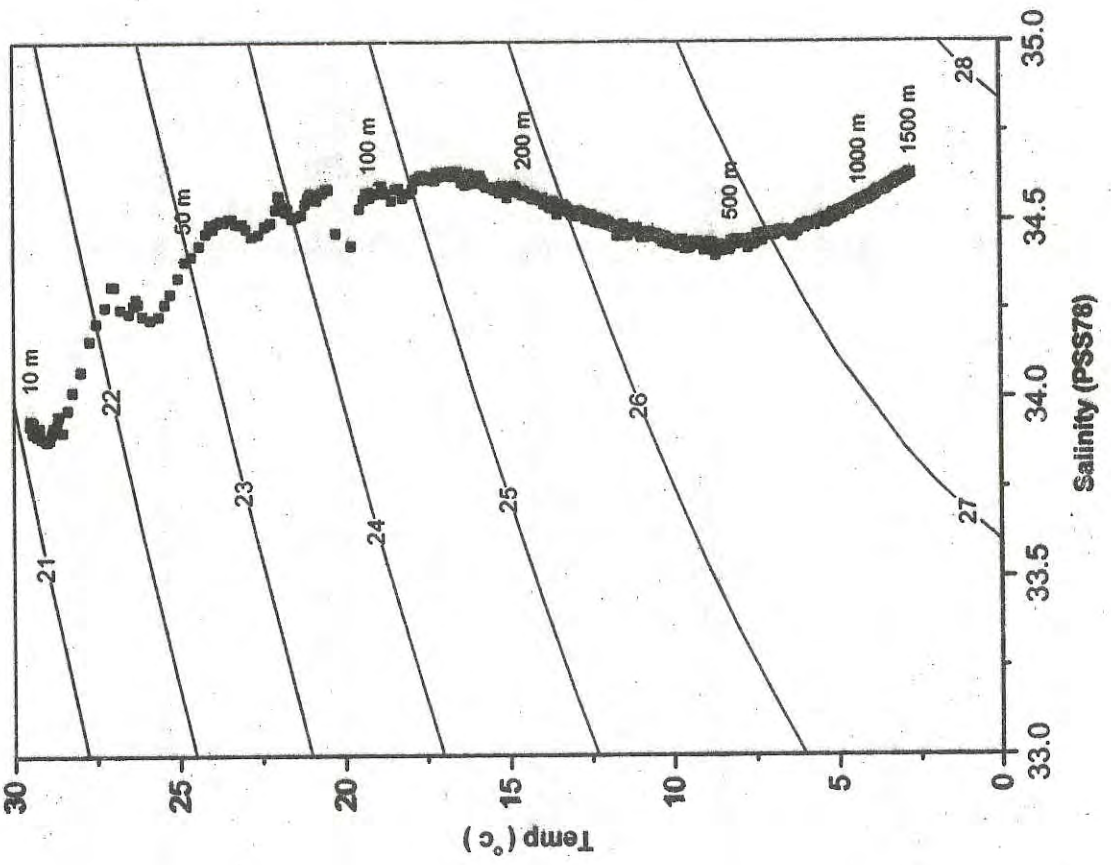
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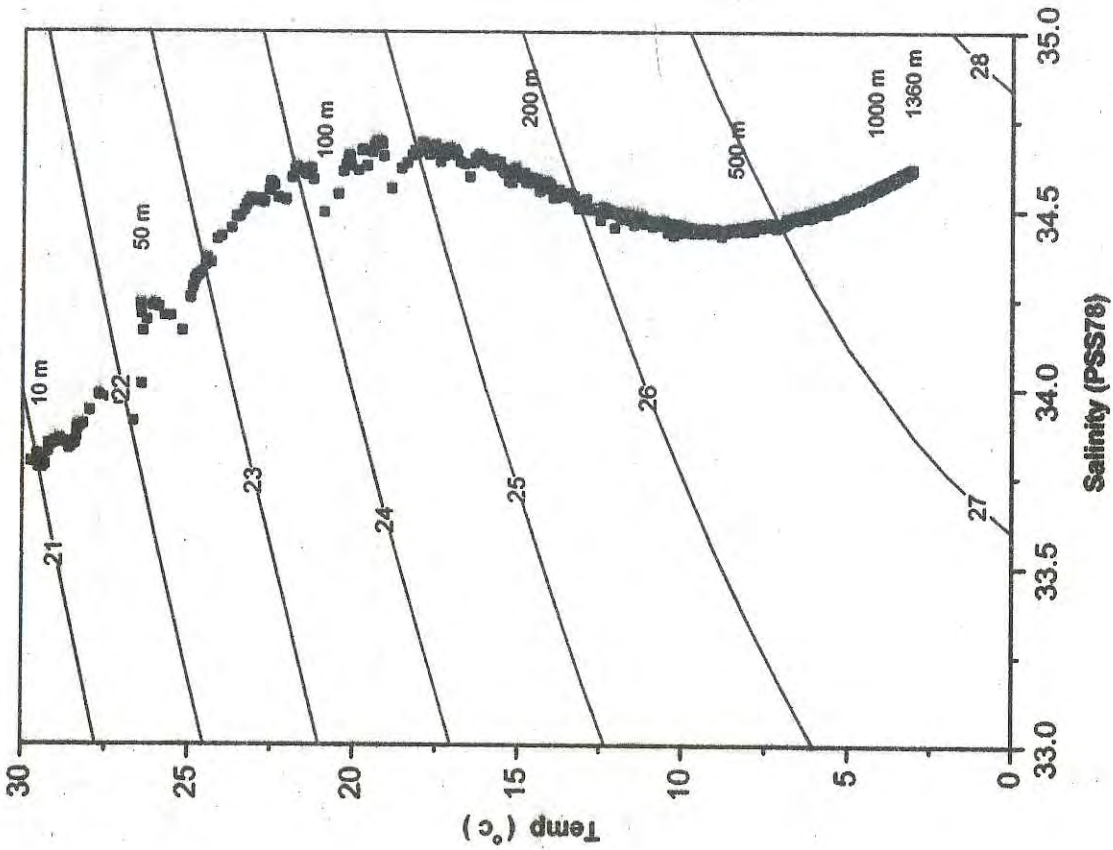
Station No.7



