A REPORT

ON THE

OCEANOGRAPHIC SAMPLING PROGRAM

JAMES BAY SURVEY

1972

C.C.G.S. NARWHAL
C.R.N. 6600-72-1

CENTRAL REGION
CANADIAN HYDROGRAPHIC SERVICE

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INTRODUCTION

The purpose of this report is to describe the methods and equipment employed in the Oceanographic Sampling Program carried out in James Bay during the 1972 field season.

The prime motivation for this survey was to provide base line data for evaluation of the oceanic impact of the diversion of water into La Grande Rivière as a result of the James Bay hydro project.

The station locations, frequency of sampling and parameter selection were planned jointly by A.O.L. and Central Region to meet the above objective and to merge with the Hydrographic Survey.

PREPARATIONS

It was arranged that both T. Pullen, B.Sc. and J.H. Weller of the Canadian Hydrographic Service would accompany the M/V MARTIN KARLSEN on a Lake Erie monitor cruise. During this cruise, experience was gained in various analytical techniques and in the organization of procedures in the laboratory and on deck. A two week formal training period at A.O.L. on the analytical techniques and instrumentation operation increased this experience and provided a medium for feedback of potential problems. During the season the program was monitored twice in the field, once by Mr. N. Freeman and once by Dr. E. Hassan.

A hydrographic winch was positioned on the starboard, after side of the well deck, of the C.C.G.S. NARWHAL and bolted to angle irons which were welded down. A davit was fitted to the bulwarks at the starboard accommodation ladder, in order to provide a working platform outside the ship. This provided a large working platform with the laboratory close at hand.

In the laboratory, a wooden rack was built to hold the Knudsen bottles as well as the required number of sample bottles. This self-draining rack was most important as it held the bottles and thermometers for reading. The analytical equipment, Salinometer and Winkler set-up, were fitted to a table top, with appropriate spaces around them for samples. (see photo #9). The mason jars and formalin used in pickling and storing the plankton samples were also kept on this table.

Appendix B gives a complete list of the equipment taken on the survey.

PROGRAM DESCRIPTION

The basic objective of the program was to sample James Bay at various sites which would then provide a basis for future monitoring. With this in mind, the first five stations were chosen to recapture Theta stations of 1961. The remaining eleven stations were chosen to monitor the effect of the La Grande Rivière on James Bay (see figure 1).

The sampling program was quite basic. Water samples from discrete depths were drawn for determinations of the dissolved oxygen content and the salinity. Plankton hauls were taken to give some idea of the various species indigenous to James Bay, at that time of year.

Bottom samples were taken for the hydrography, some of which were stored for Dr. Pelletier at A.O.L. Also one core at each station was obtained with an Alpine corer and stored for Dr. Pelletier.

SAMPLING EQUIPMENT

The winch used was a Swann Bathythermograph Winch, Series 315, #1241 with a 5/32 galvanized three strand wire, run through a meter block at the davit. Knudsen bottles fitted with two reversing thermometers each, were employed in the survey. A Dietz-Lafond bottom grab was used for all bottom samples. An Alpine corer was employed in obtaining the bottom cores which were stored in plastic sleeves designed for this purpose. Two secchi discs were lost due to structural weaknesses, but a third was made up and proved very satisfactory. The plankton net employed was a standard 3/4 metere diameter net of #6 mesh size. There was a flowmeter set in the opening to assist in quantifying the results for numerical analysis of the samples. A fire hose from the deck hydrant was used to flush the net down with salt water before final retrieval of the sample. A Bissett Berman STD provided an on station, depth profile of salinity and temperature until it malfunctioned.

LABORATORY PROCEDURES

Upon recovery of the STD, the chart was removed and labelled, and the STD was placed on charge preparatory to the next cast. The Knudsen bottles were racked, in the reversed position, in order of removal (i.e. surface to bottom was left to right). At this point, the O_2 samples were drawn and pickled, then placed in order next to the titration set. The salinity samples were drawn and stored until the end of a series of stations, as continuous uninterrupted work is required to process them. The Plankton sample was placed in a mason jar which contained 40 ml of formalin, 10% formaldehyde with Methanime buffer and filled with salt water.