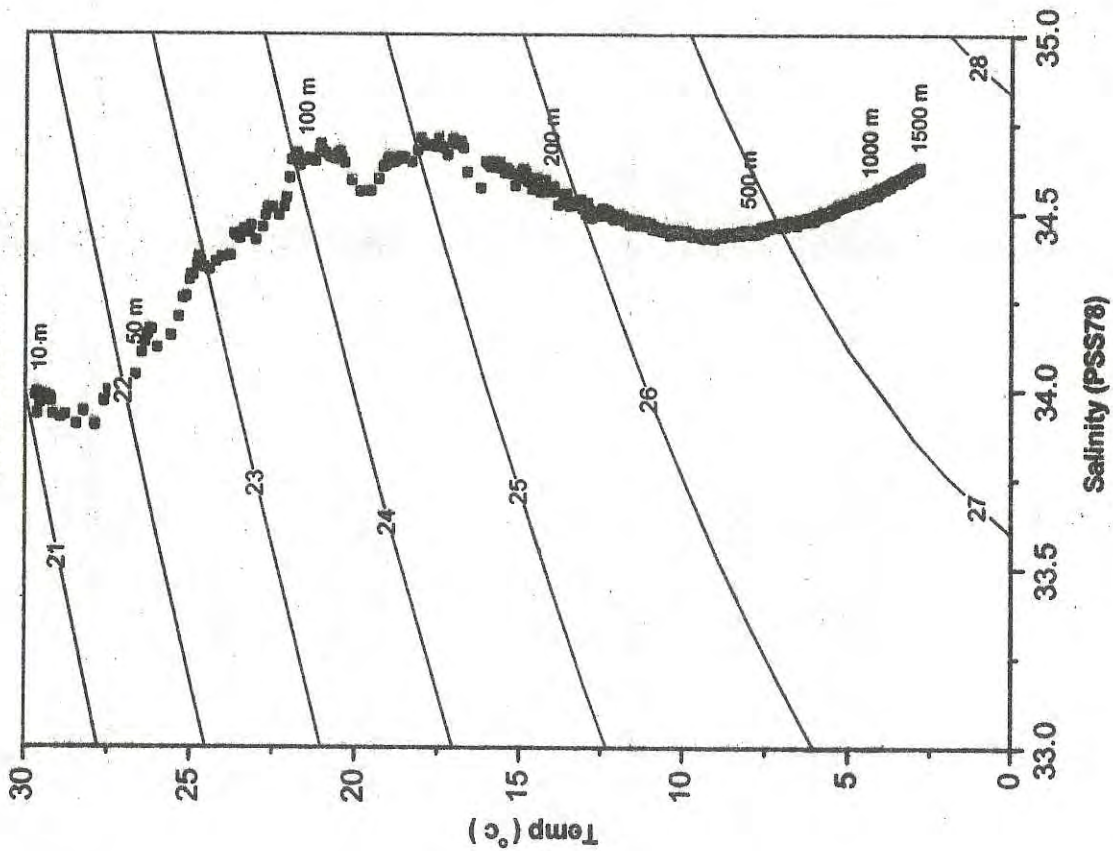
Station No. 8



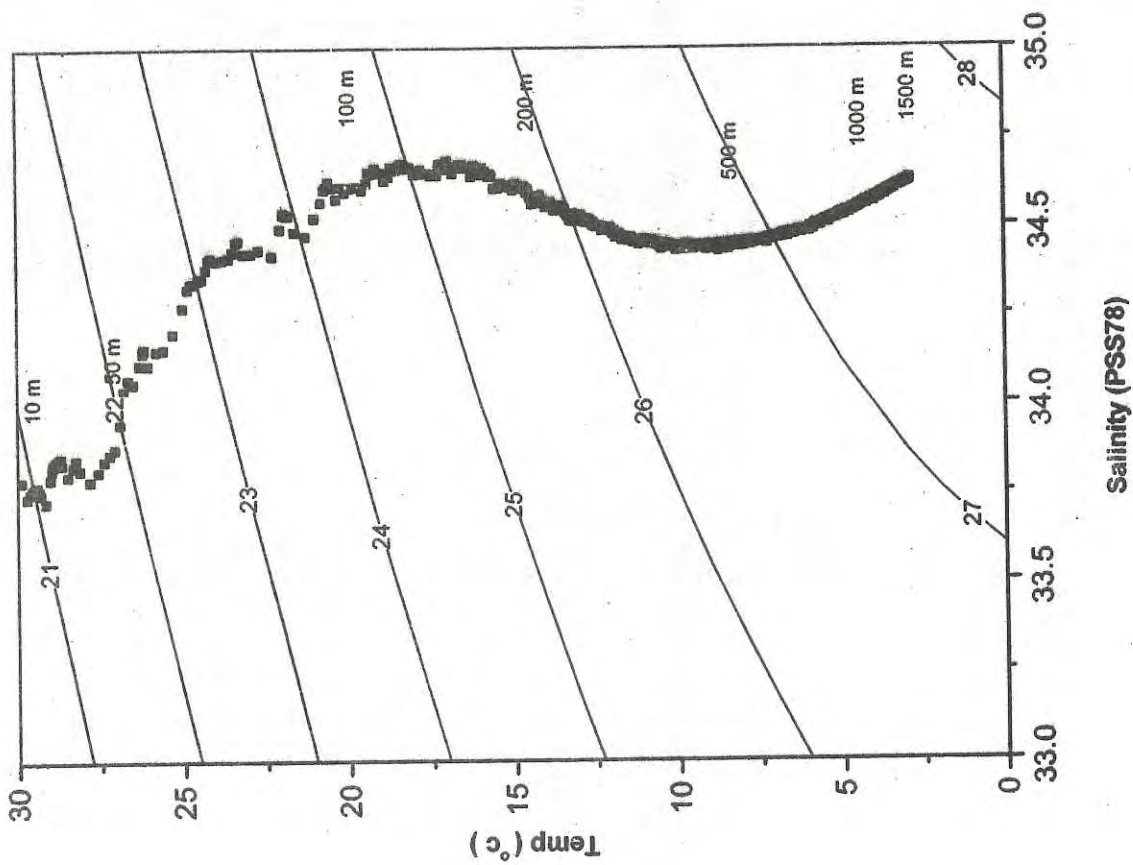
Station No.9



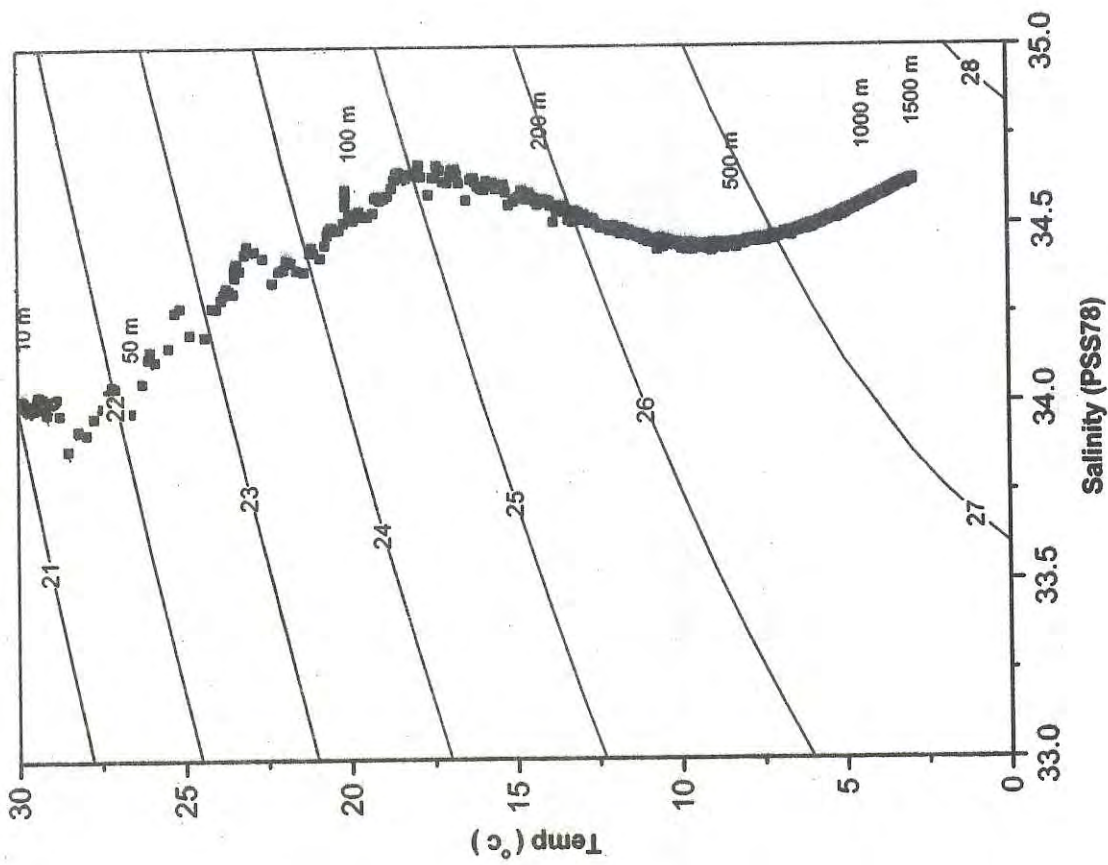
Station No. 10



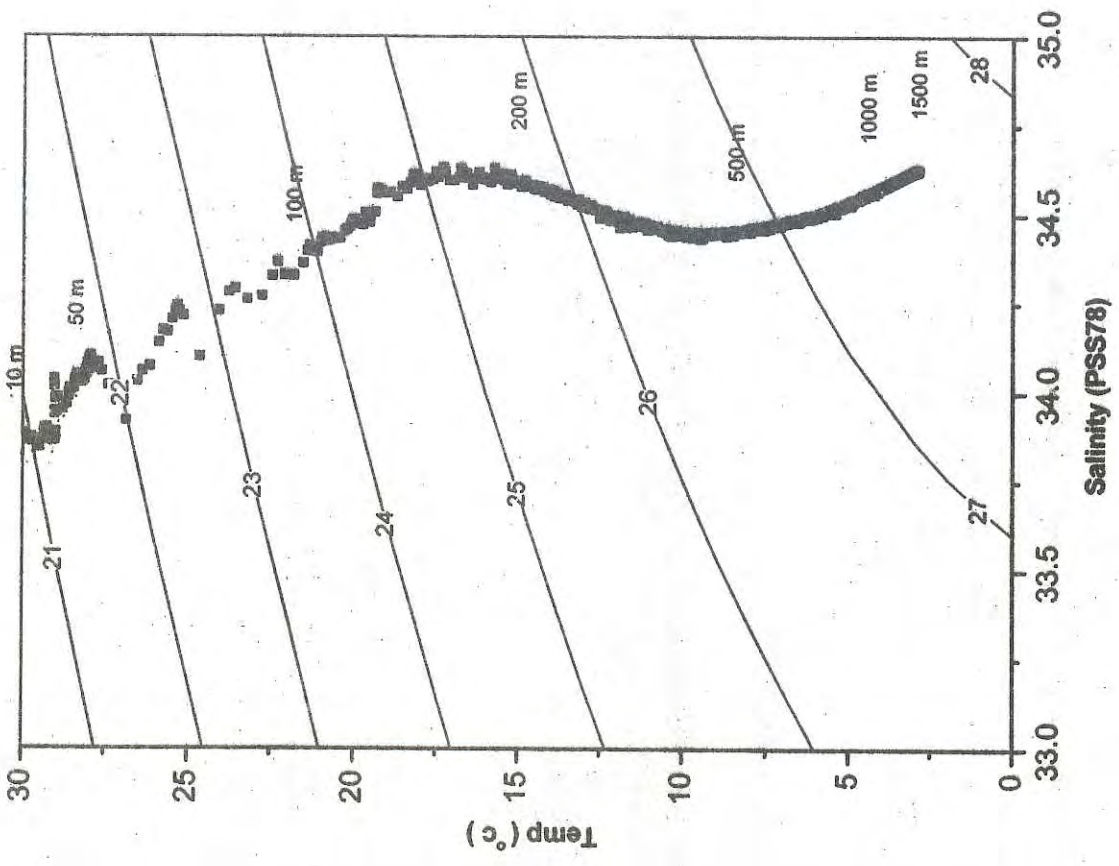
Station No. 12



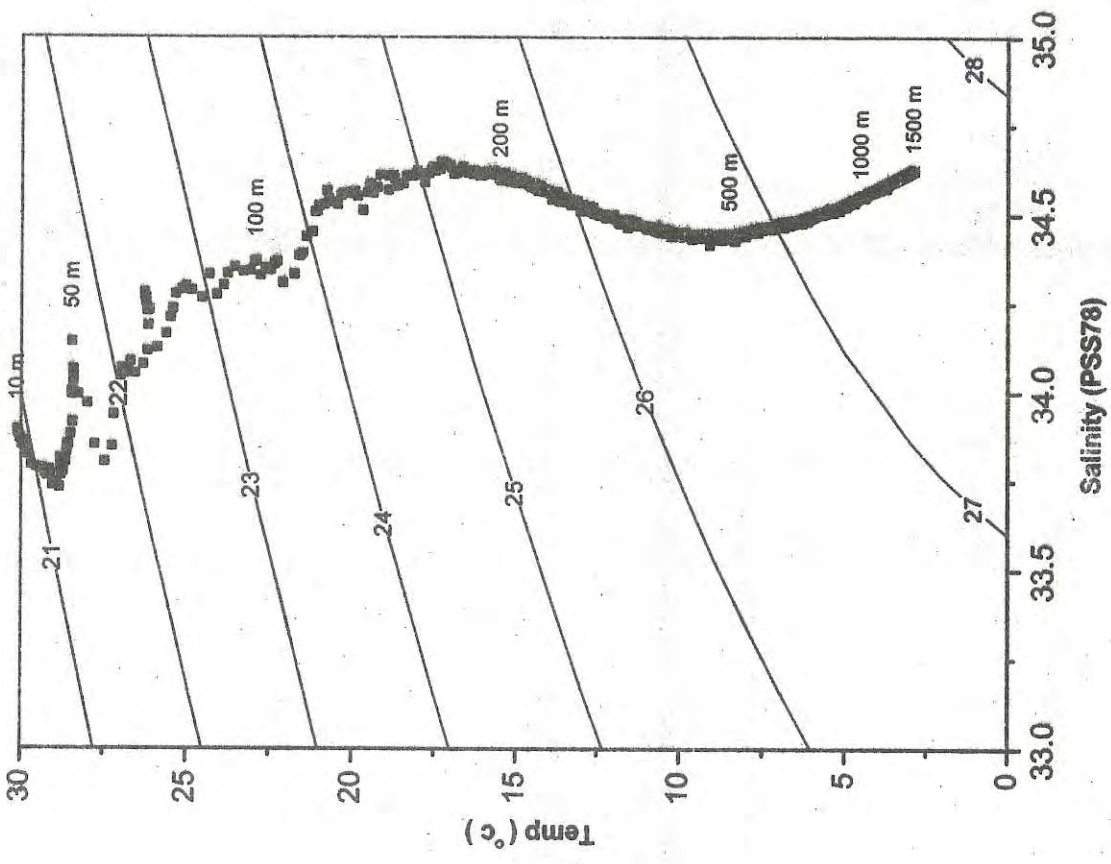
Station No. 11



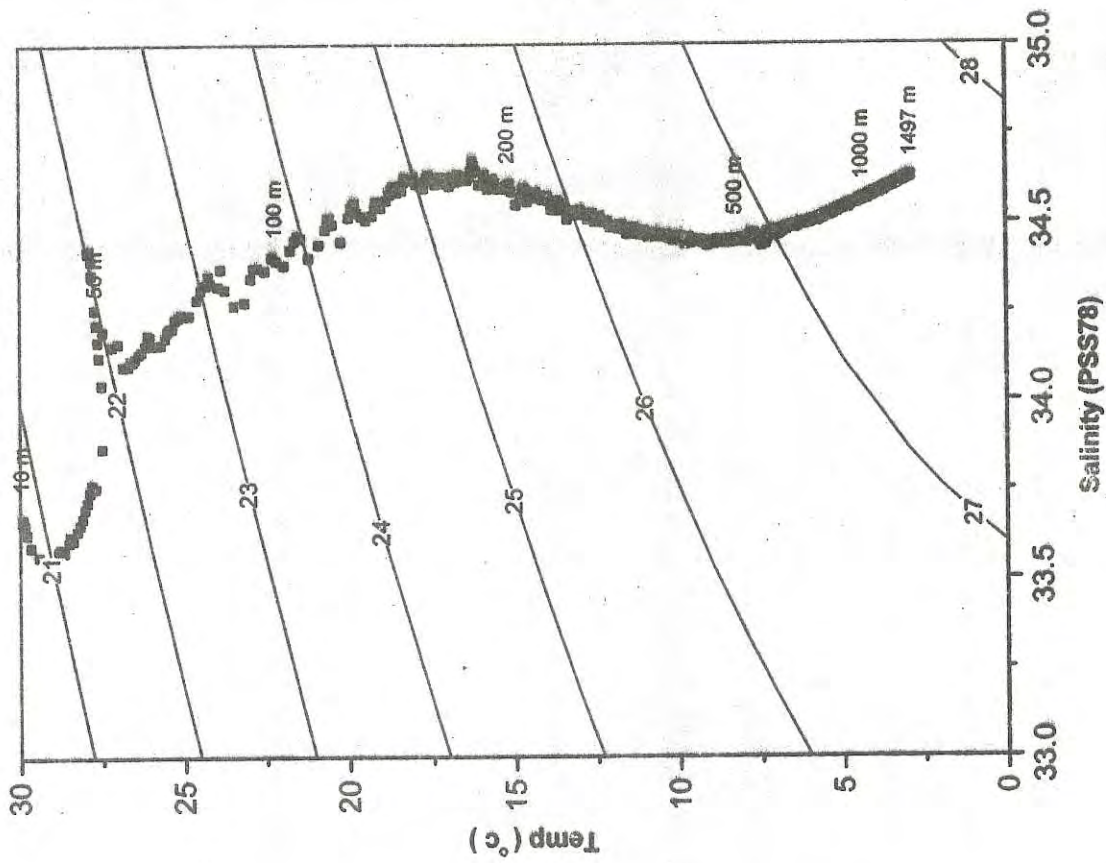
Station No.13



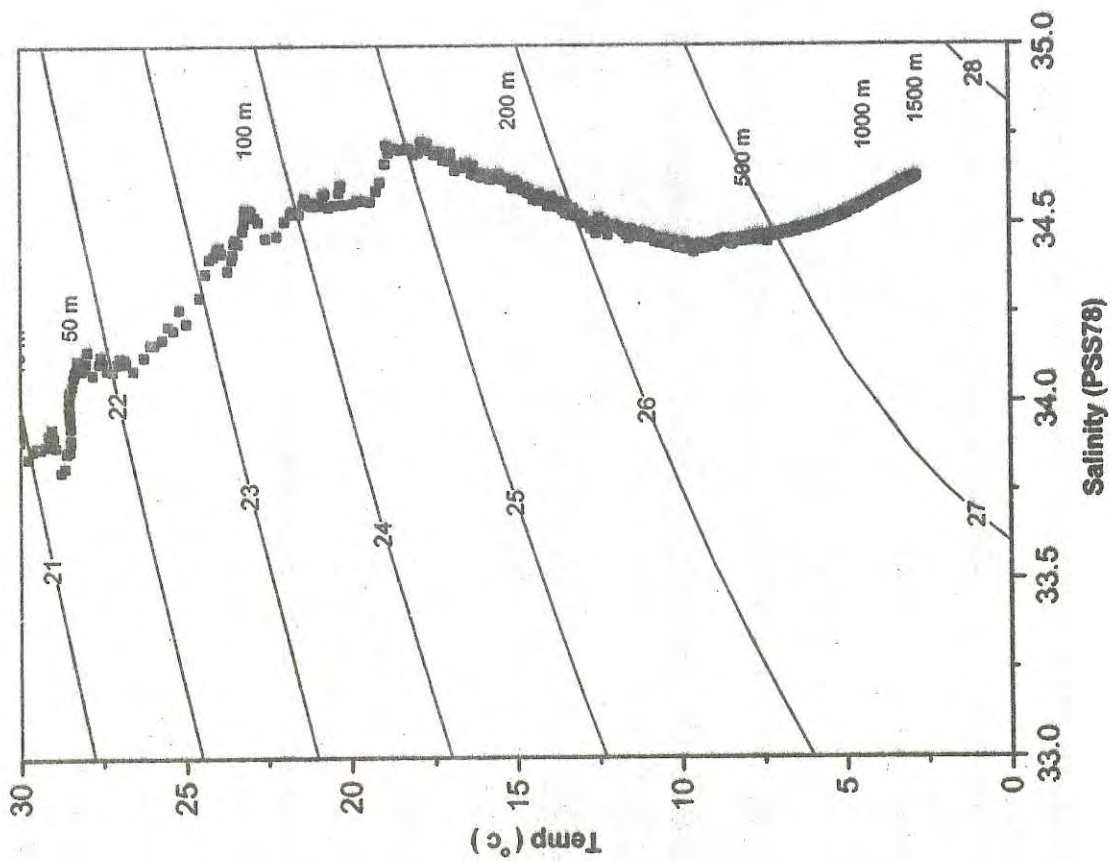
Station No. 14



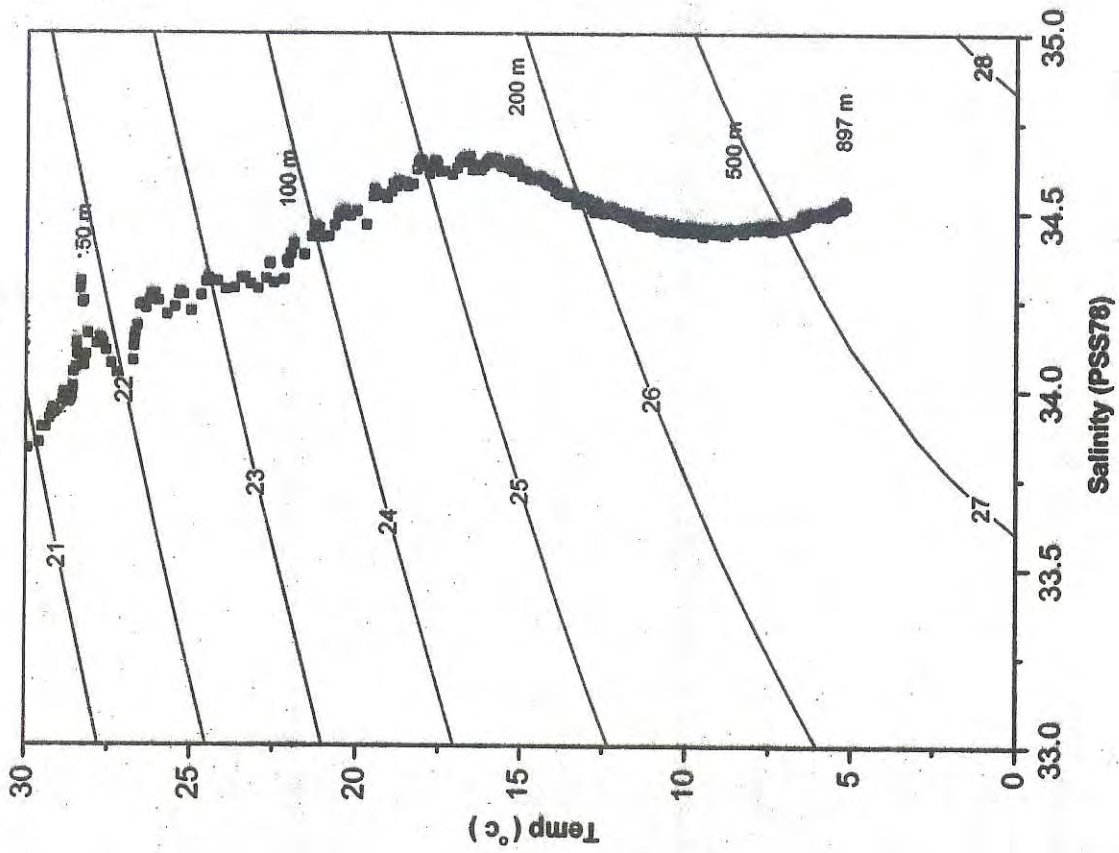
Station No. 17



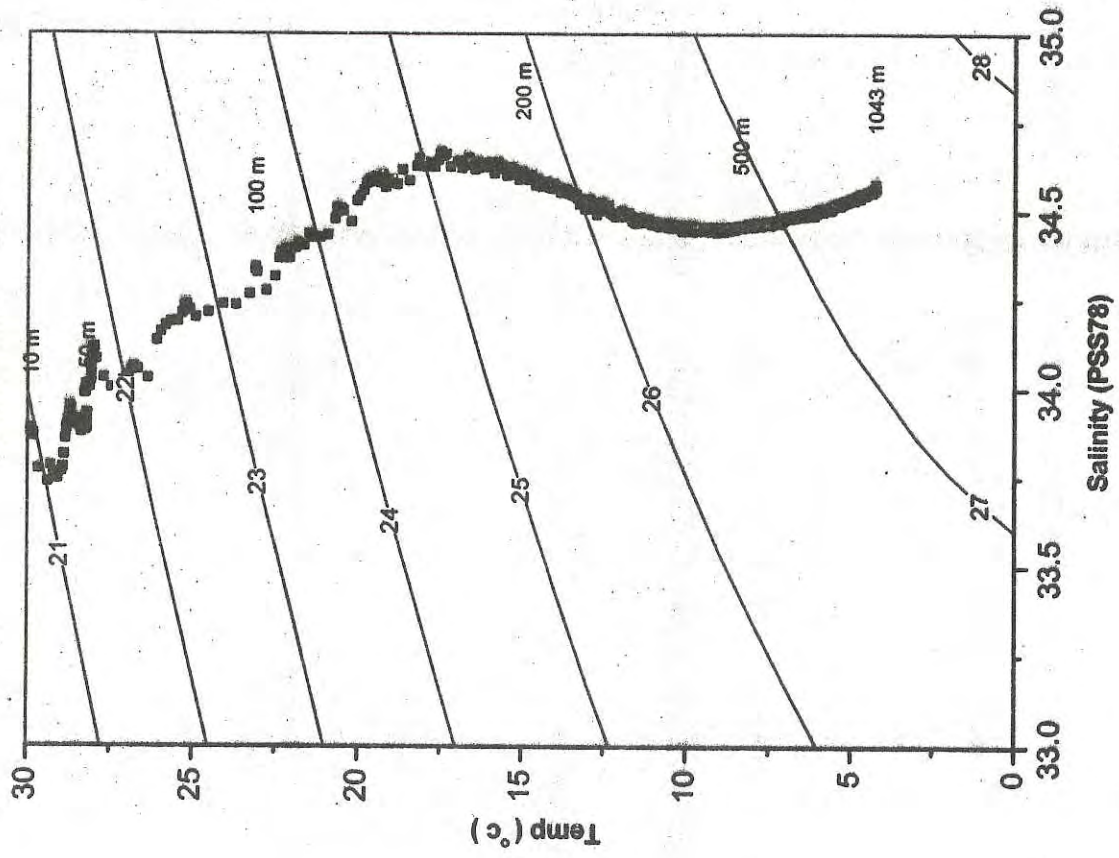
Station No. 15



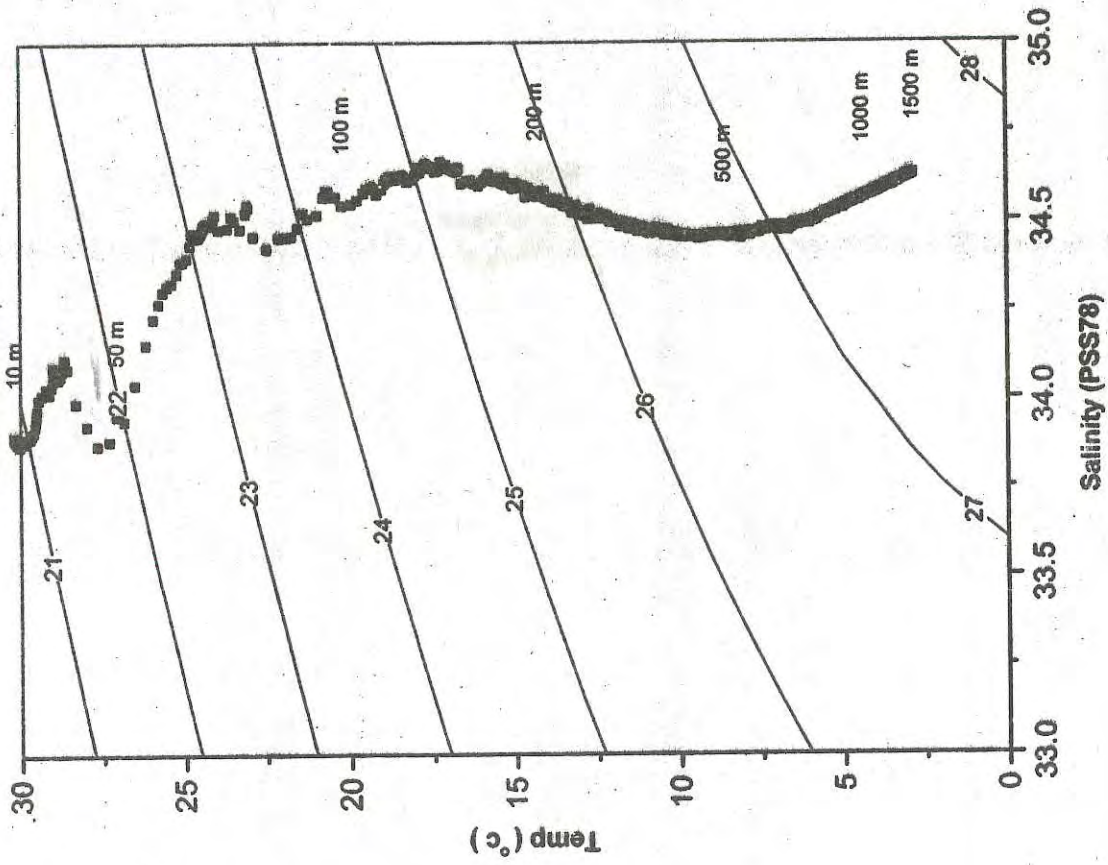
Station No.18



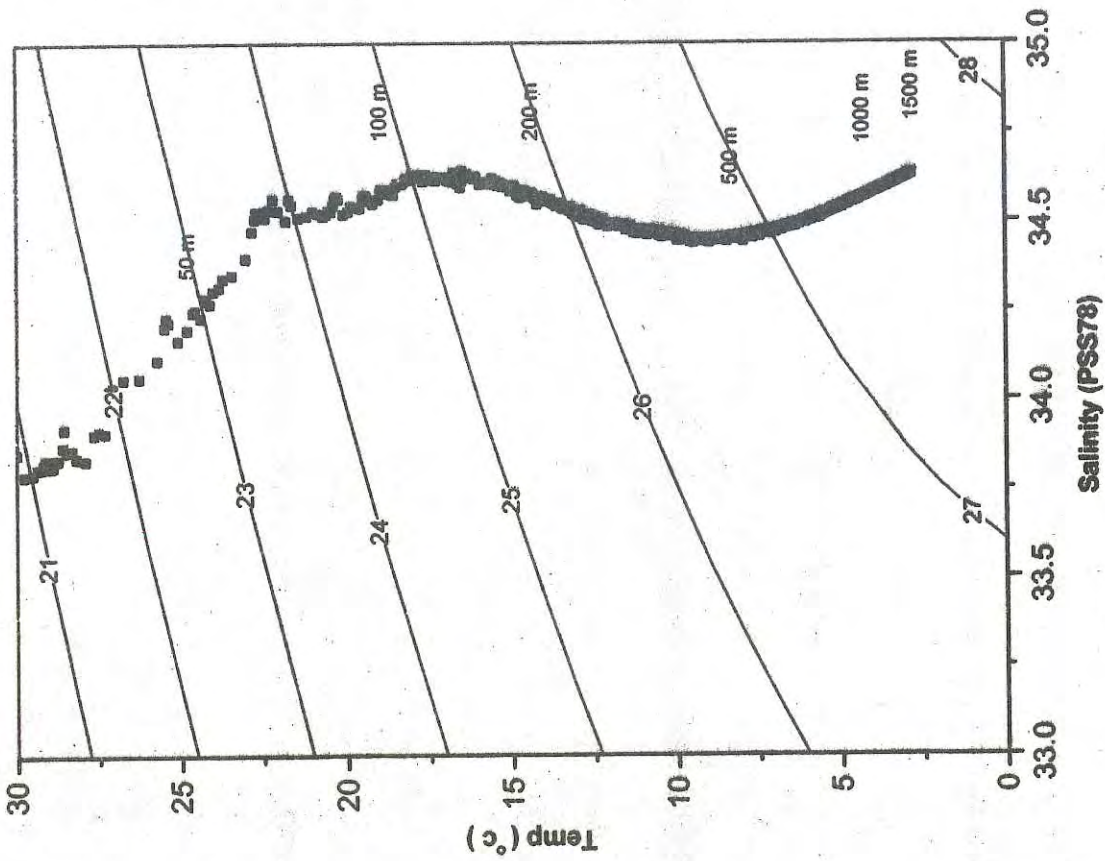
Station No. 19



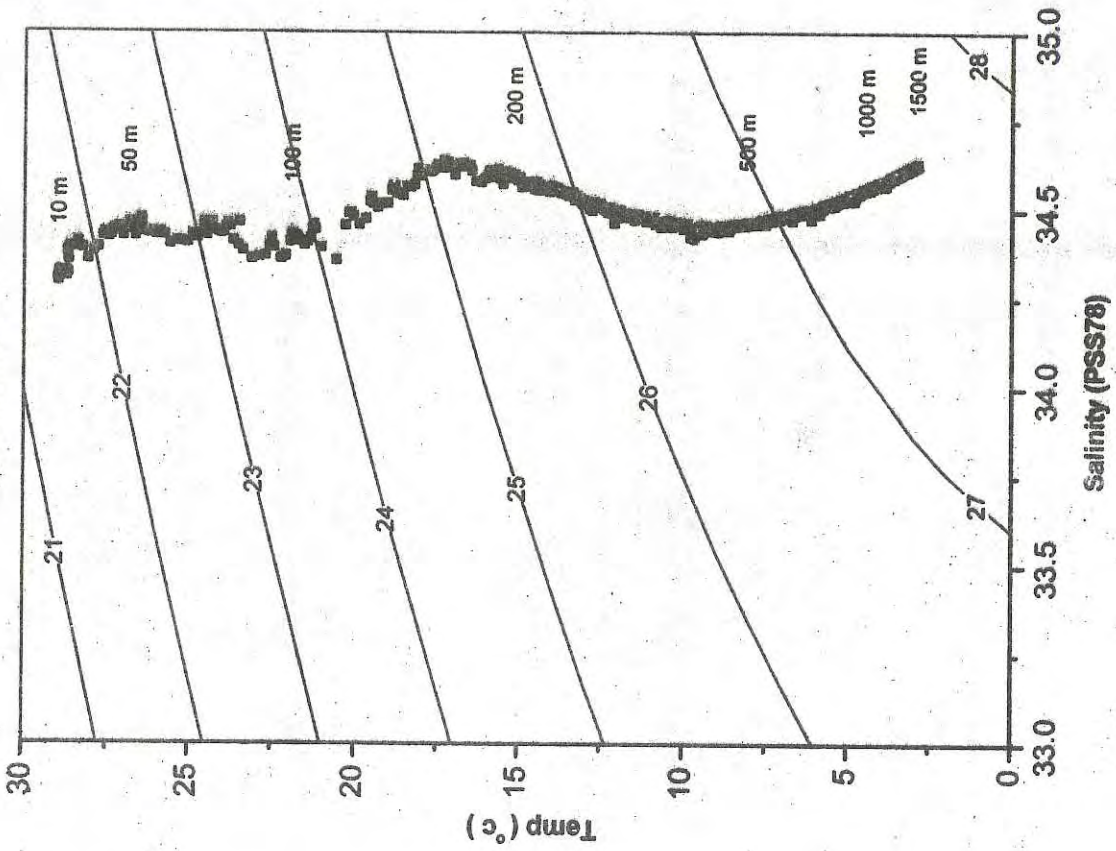
Station No. 21



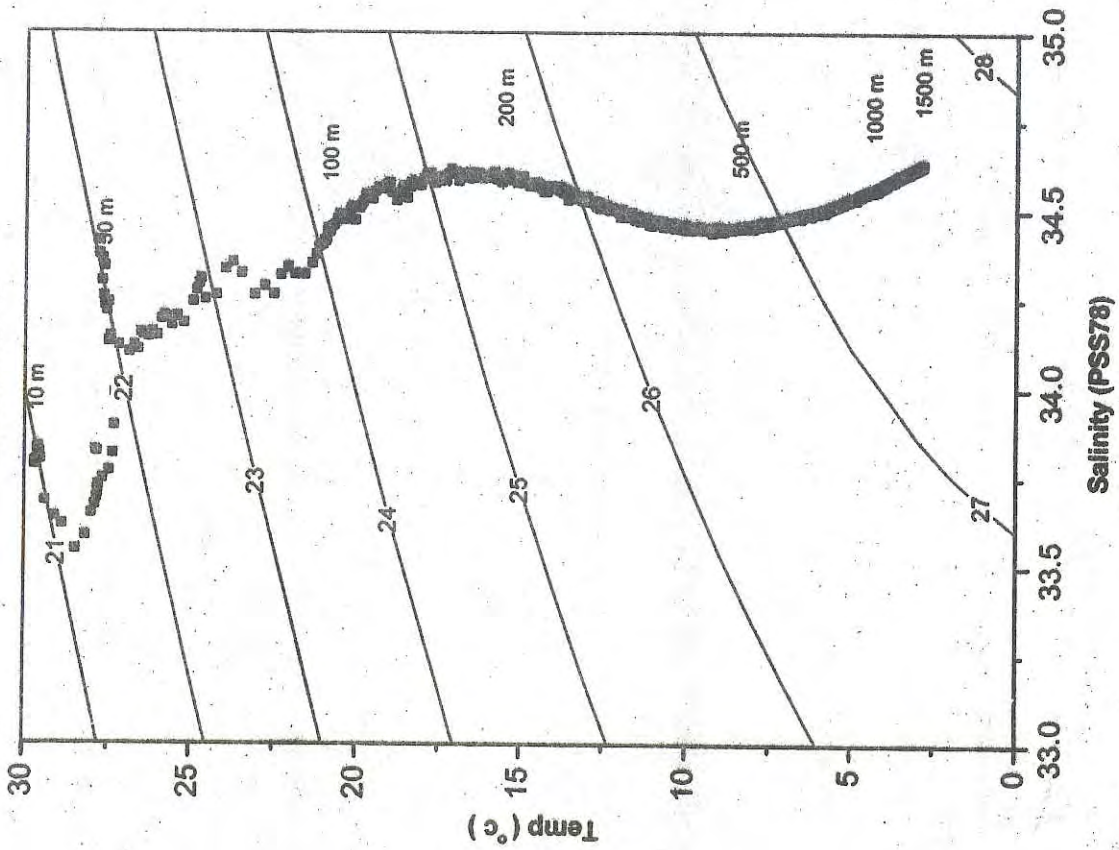
Station No. 20



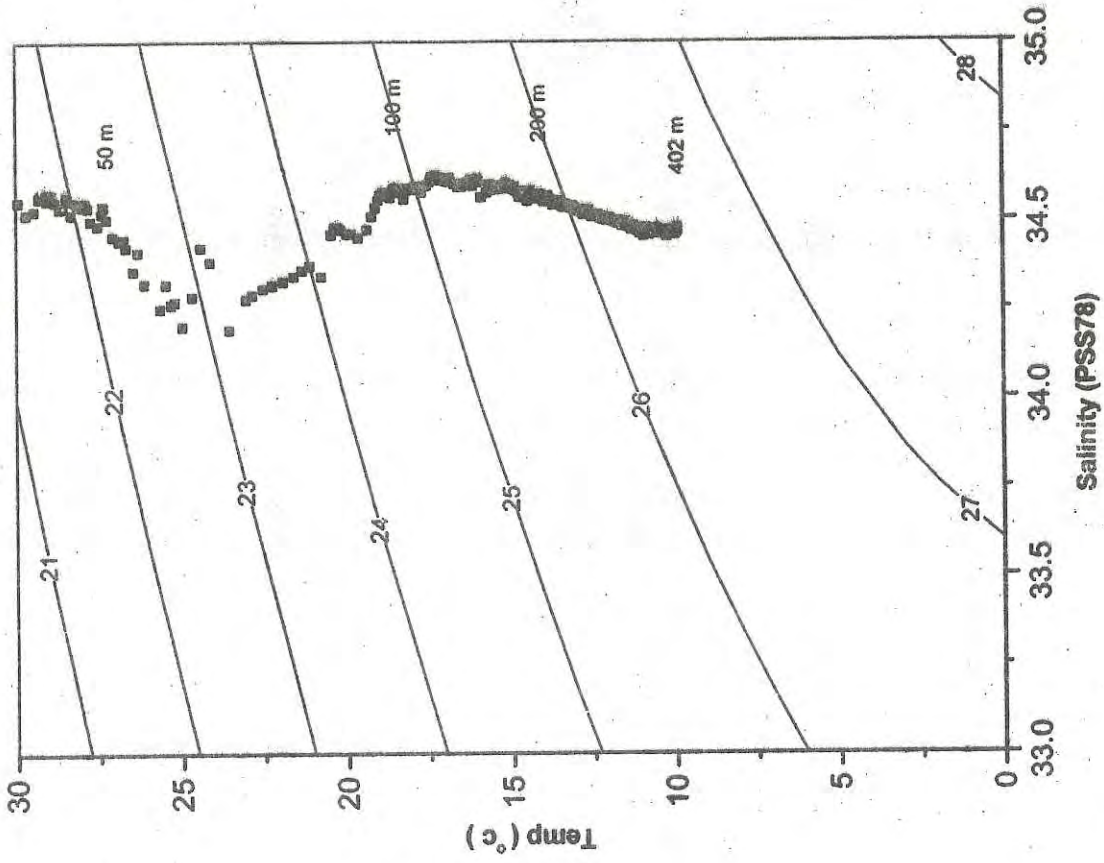
Station No. 23



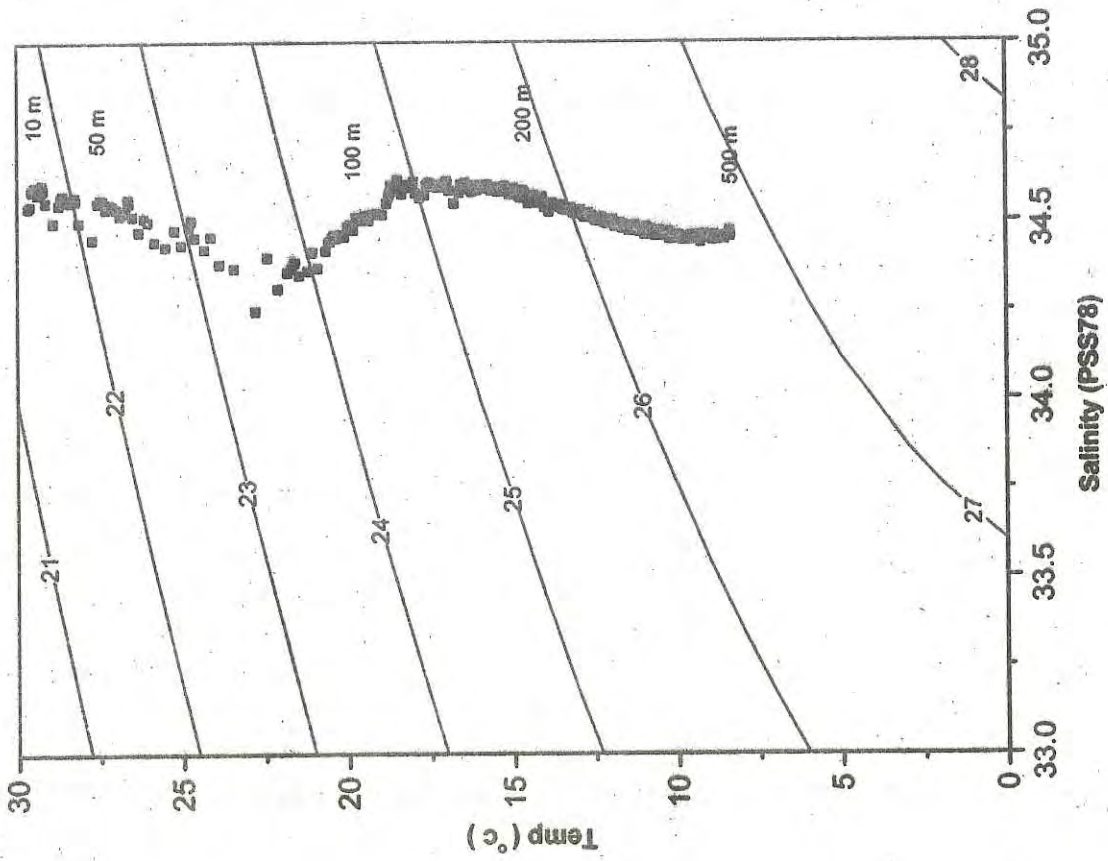
Station No. 22



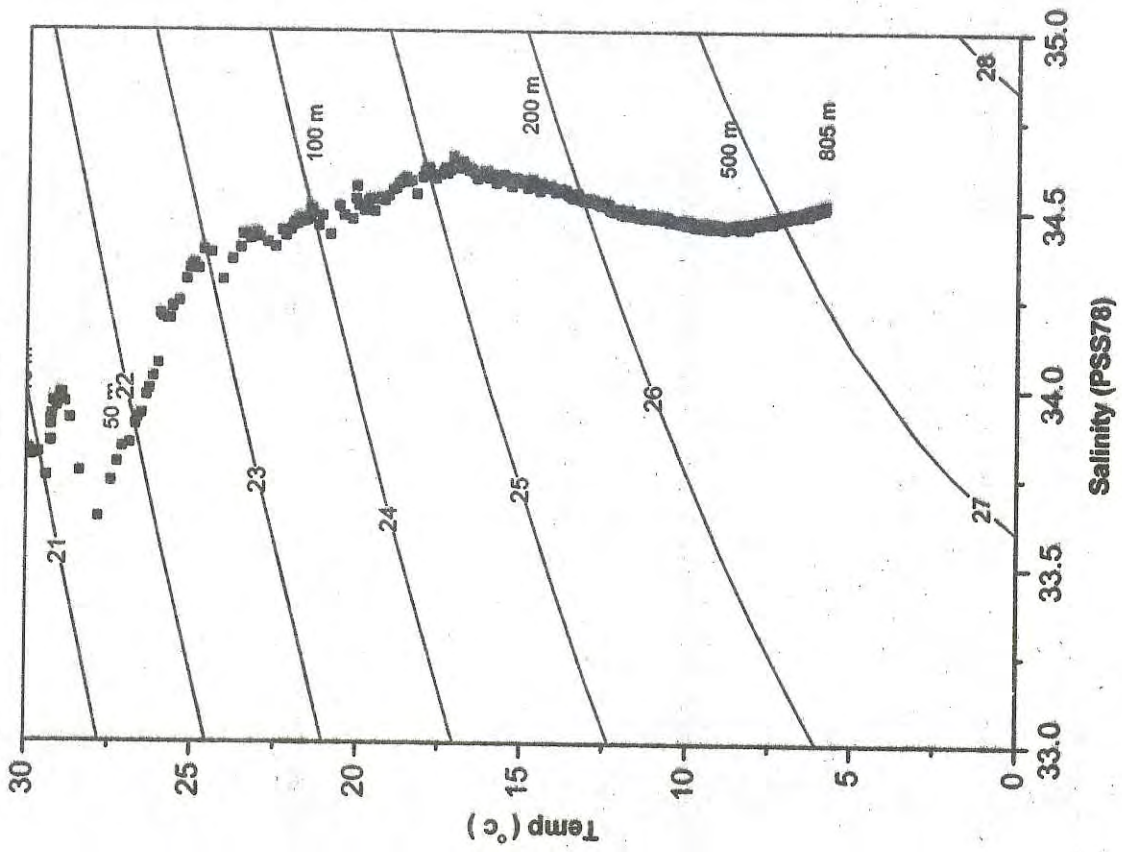
Station No. 25



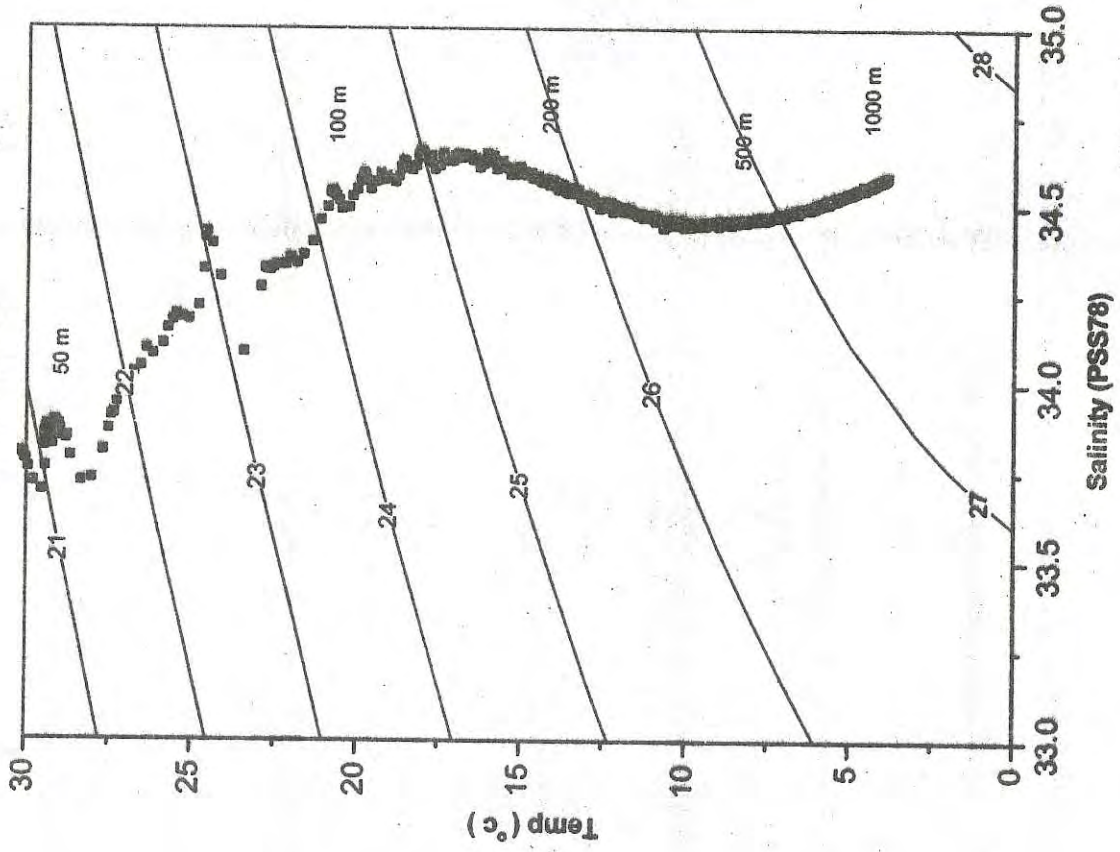
Station No. 24



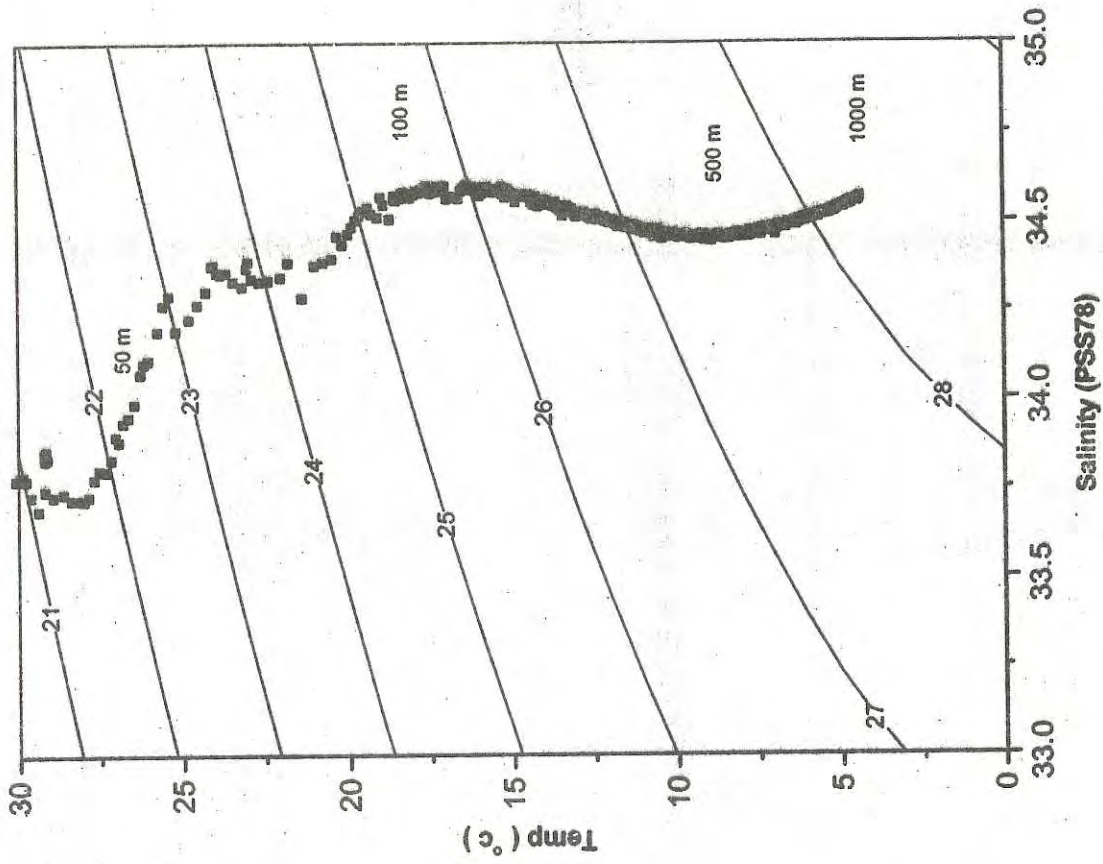
Station No. 26



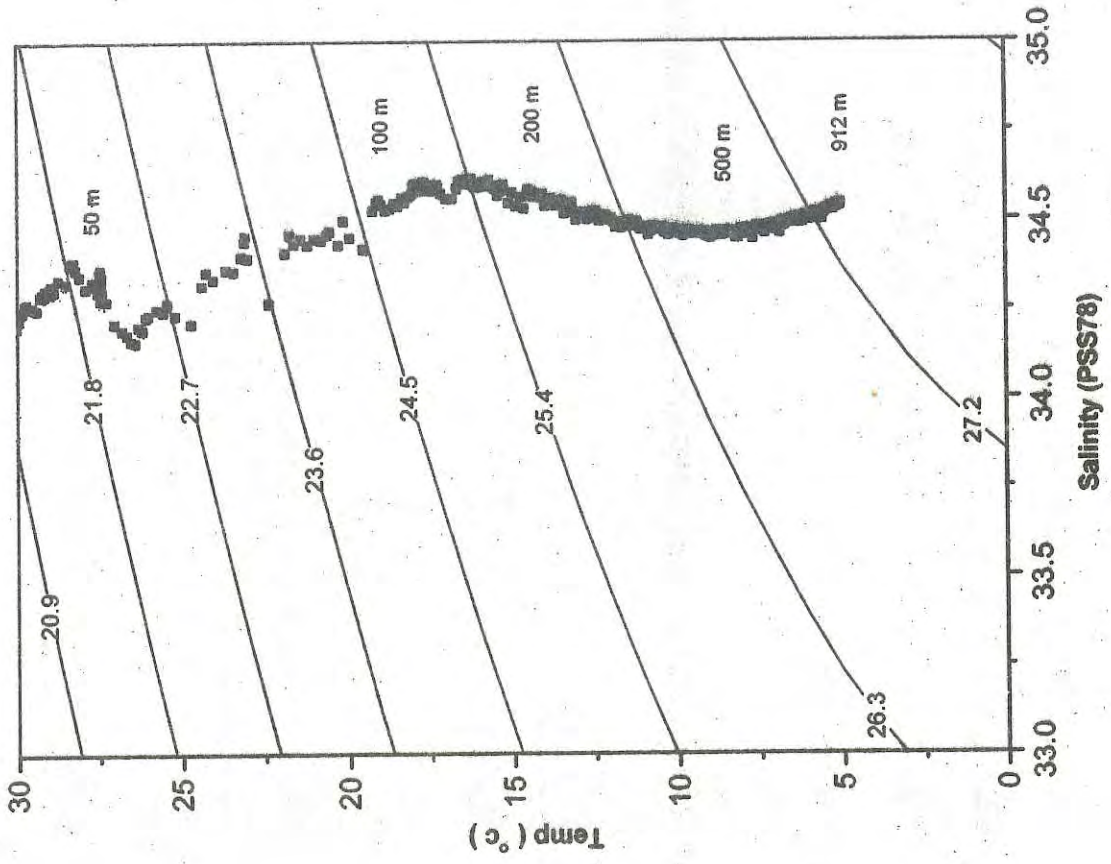
Station No. 27