Dissolved oxygen titrations were performed between stations using the modified Winkler method provided in kit form by A.O.L. The Salinometer, a Hytech Model 621, was used to determine the salinities of the various samples. Standard sea water was used to calibrate the instrument and sub-standard was used to measure the drift and to provide a basis for correcting the results.

NOTES AND FORMS

All four of the Canadian Oceanographic Data Center forms were maintained. The Bridge Log was kept, mainly for the position data and the on-station surface meteorology. The Data Summary was used to record the results of the salinity determinations and oxygen titrations as well as a second source of Bridge Log data. The Deck Sheet contained the wire out, wire angle and the reversing thermometer readings. This form also contained the number of the analytical sample bottle, which helped avoid confusion. The Cruise Master contained all the forms and carried the information that is needed on the title page of the computer print-out.

The oxygen titration results and salinity determination results, were entered onto special forms with room for the required calculations used to standardize the data. A Plankton Log was filled out on each cast to provide the information necessary for the analysis of the stored samples.

PERSONNEL

During the cruise three Hydrographic personnel worked in the Laboratory doing the actual sampling. One drew the samples, while the other two cast the bottles and the net. Notes were kept up to date and if a fourth person had been in the lab., the O_2 titrations could have been done more quickly. A winch operator was also required while stopped on station. Very little extra effort was required of the Bridge crew other than recording the on-station meterology.

CONCLUSIONS

The survey ran according to plan with only minor loss in data experienced. Outlined below are recommendations for future surveys:

The Bissett-Berman should be overhauled prior to the next survey season. If the dissolved oxygens are not required, a station could be done in the time it takes for one Bissett-Berman cast. High winds occassionally necessitated deletion of the Plankton tow, due to the high drift speed of the ship and possibly horizontal tows should be considered in the future.

The concept of watches would speed up work and would enable Oceanography to be carried out around the clock if the ship could operate at night. Darkness makes little difference to the sampling program as the lighting on the ship was sufficient for working at night. A watch of six on, then six off, would work well--after two or three runs one Oceanographer/Hydrographer per watch with two assistants, coxswain or seaman, and one winch operator would be sufficient.

The actual on-station sampling and the between station recording and analysis can easily be arranged and kept up. The O_2 titrations and salinities can be left till the end of a series, or if the organization and manpower are available, they can be kept up to date. The casting of the bottles and net, the reading of the thermometers and updating of the logs and data sheets are the only things that cannot be left until later.

SUMMARY OF WORK COMPLETED

Stations	16
Serial Stations Occupied	65
Discrete Samples Taken	307
Bissett-Berman Casts	65
Cores Taken	16 (stored)
Bottom Samples	15 (stored)
Plankton Hauls	53
Plankton Samples	54 (stored)
Titrations and Salinity Determinations	307
Thermometer Readings	614
RS-5 Casts	4