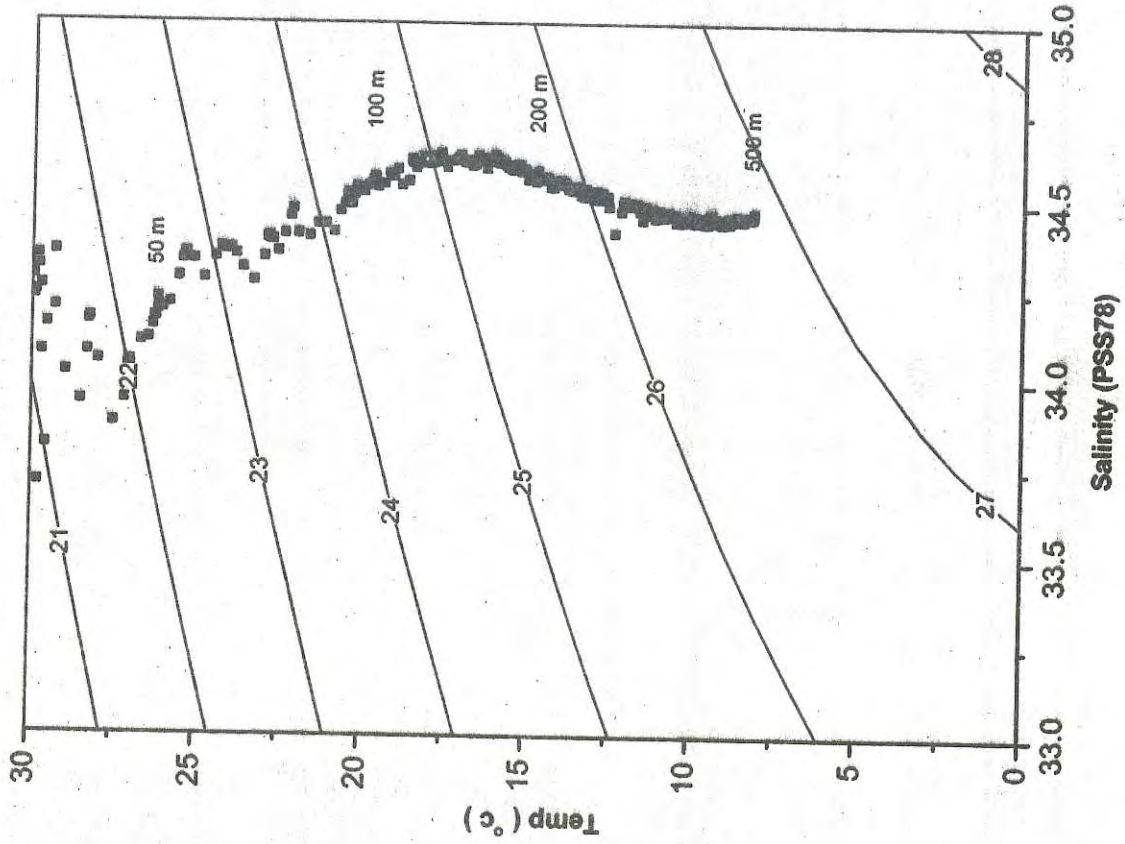
Station No. 29



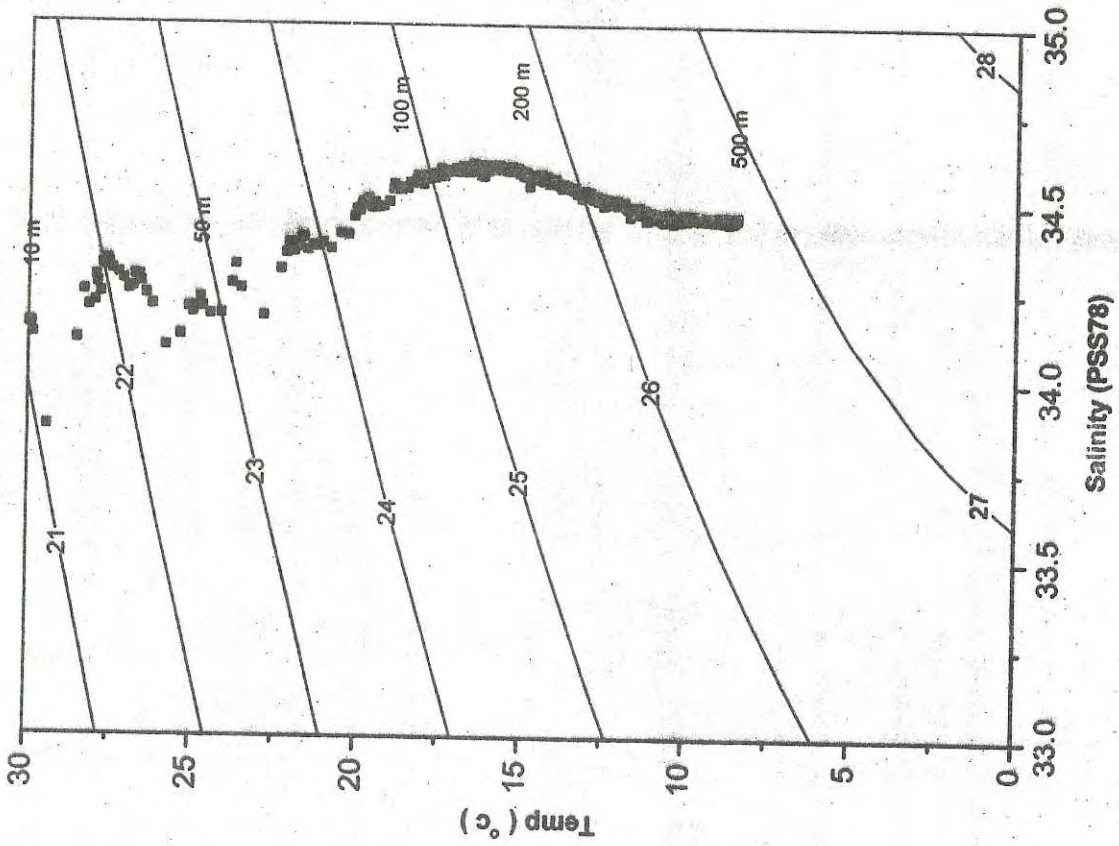
Station No. 28



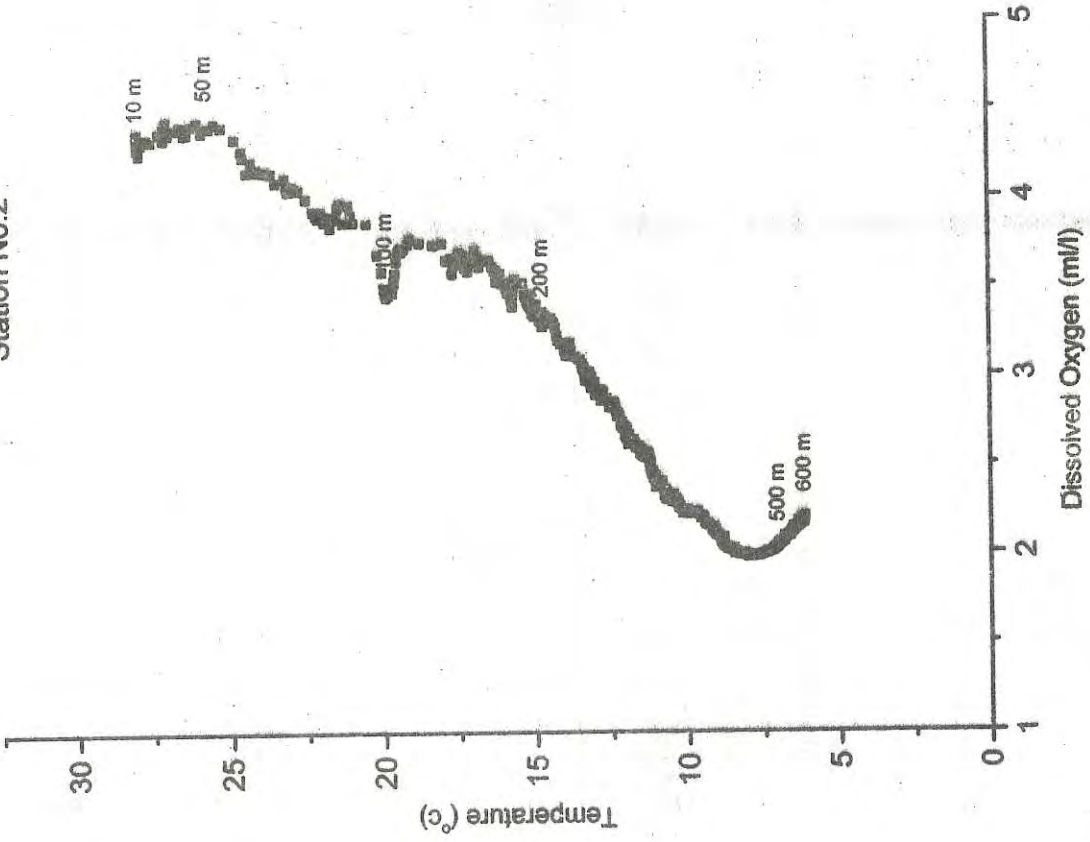
Station No. 30



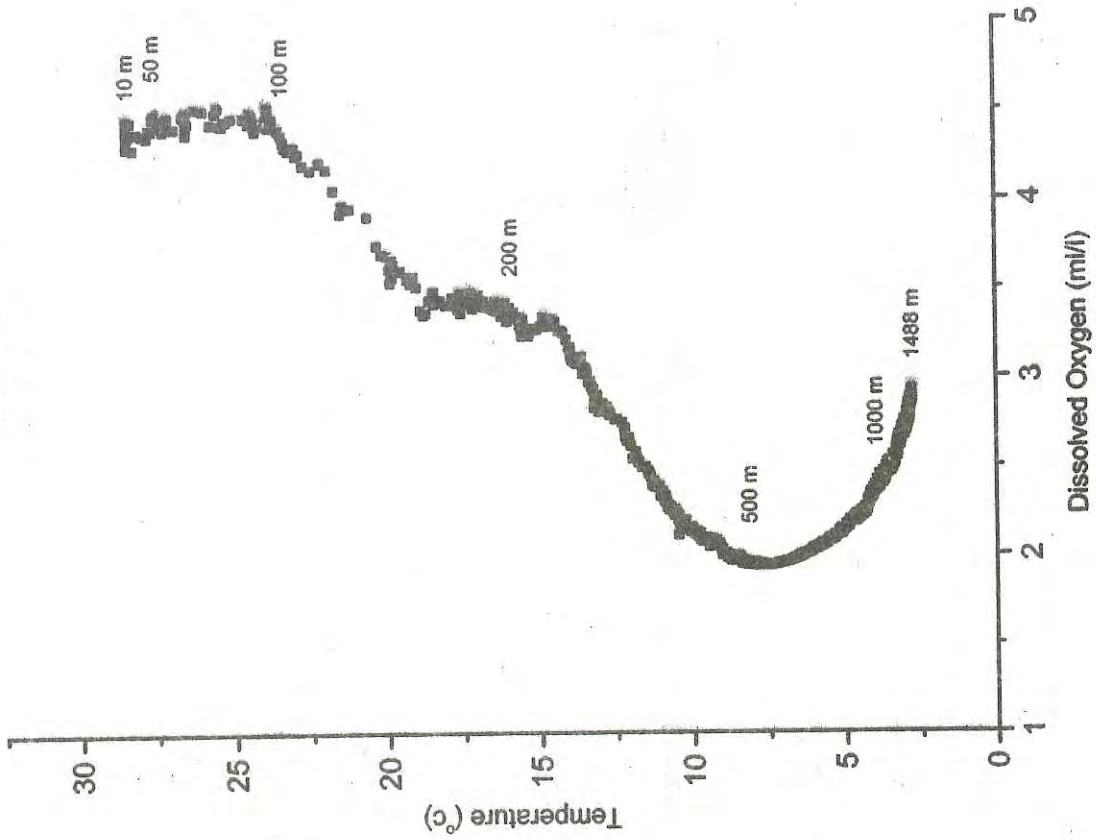
Station No. 31



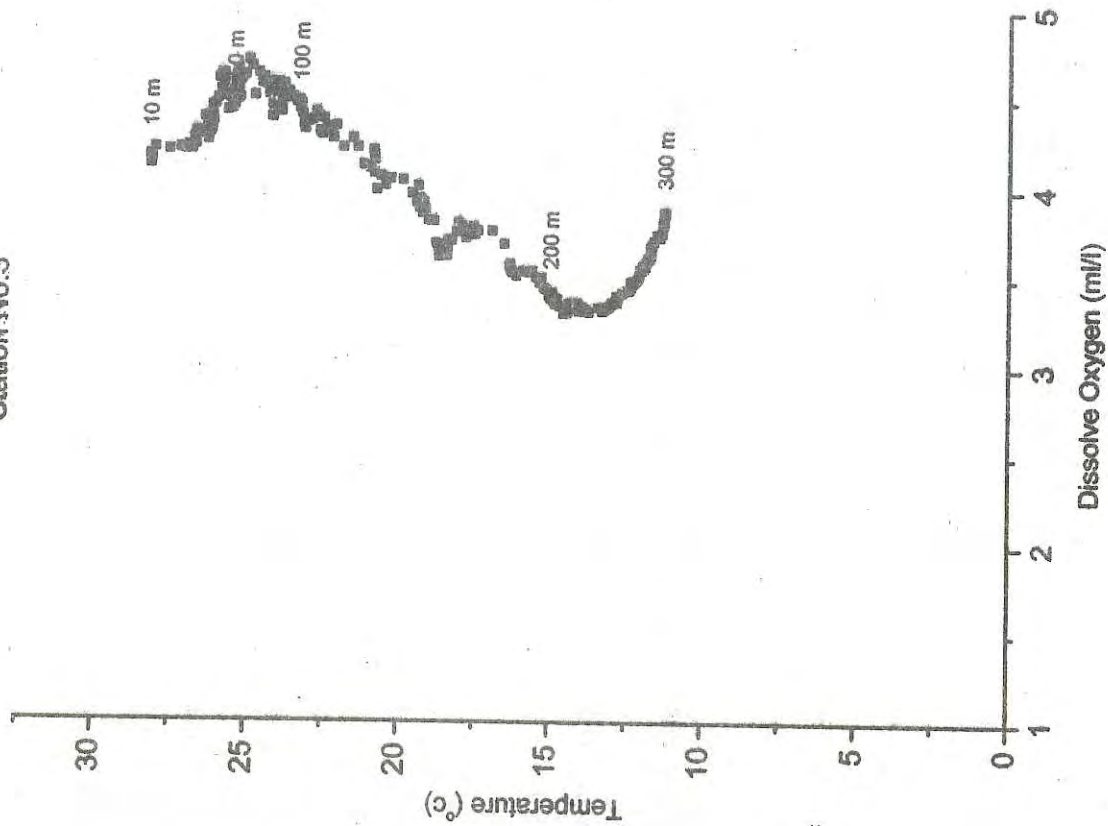
Station No.2



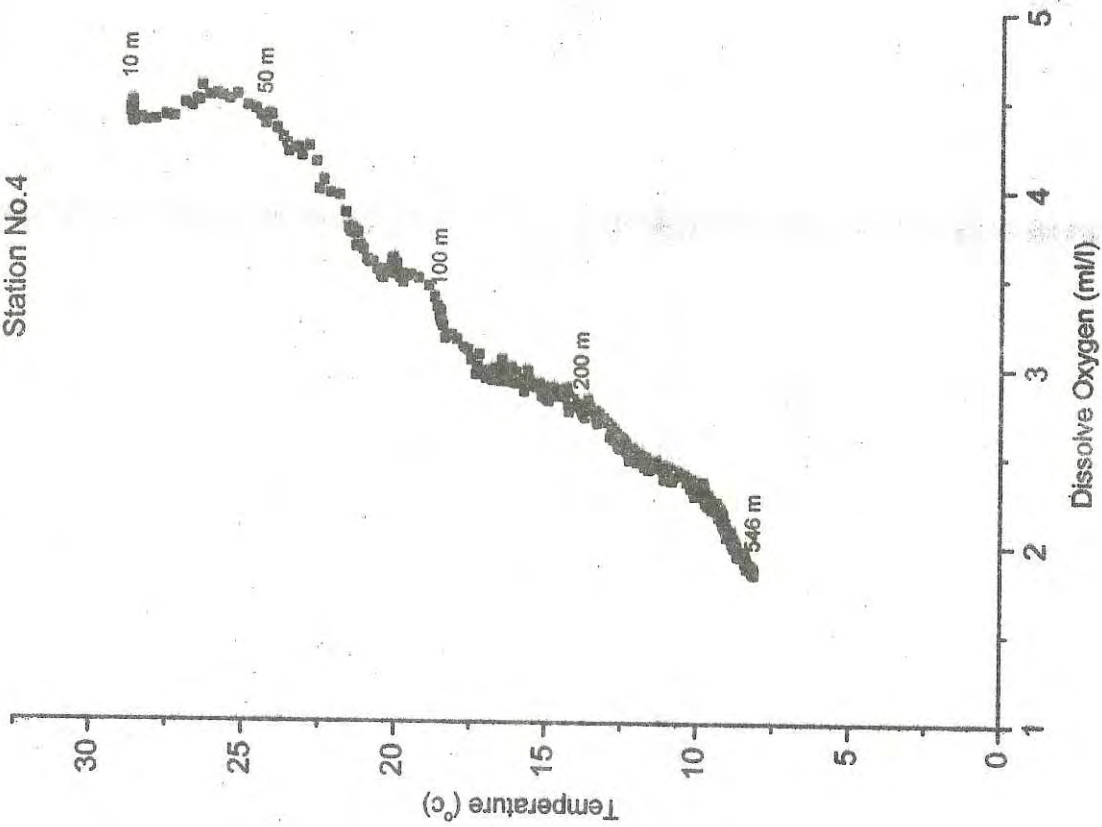
Station No.1



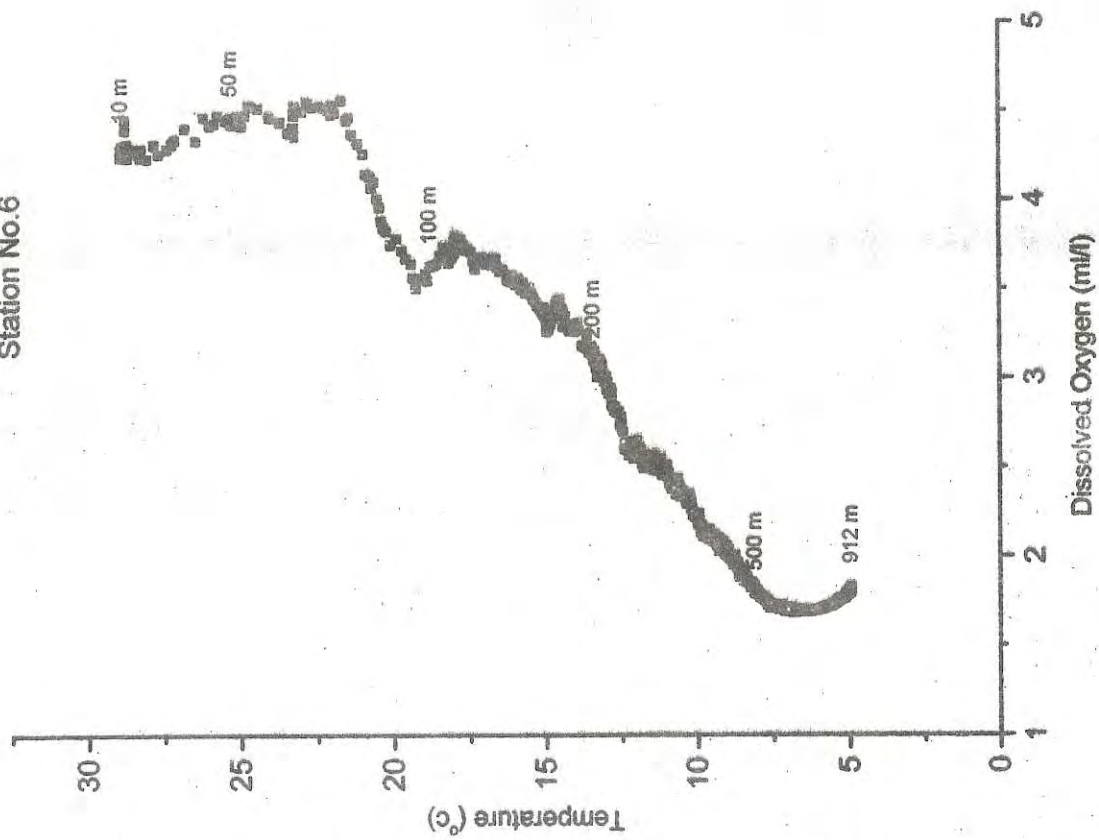
Station No.3



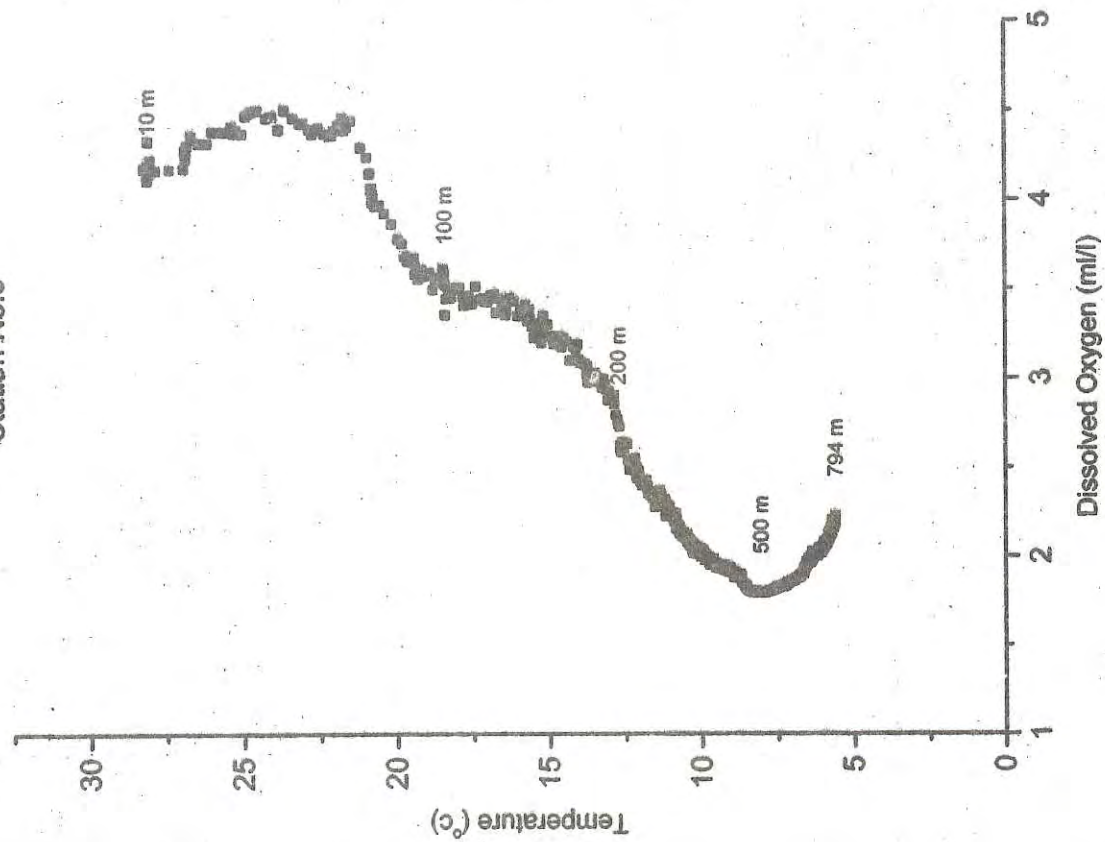
Station No.4

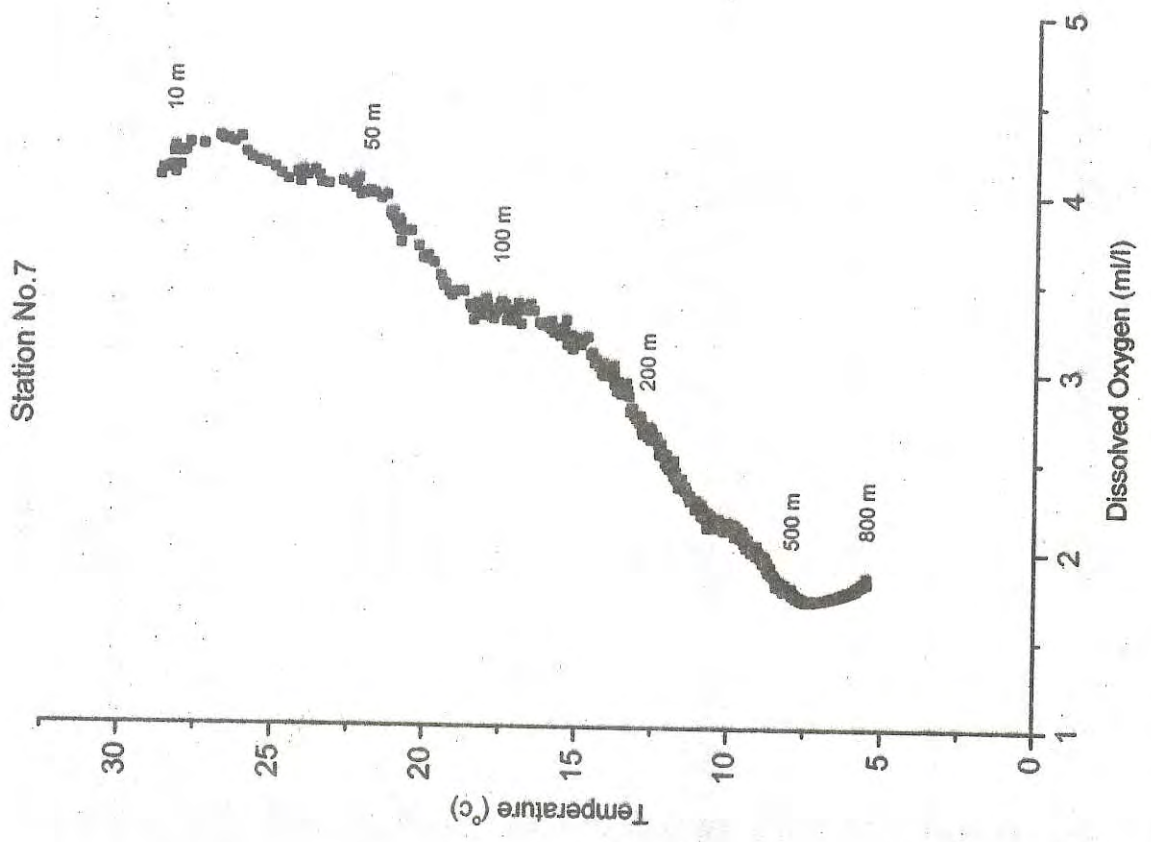
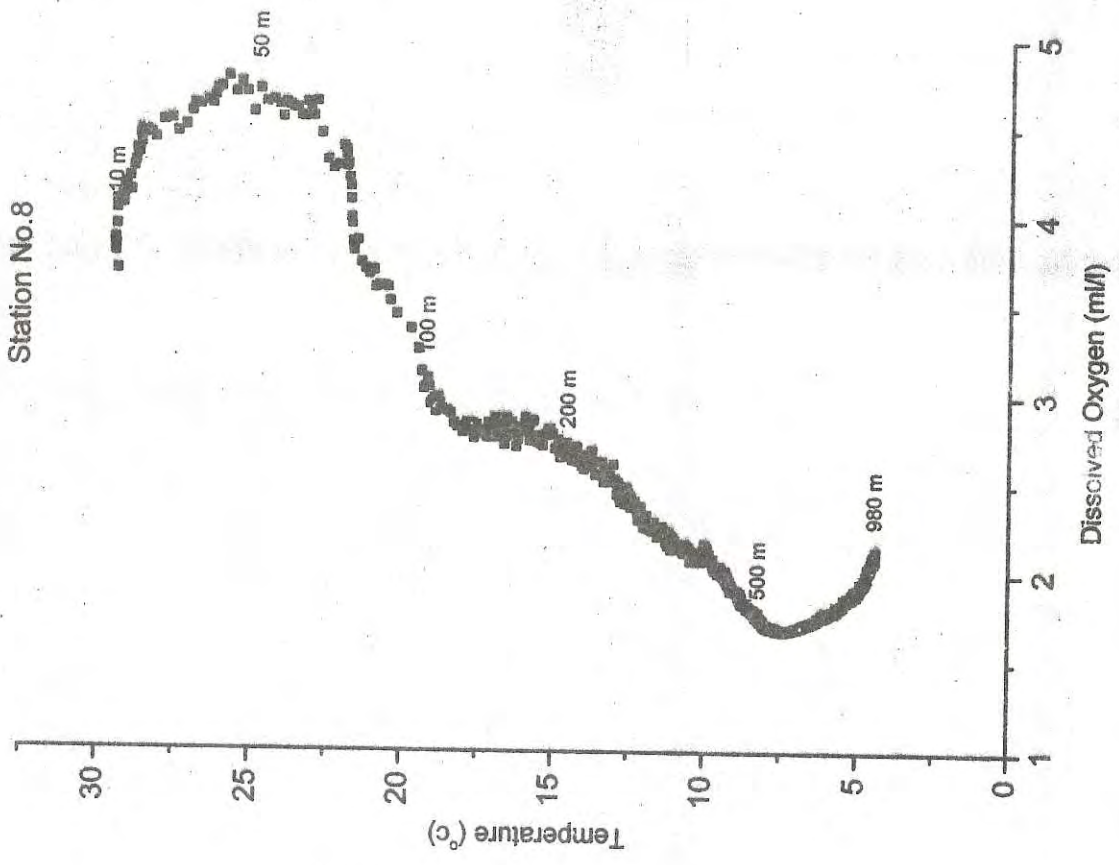


Station No.6

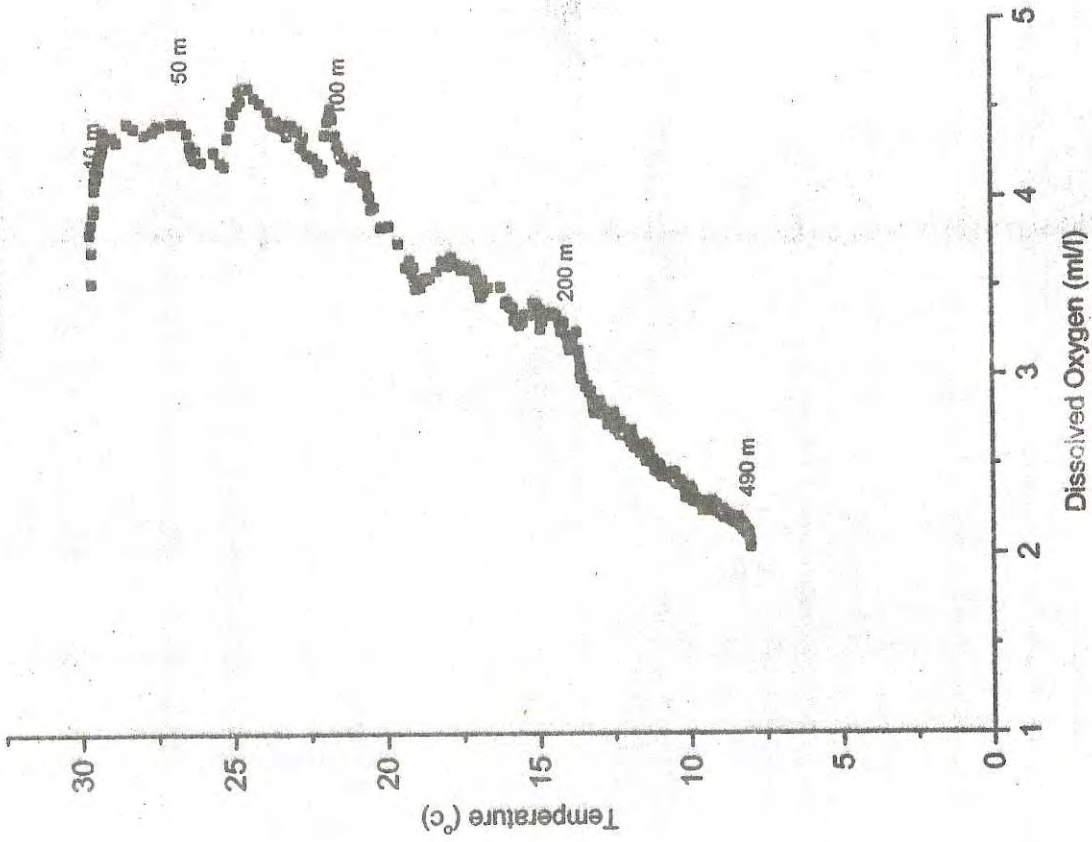


Station No.5

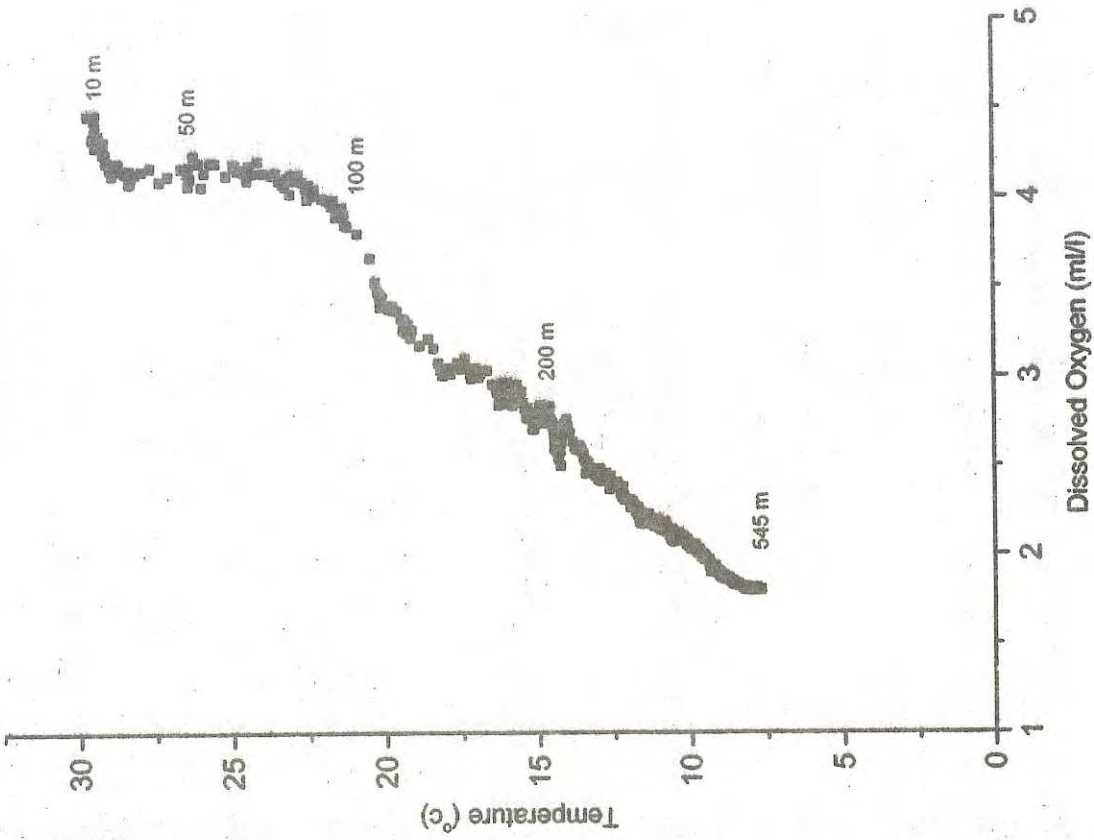


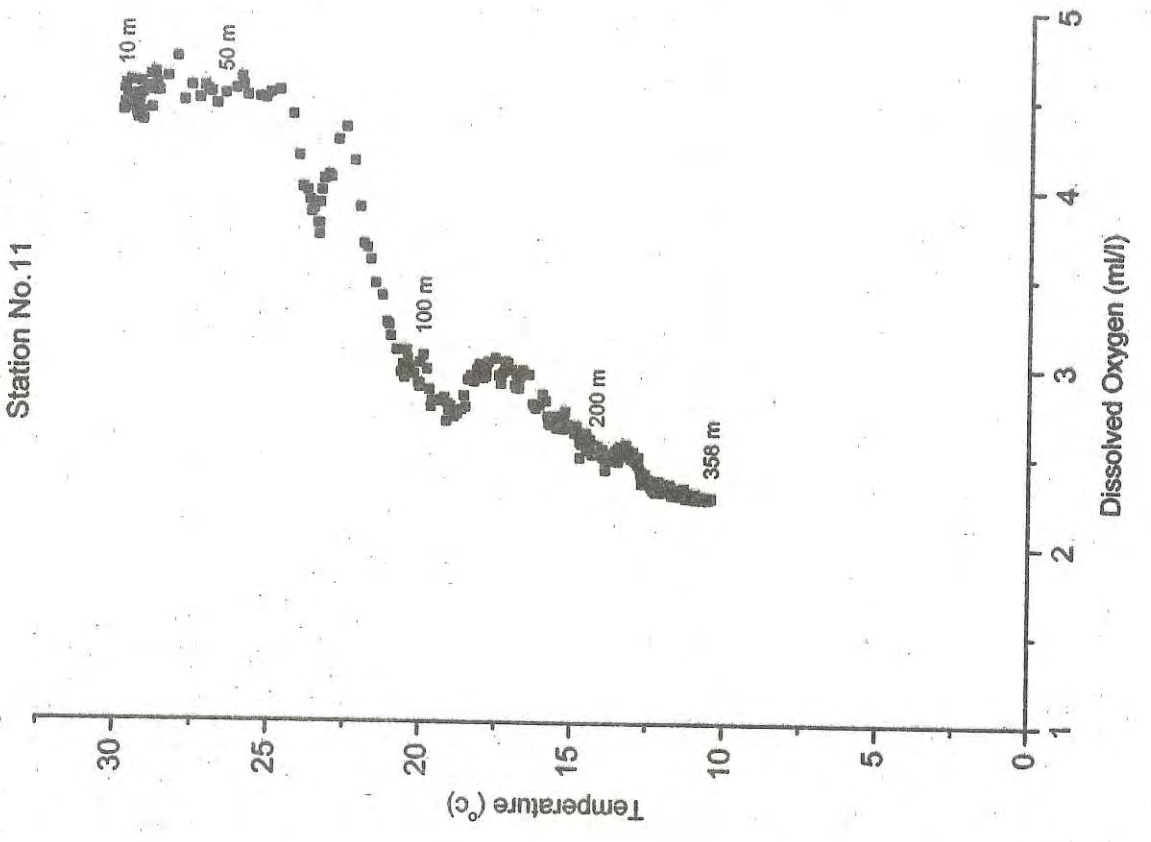
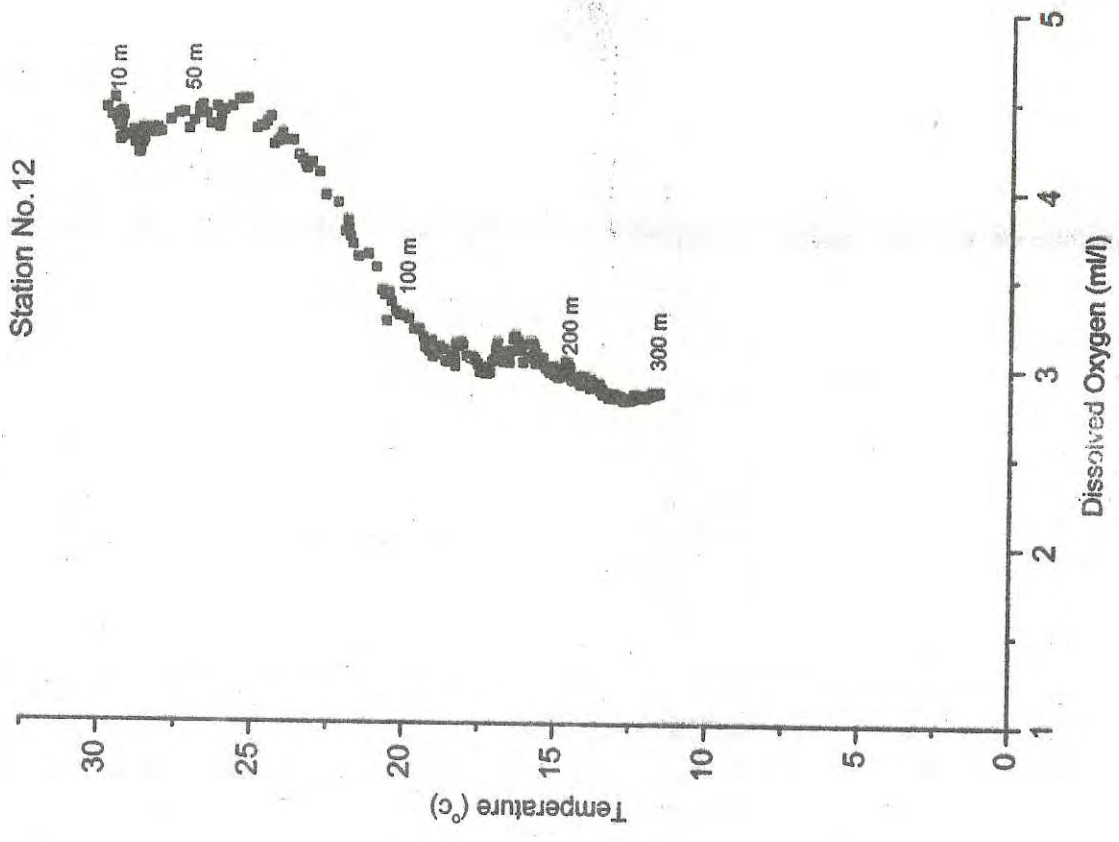


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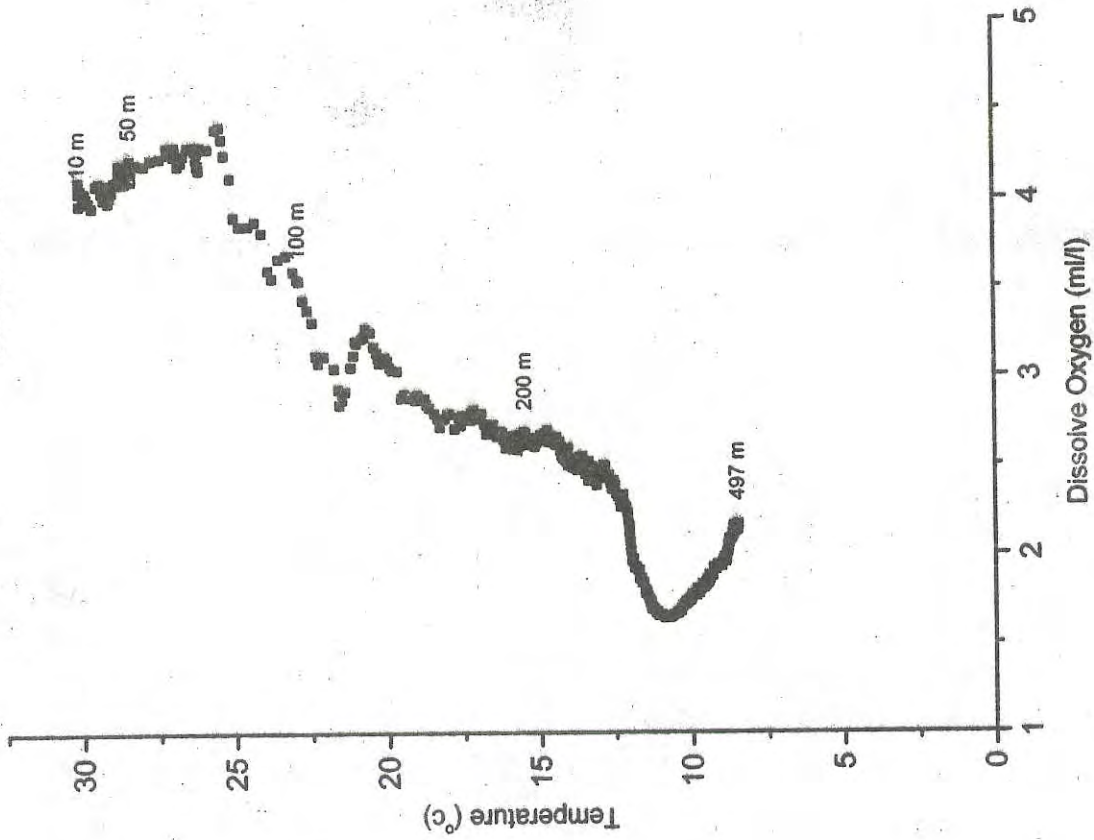