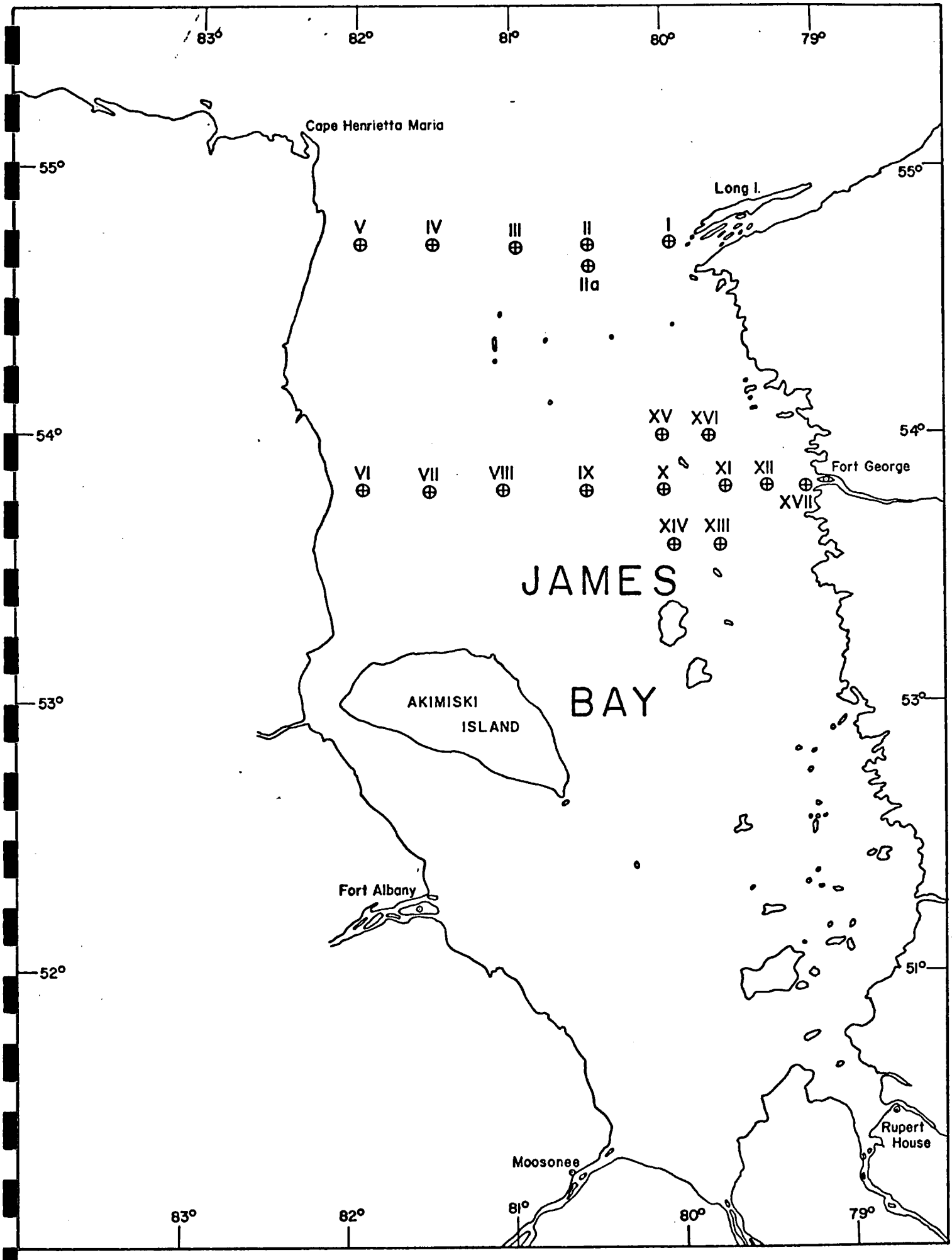


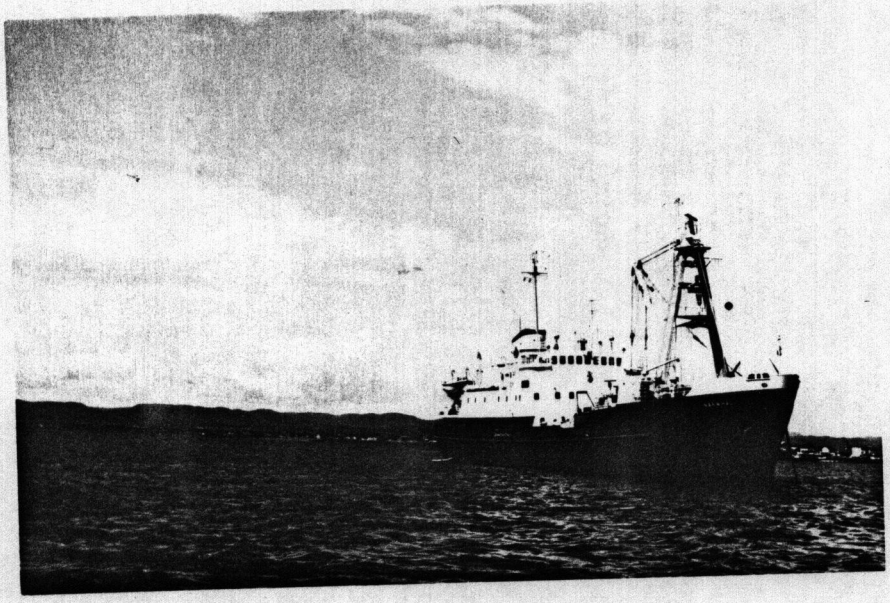
Fig. I Oceanographic Stations

STATION	LAT. (N)	LONG. (W)	DATES OCCUPIED
I	54°45.5'	80°00.5'	07.08 18.09 14.10
II	54°46.0'	80°24.5'	08.08 18.09 13.10
III	54°46.0'	80°58.5'	08.08 18.09 13.10
IV	54°46.0'	81°32.5'	08.08 18.09 13.10
V	54°47.6'	82°00.5'	08.08 18.09 13.10
VI	53°49.5'	81°49.0'	09.08 17.09 13.10
VII	53°49.5'	81°26.5'	09.08 17.09 13.10
VIII	53°49.5'	81°02.5'	09.08 17.09 13.10