Station No.9

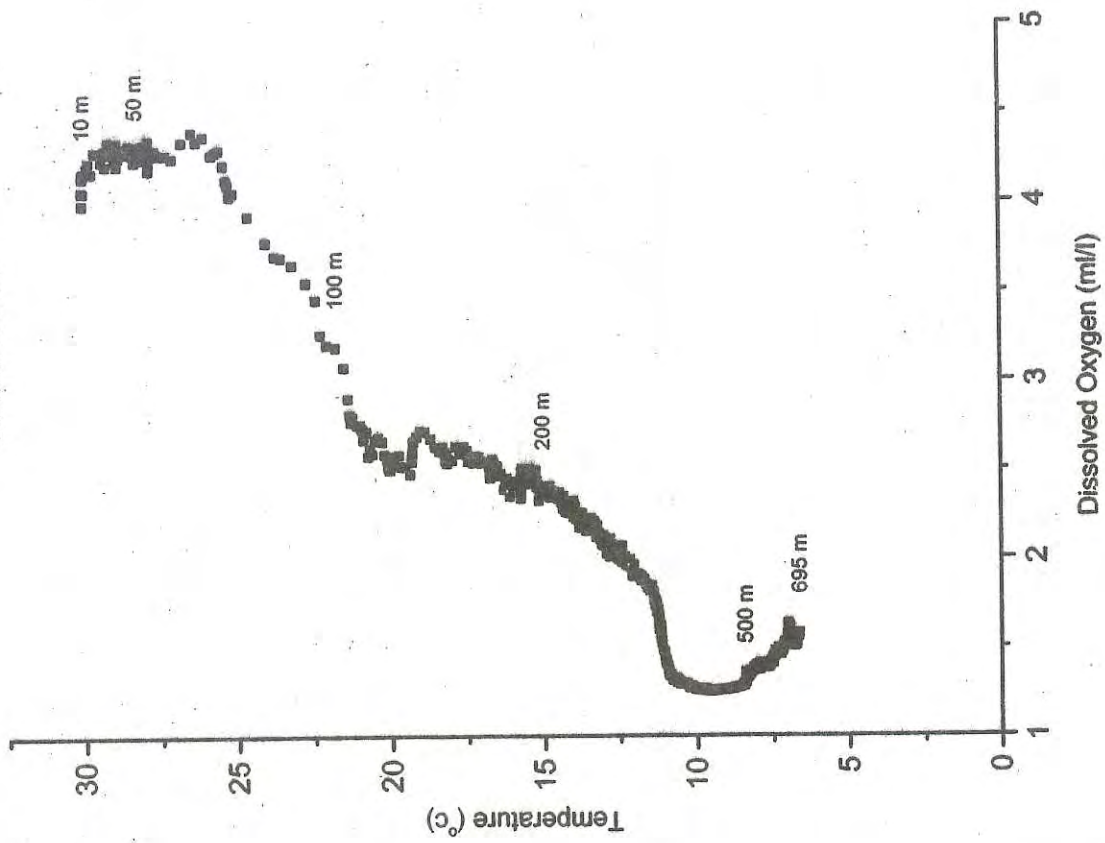




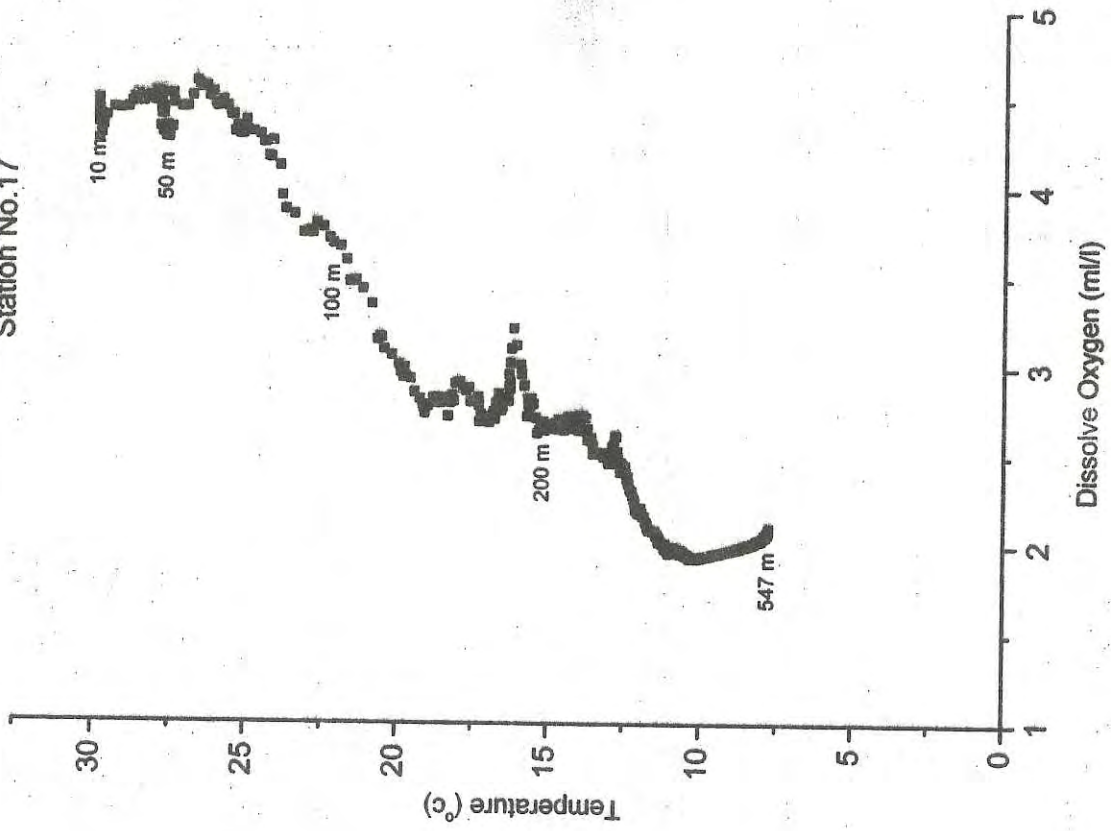
Station No. 14



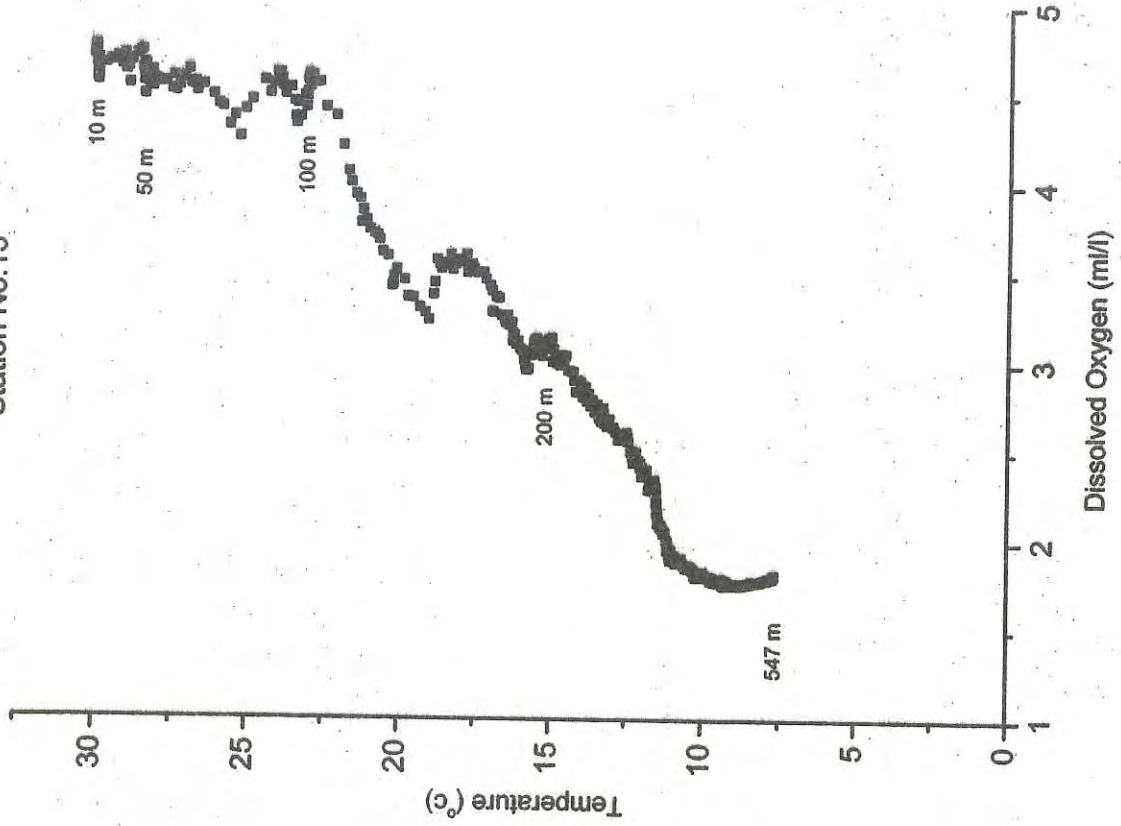
Station No. 13



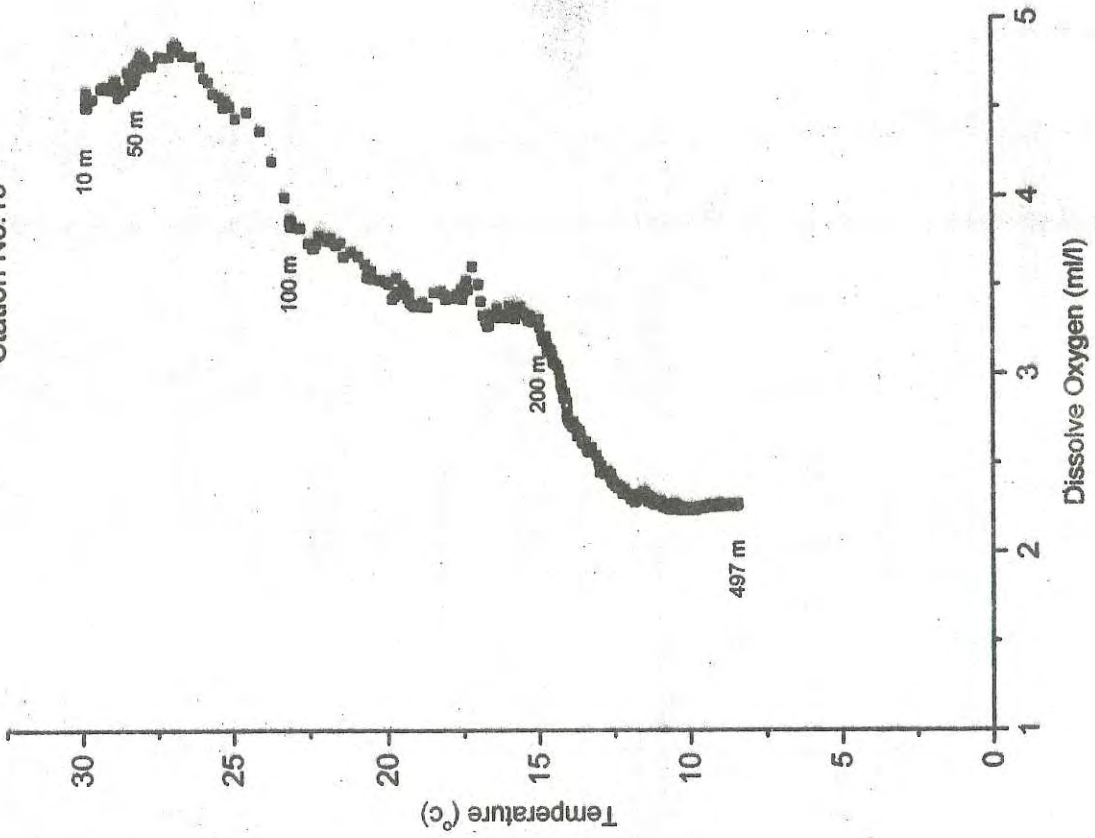
Station No. 17



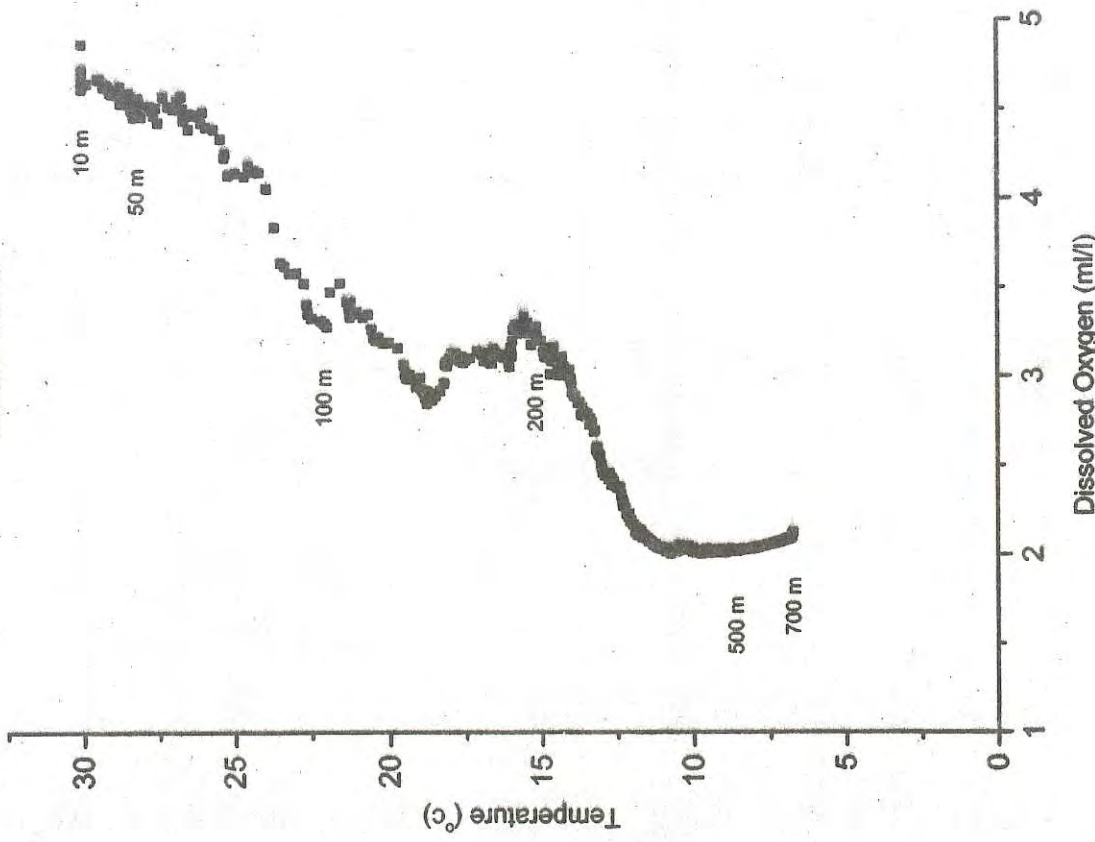
Station No. 15



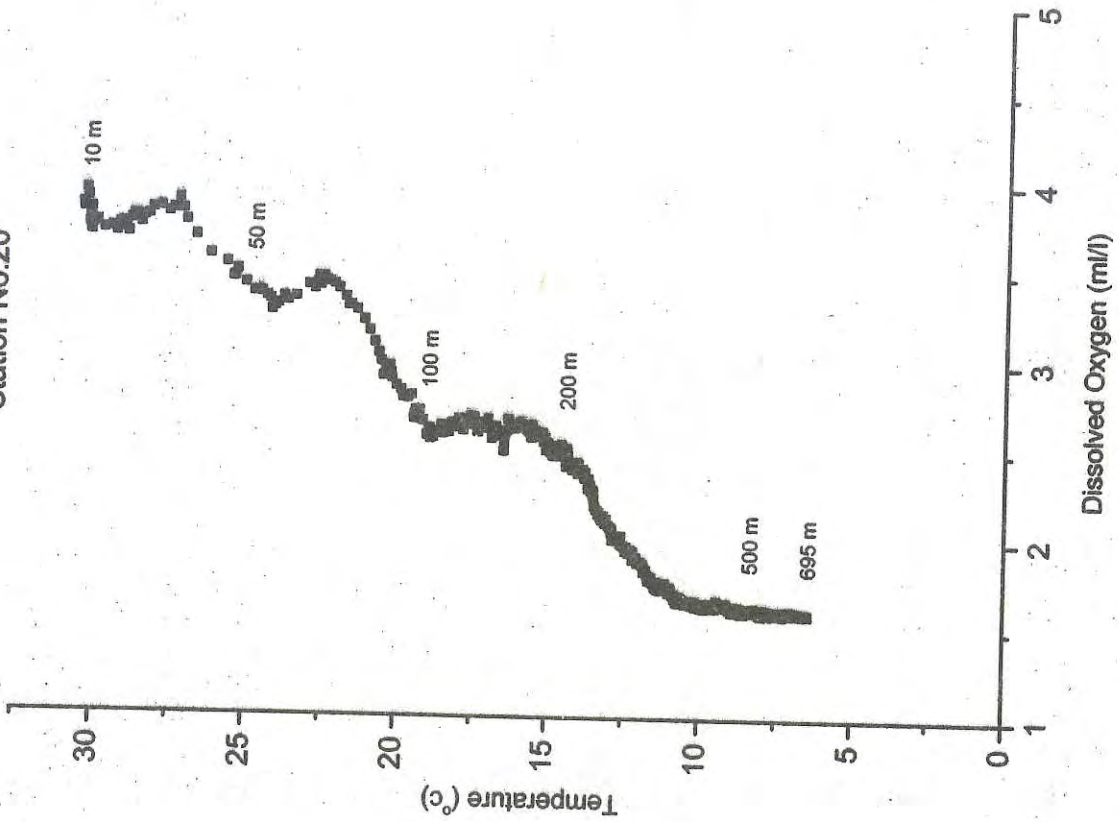
Station No. 19



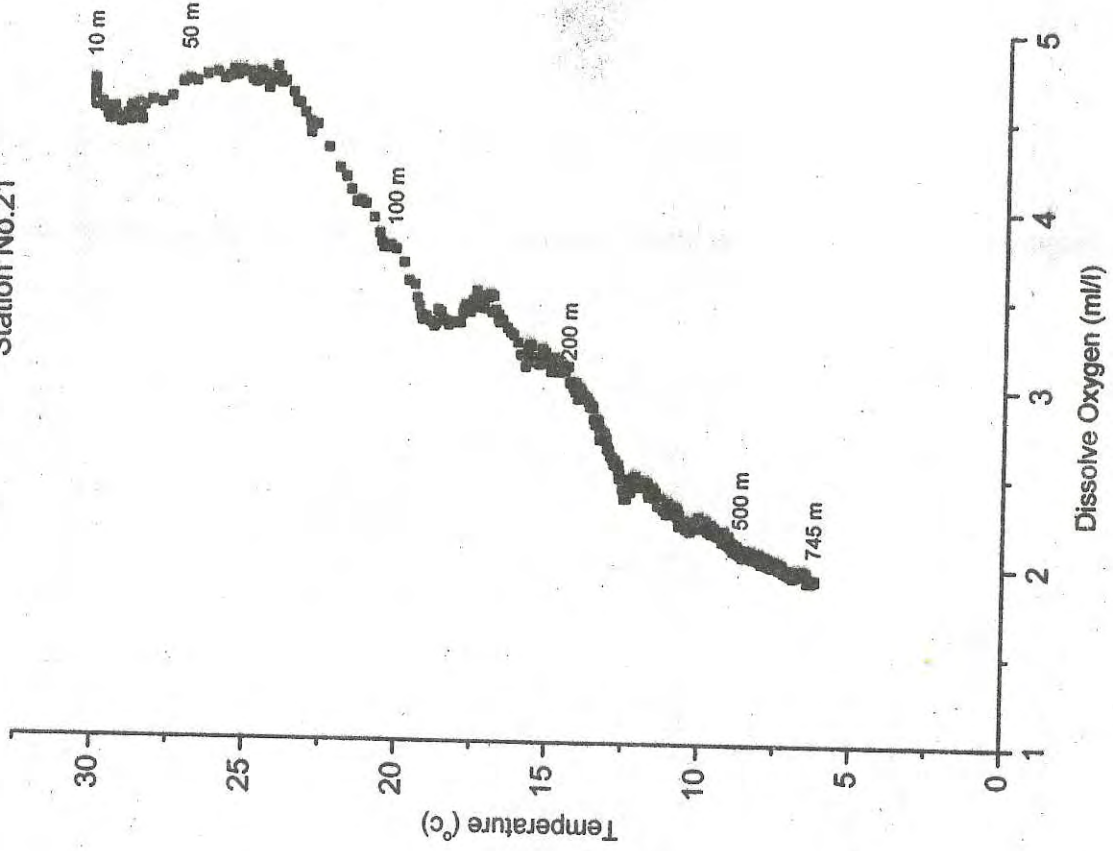
Station No. 18



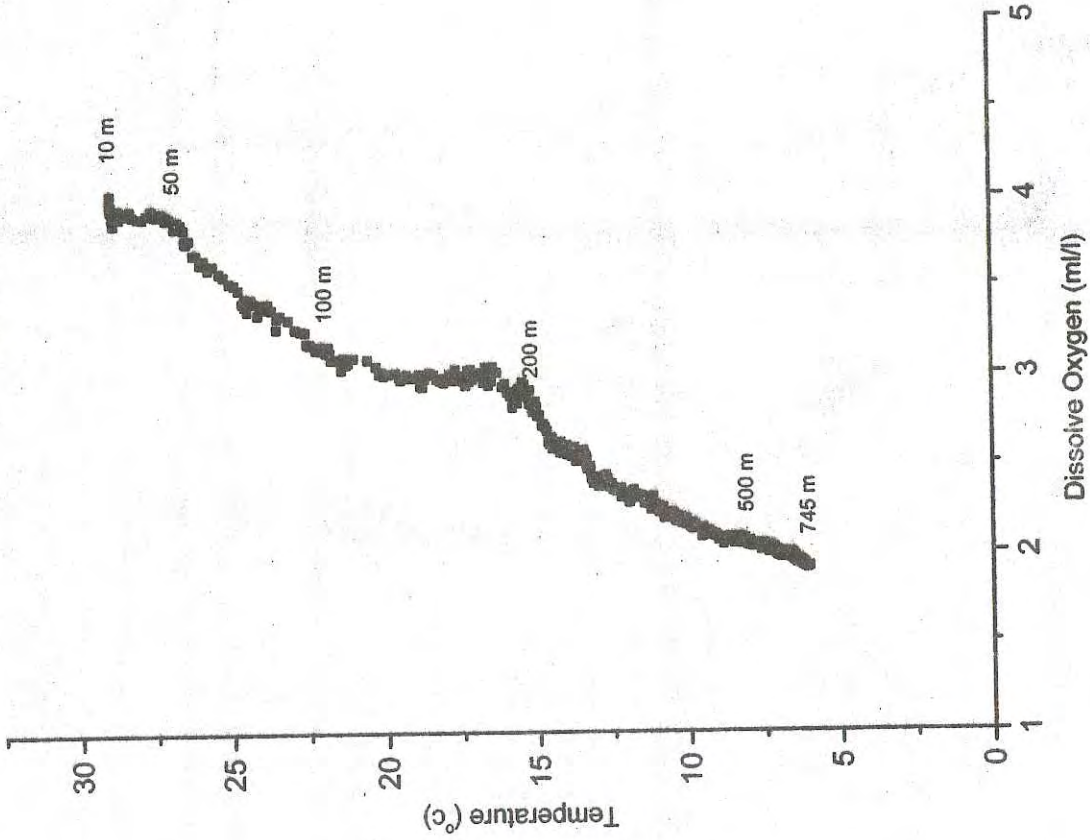
Station No.20



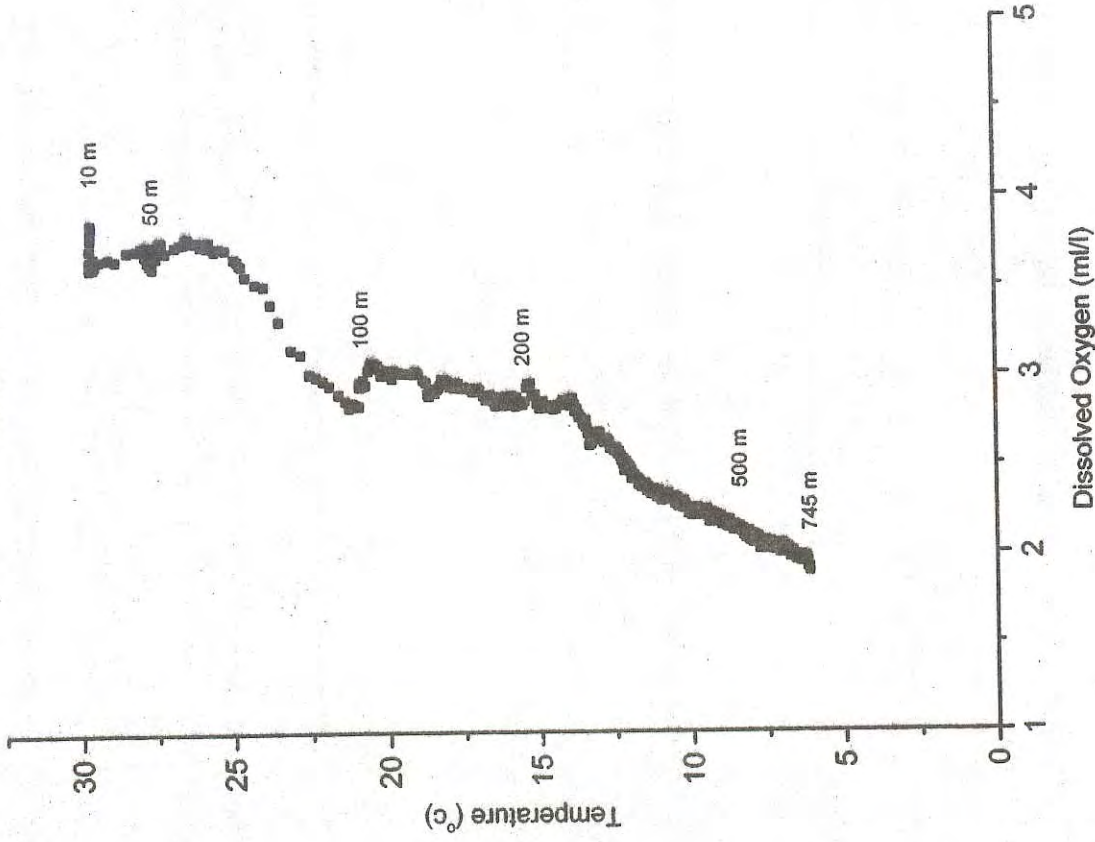
Station No.21



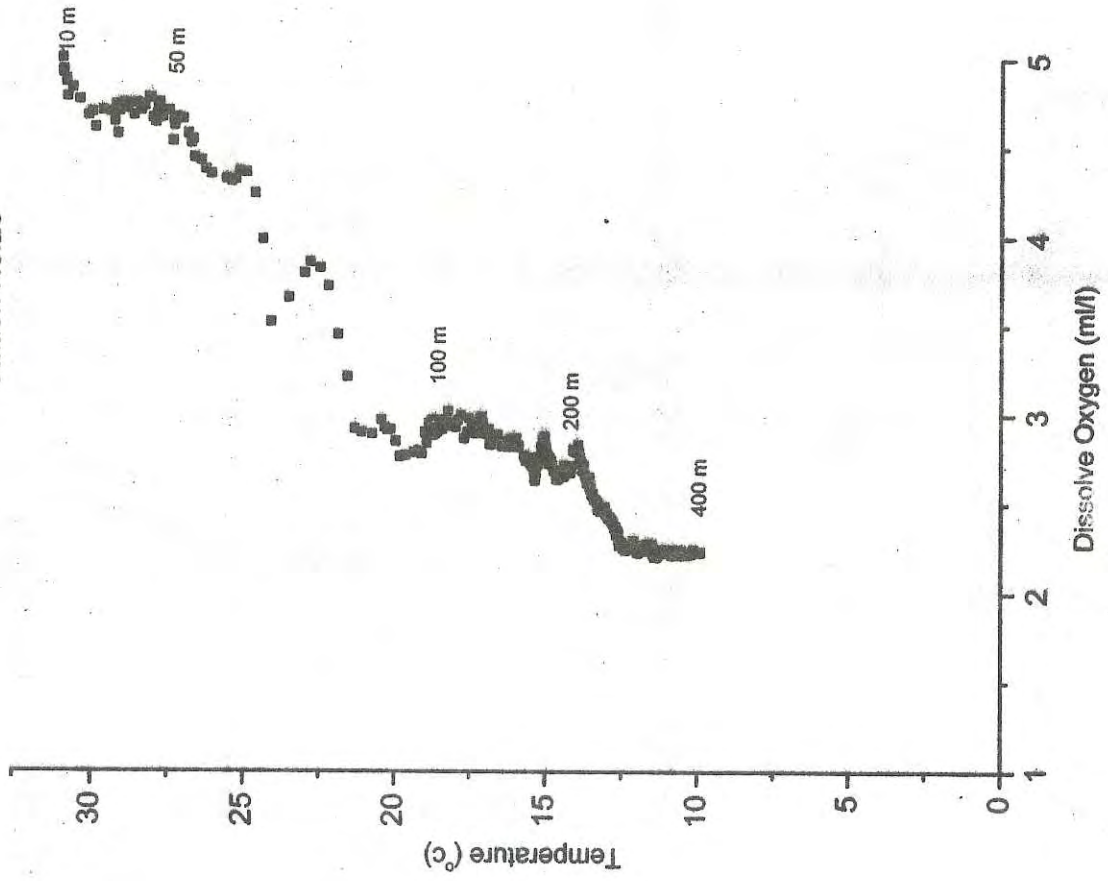
Station No.23



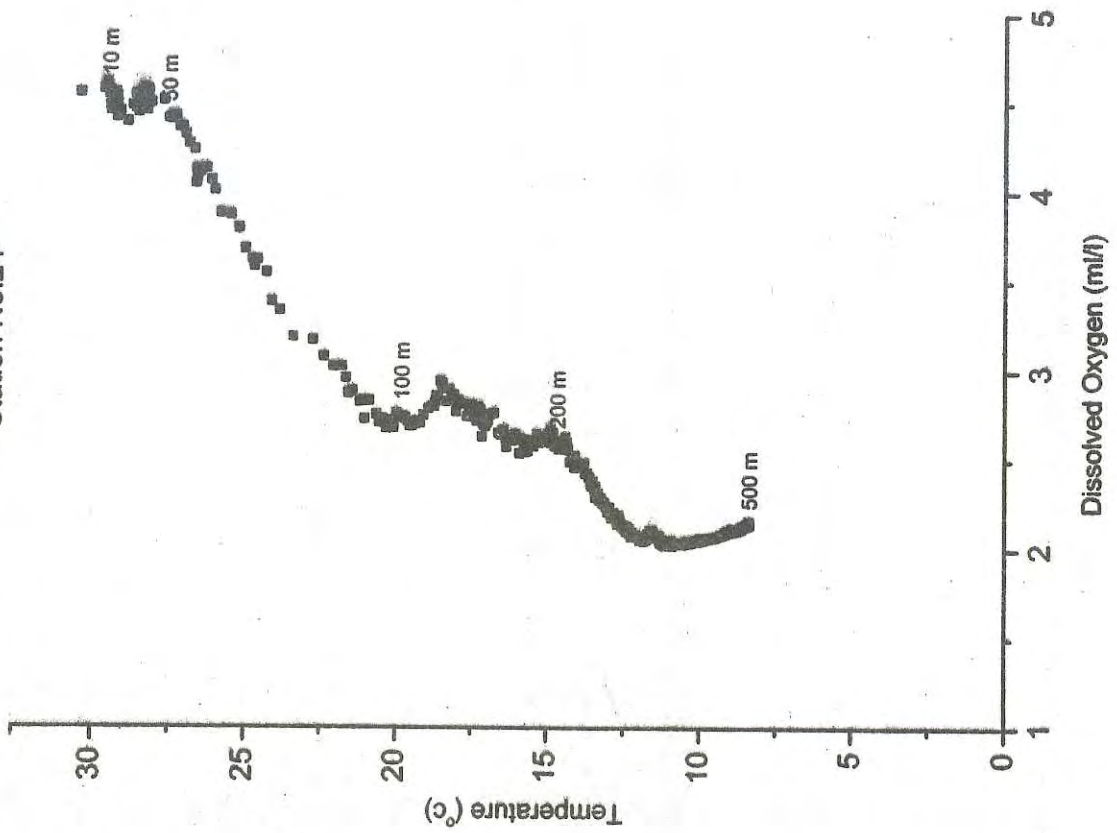
Station No.22



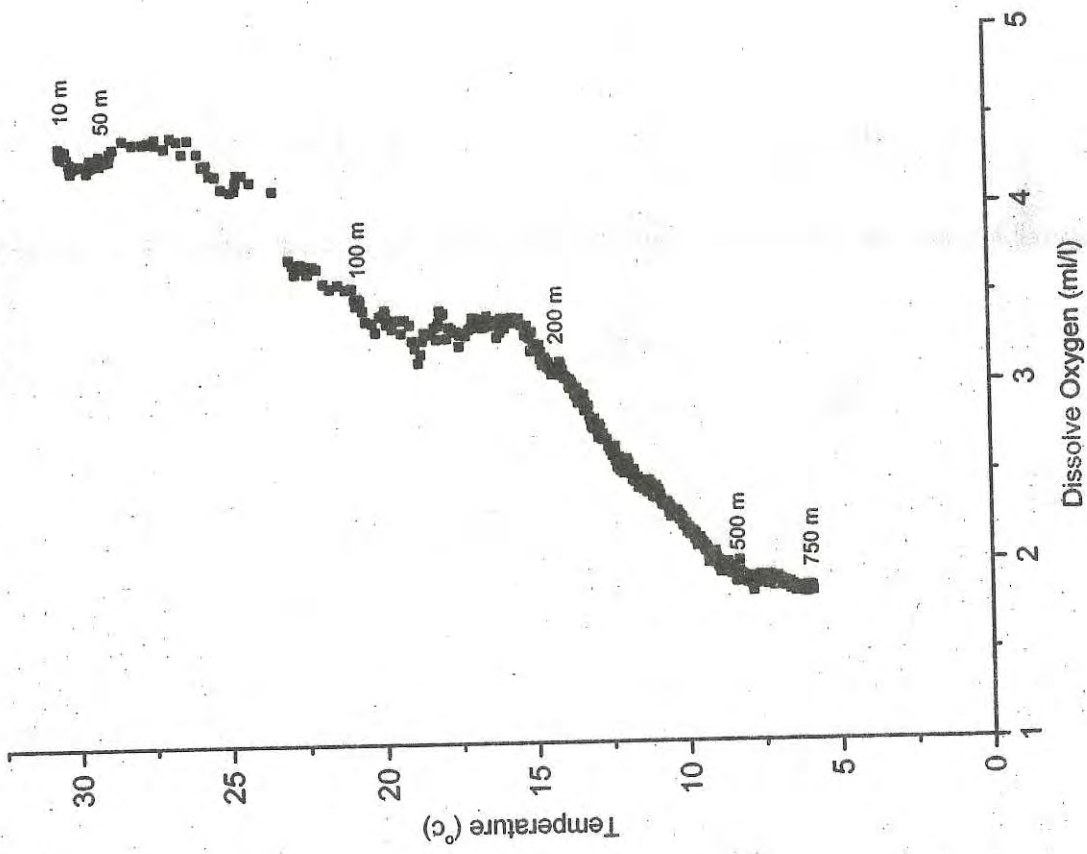
Station No.25



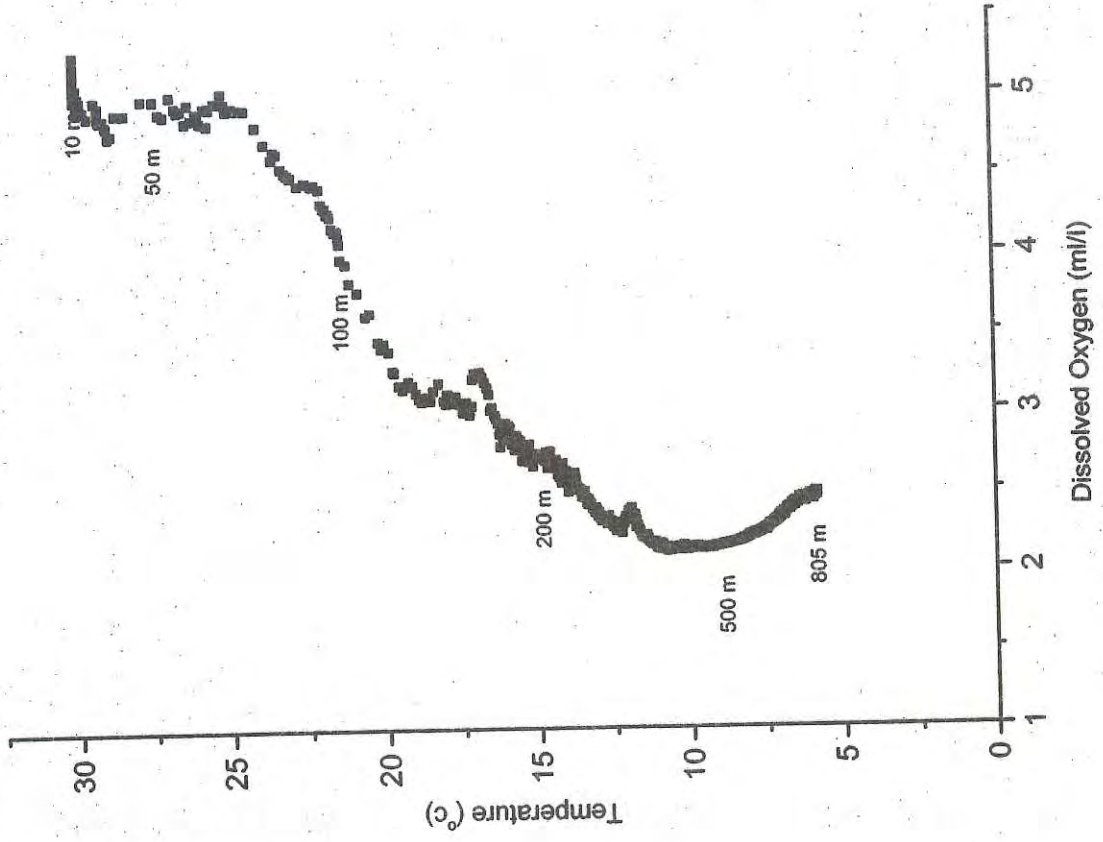
Station No.24

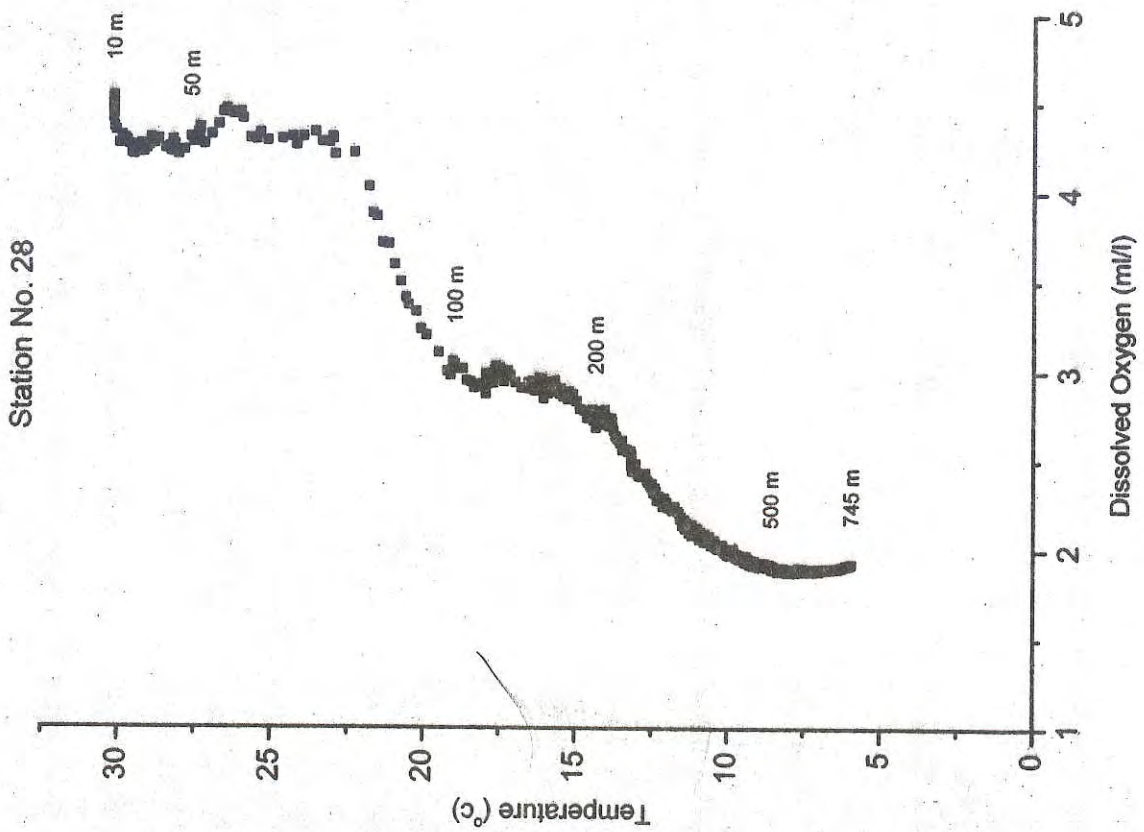
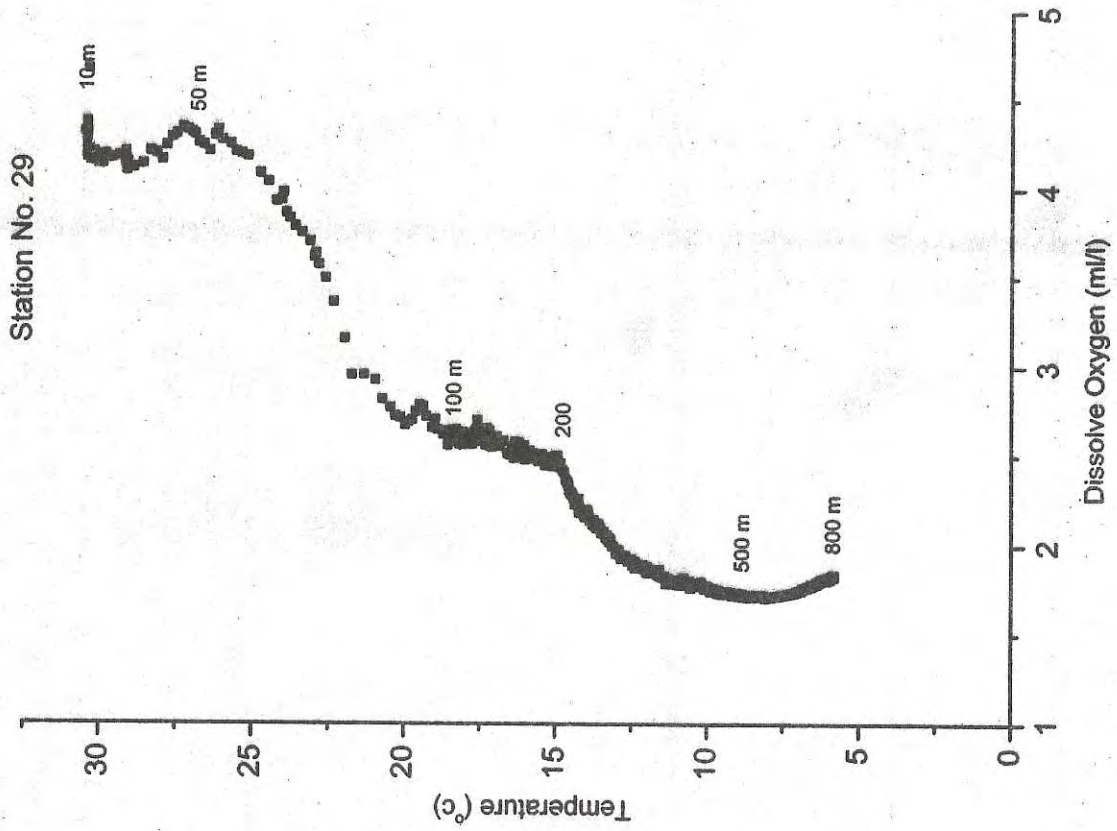


Station No.27

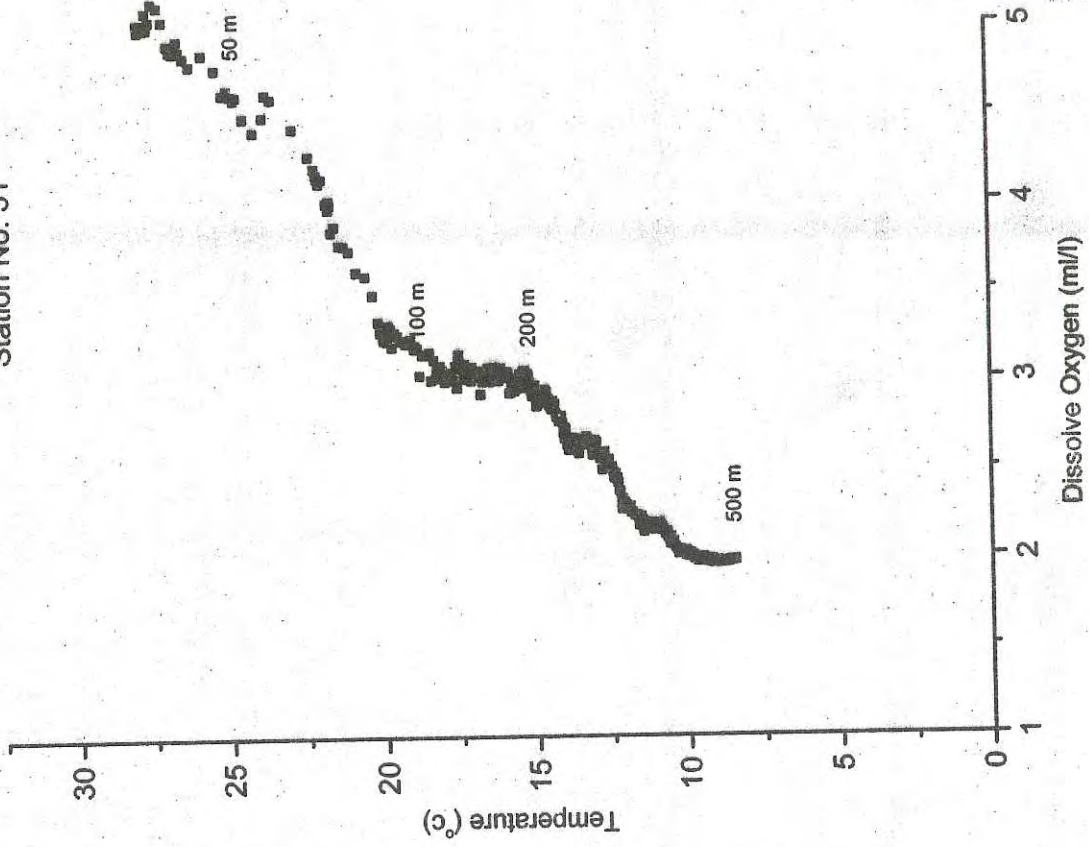


Station No.26

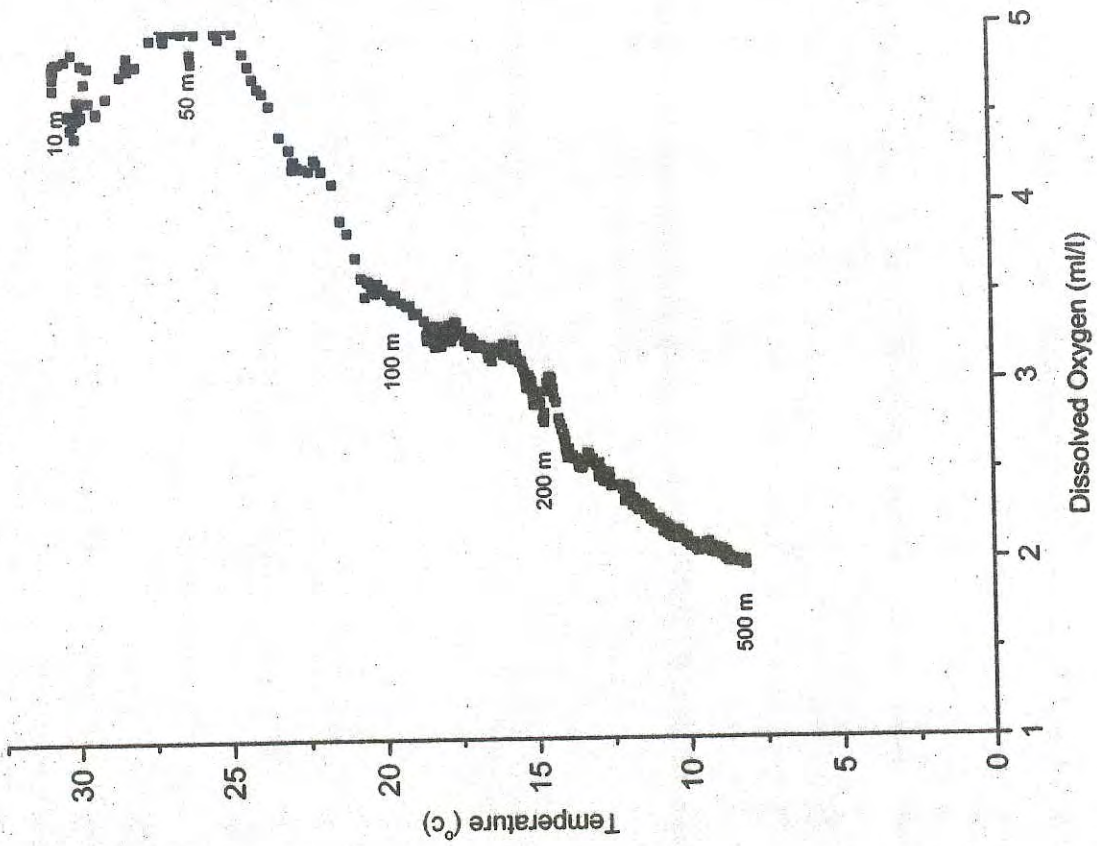




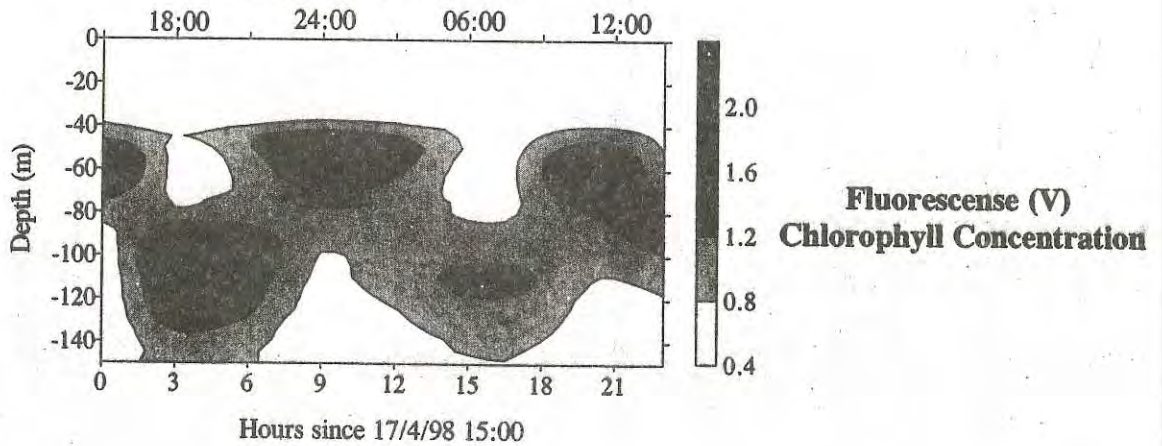
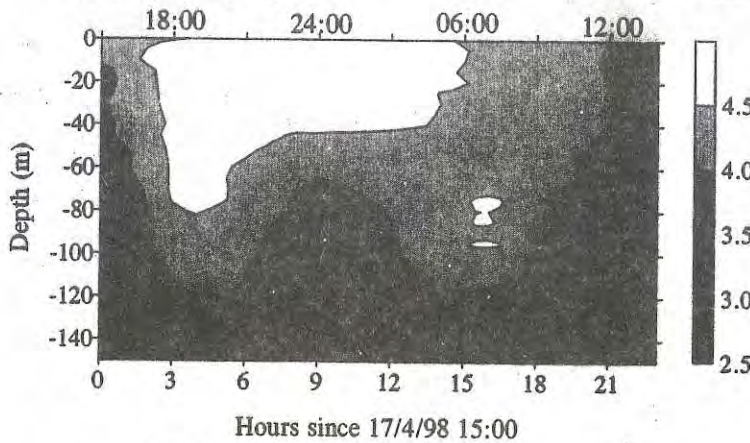
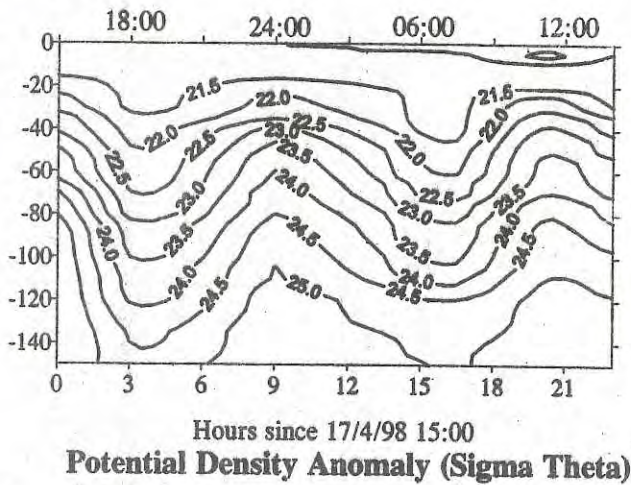
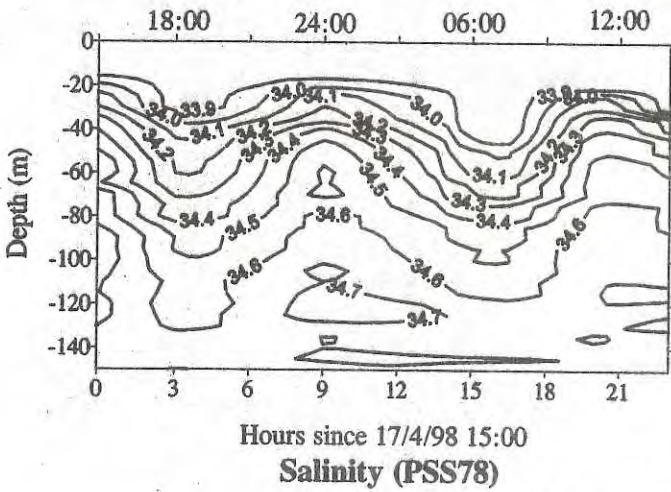
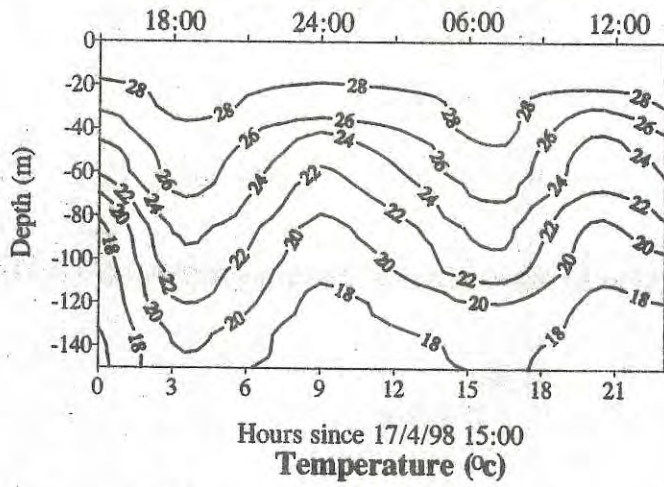
Station No. 31



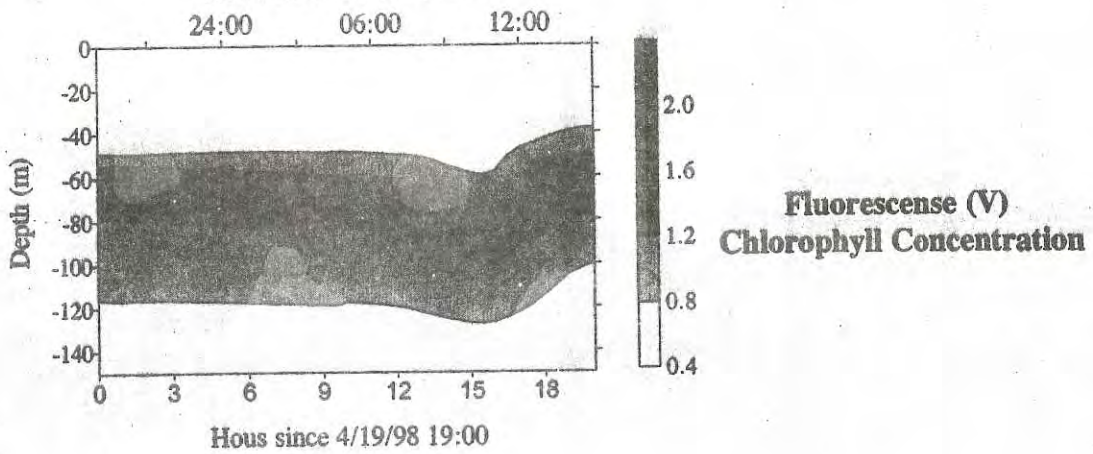
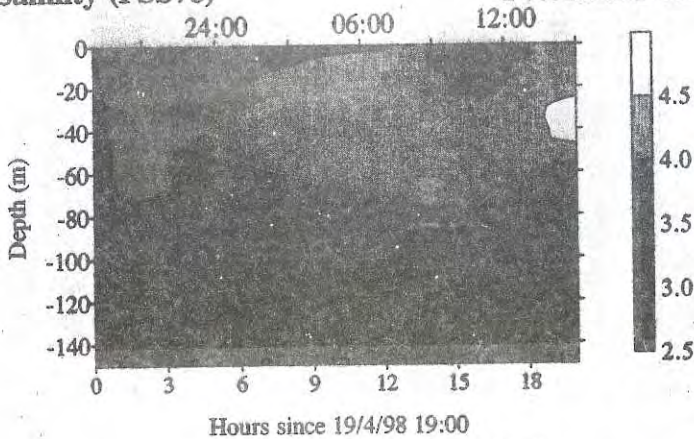
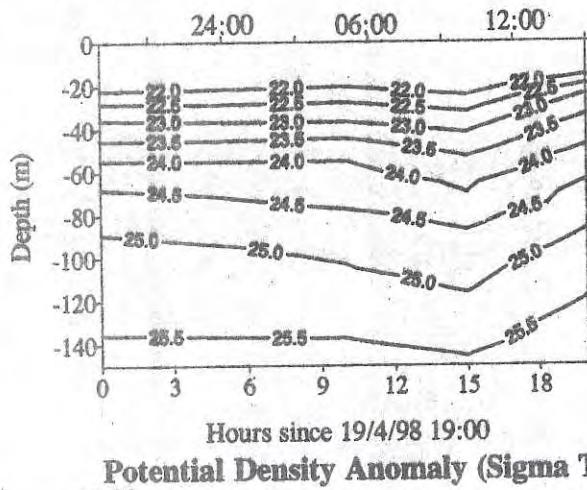
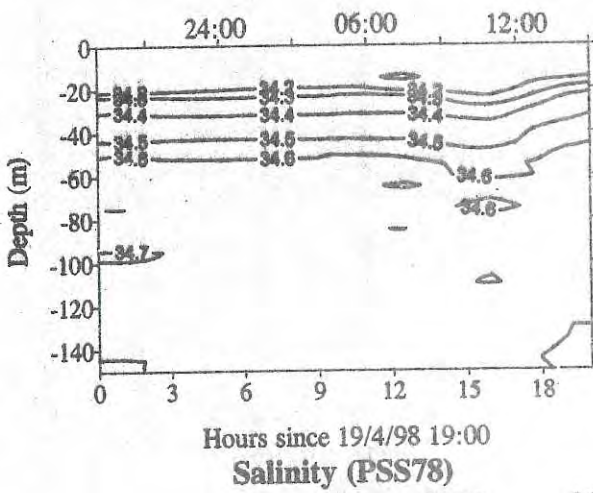
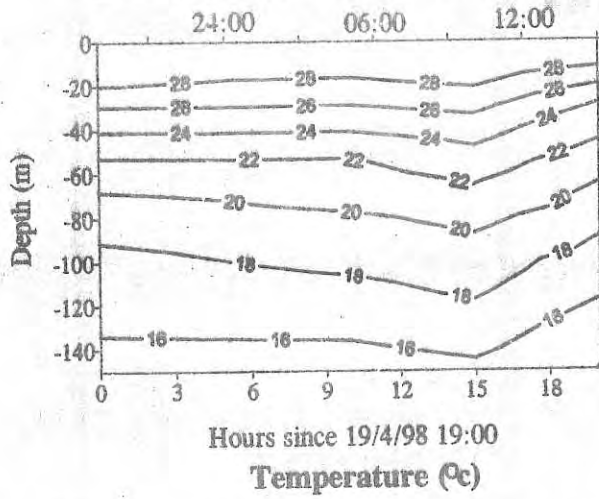
Station No. 30



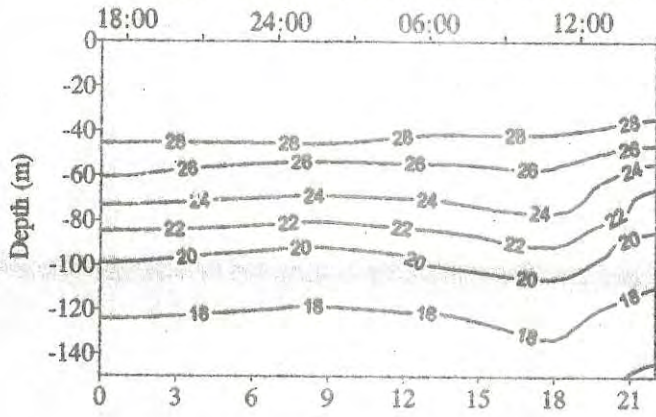
Time Series of Station No. 1



Time Series of Station No. 5

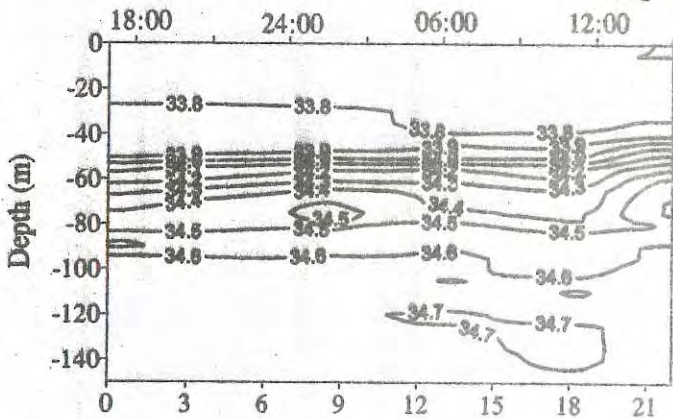


Time Series of Station No. 12



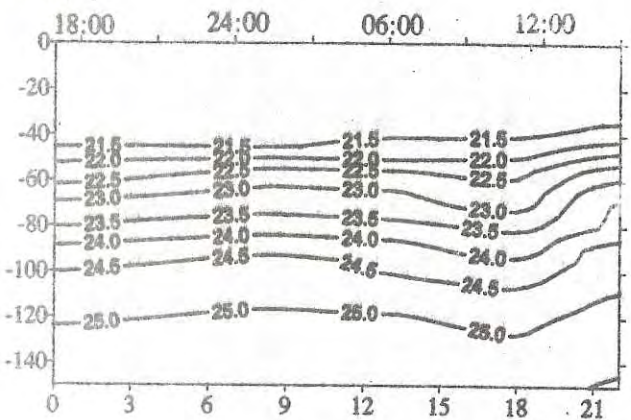
Hours since 25/4/98 17:00

Temperature (°C)



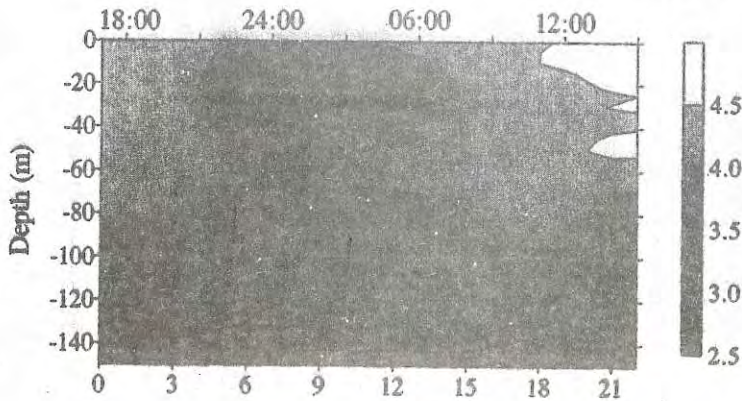
Hours since 25/4/98 17:00

Salinity (PSS78)

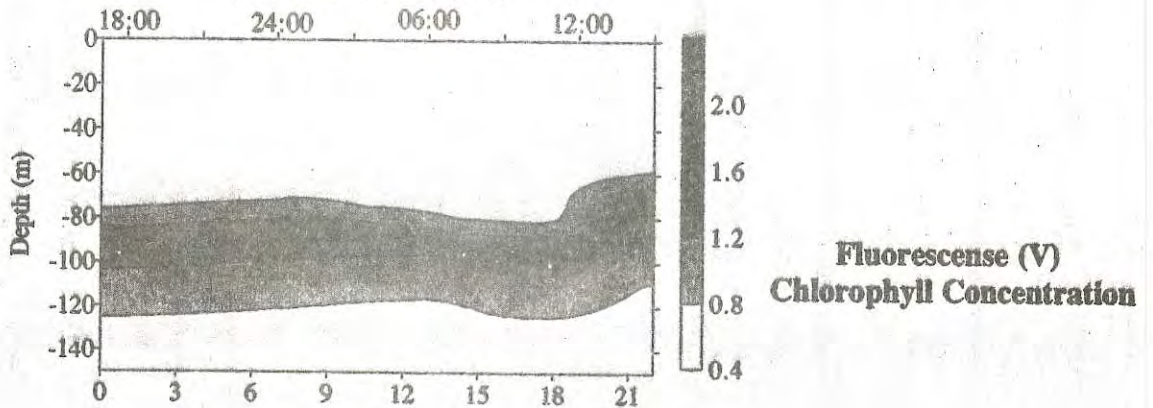


Hours since 25/4/98 17:00

Potential Density Anomaly (Sigma Theta)

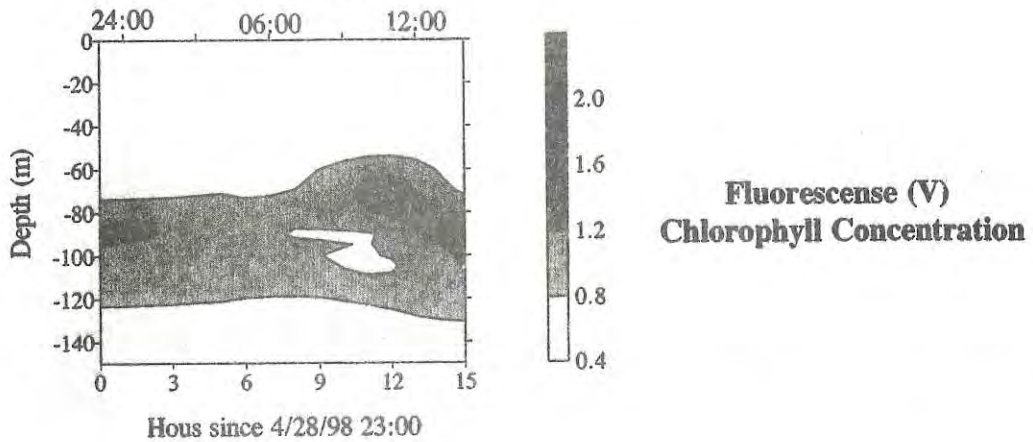
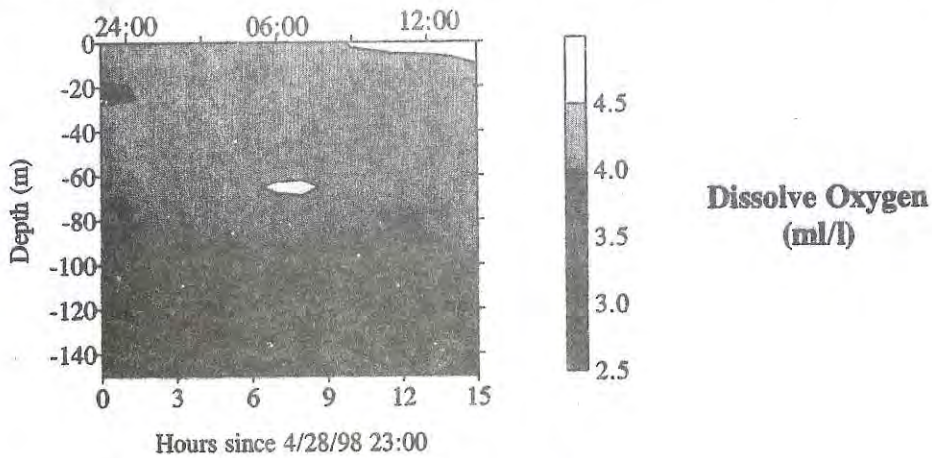
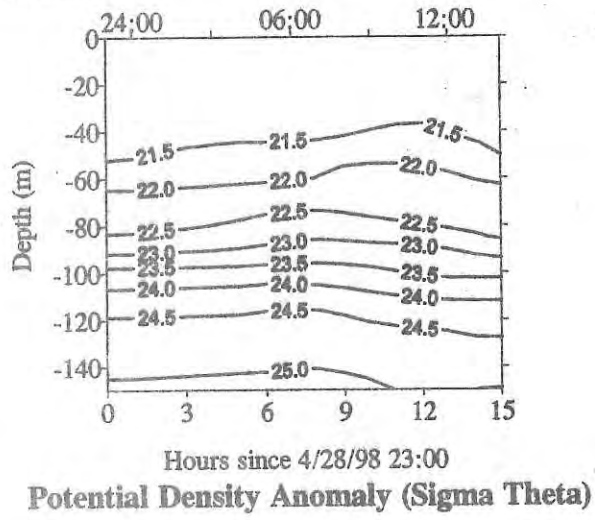
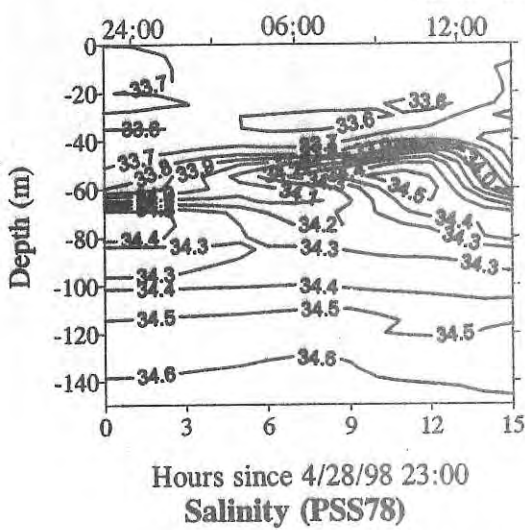
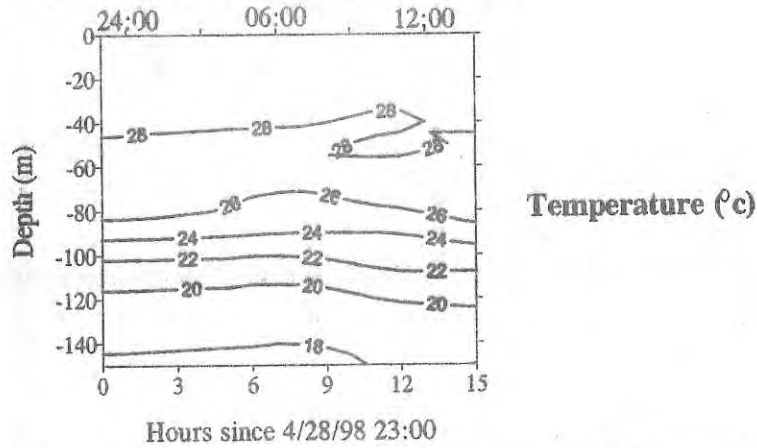


Hours since 25/4/98 17:00

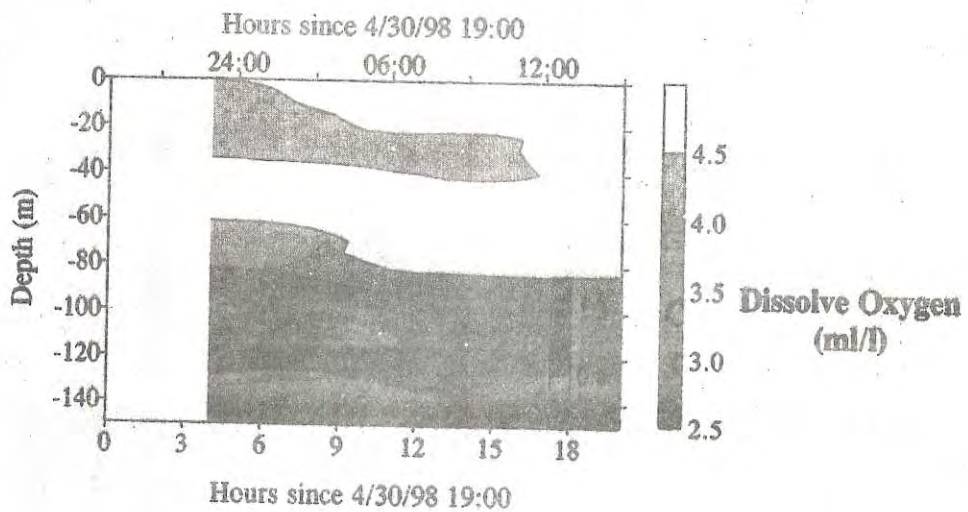
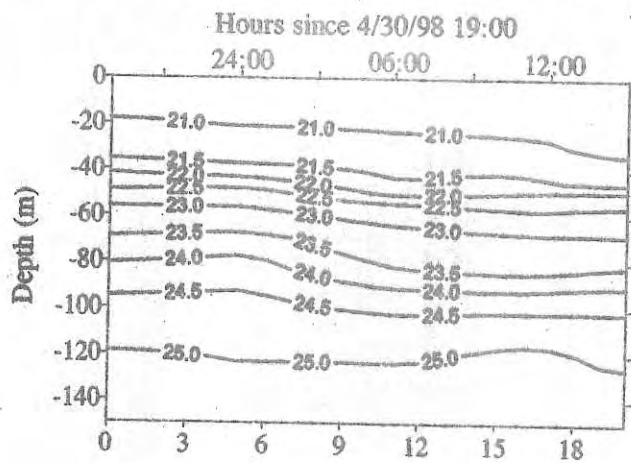
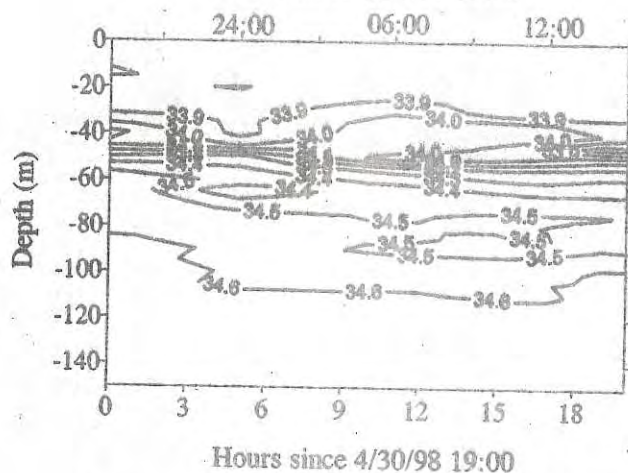
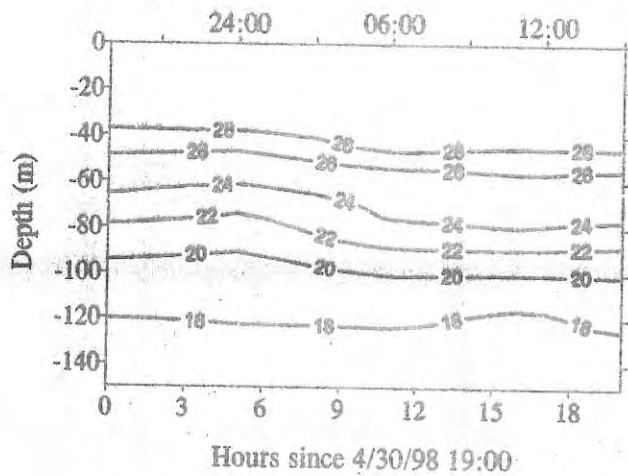


Hours since 25/4/98 17:00

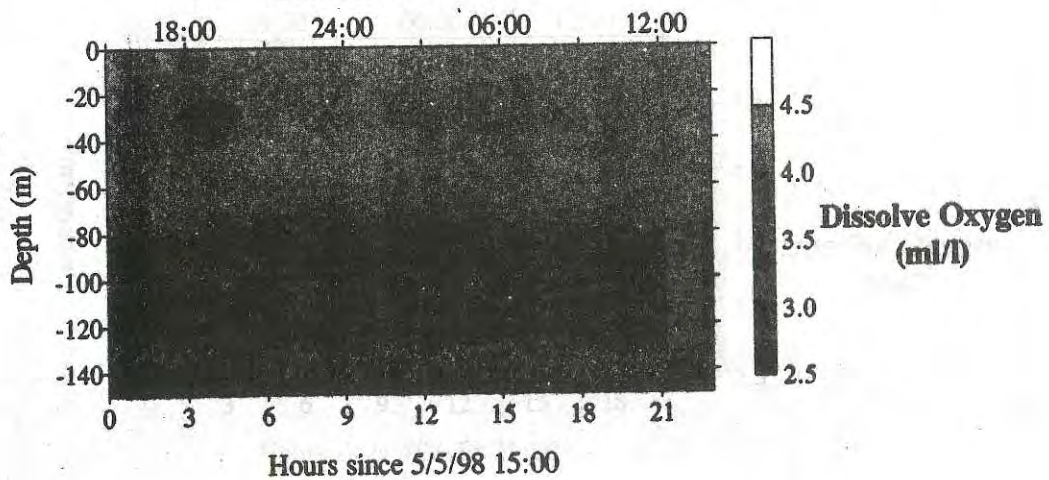
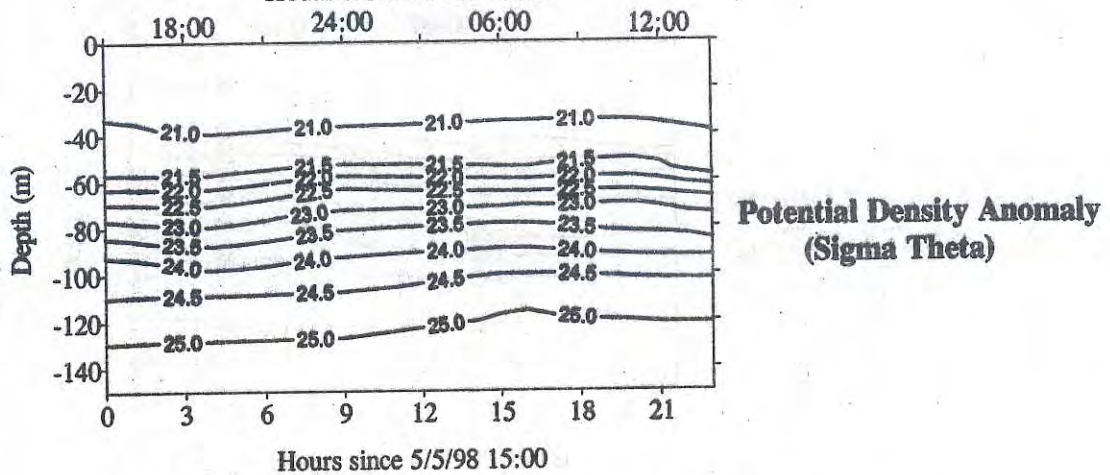
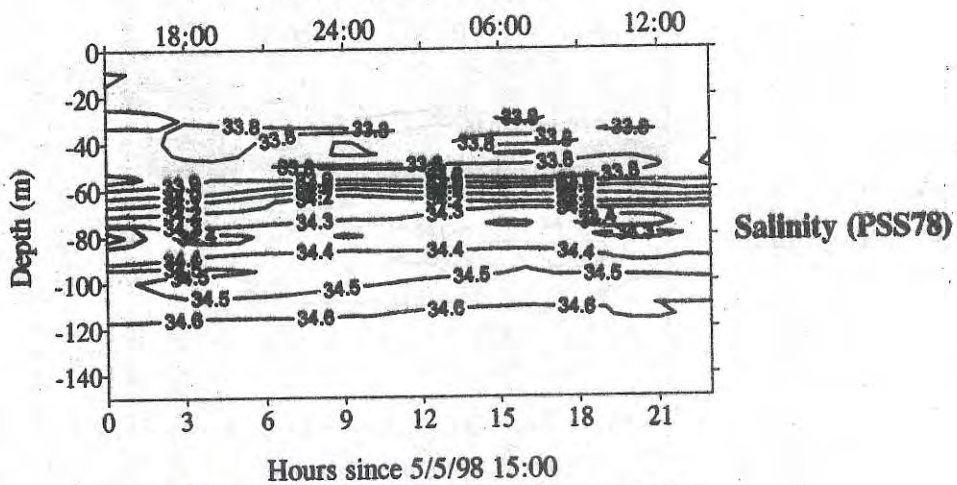
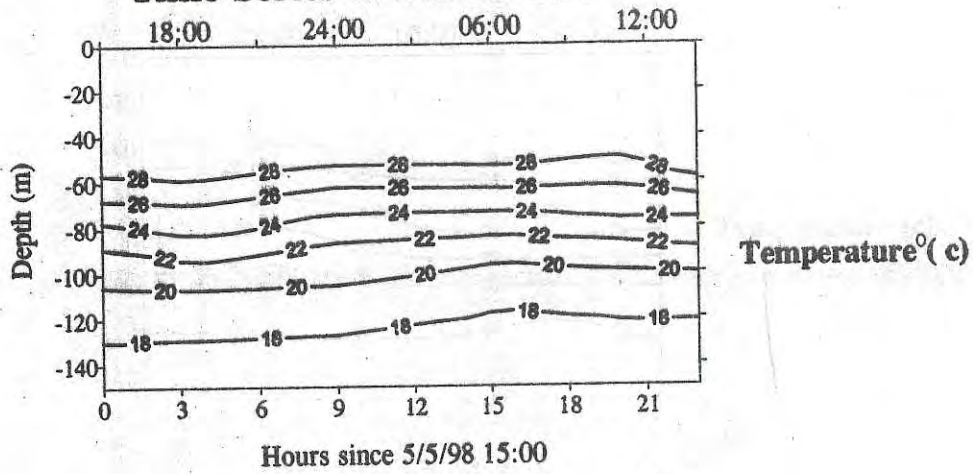
Time Series of Station No. 17



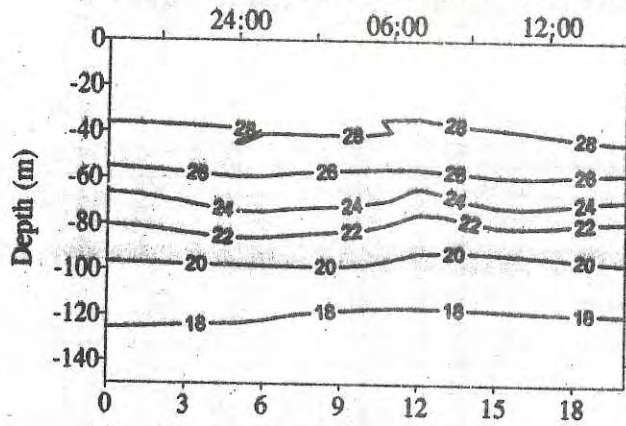
Time Series of Station No. 21



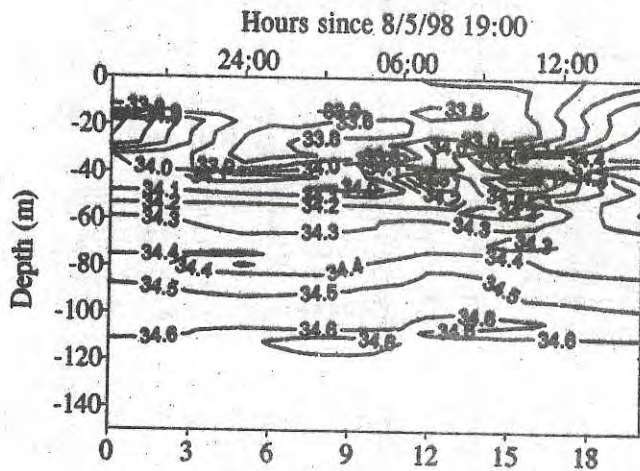
Time Series of Station No. 27



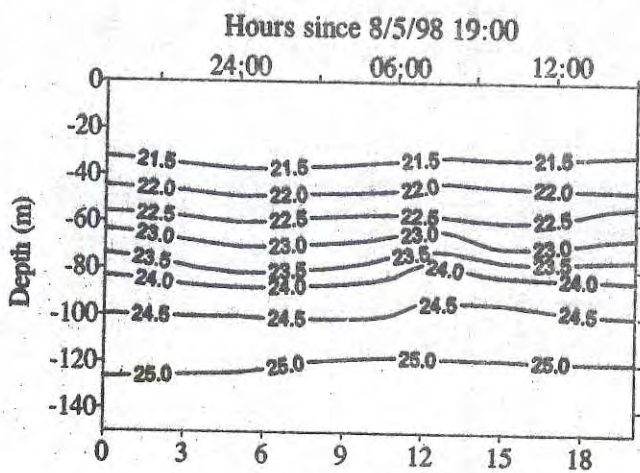
Time Series of Station No. 30



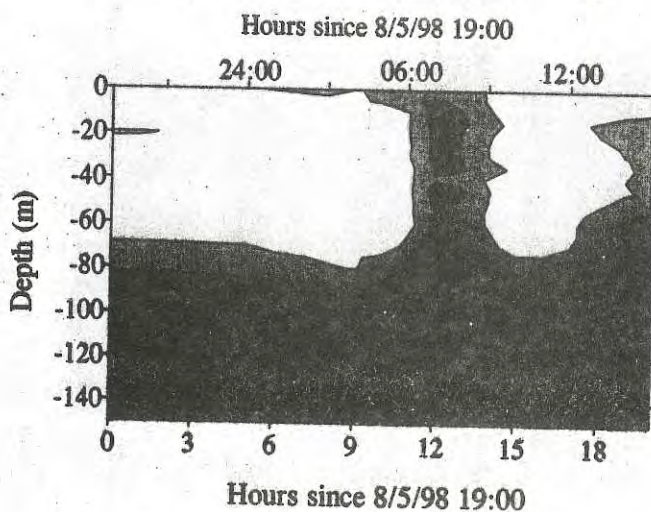
Temperature (°C)



Salinity (PSS78)

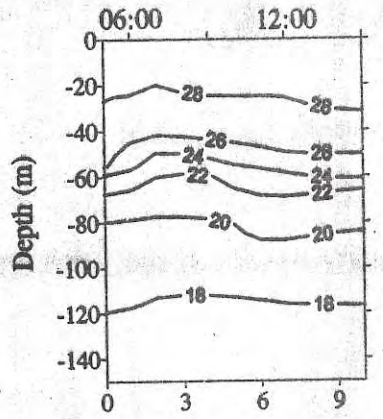


Potential Density Anomaly (Sigma Theta)

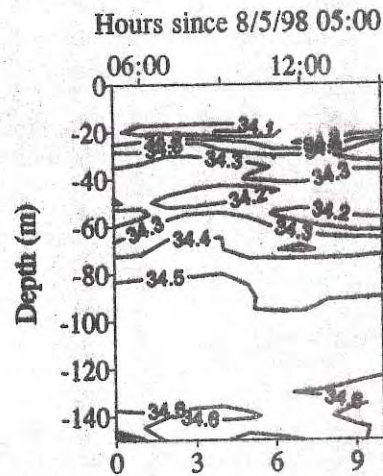


Dissolve Oxygen (ml/l)

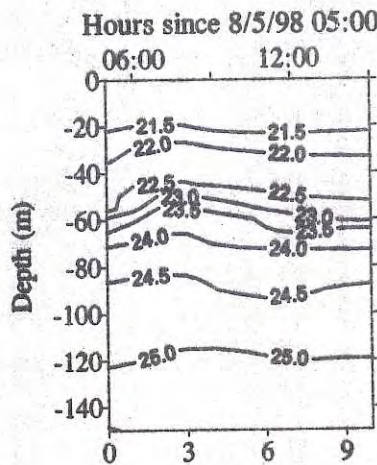
Time Series of Station No. 31



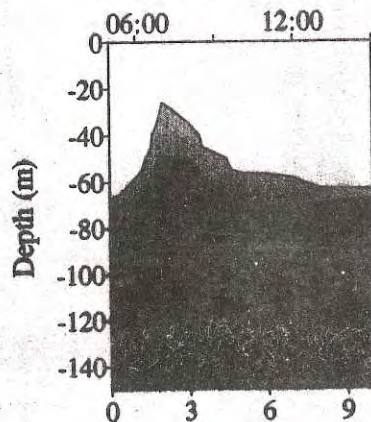
Temperature (°C)



Salinity (PSS78)



Potential Density Anomaly (Sigma Theta)



Dissolve Oxygen (ml/l)

Hours since 8/5/98 05:00

References

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