IX	53°49.8'	80°33.5'	09.08 17.09 13.10
X	53°50.5'	80°01.0'	09.08 30.08 14.09 01.10 11.10
XI	53°50.0'	79°36.0'	09.08 30.08 14.09 01.10 11.10
XII	53°50.0'	79°21.0'	10.08 30.08 16.09 01.10 11.10
XIII	53°37.5'	79°36.0'	10.08 30.08 14.09 02.10 11.10
XIV	53°37.0'	80°00.0'	10.08 30.08 14.09 02.10 11.10
XV	54°02.1'	80°01.0'	10.08 30.08 16.09 02.10 12.10
XVI	54°02.0'	79°48.0'	10.08 30.08 16.09 02.10 12.10
XVII	53°49.3'	79°50.2'	11.08

APPENDIX A

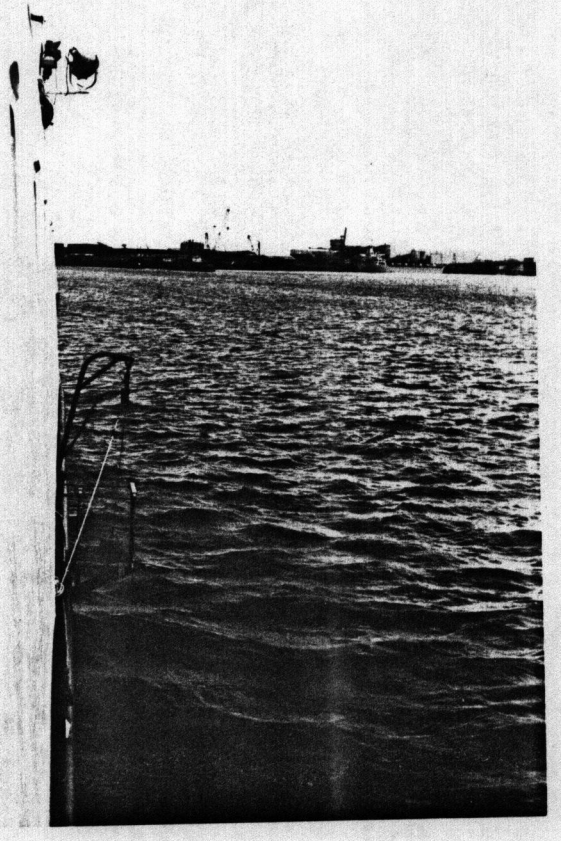
PICTURES

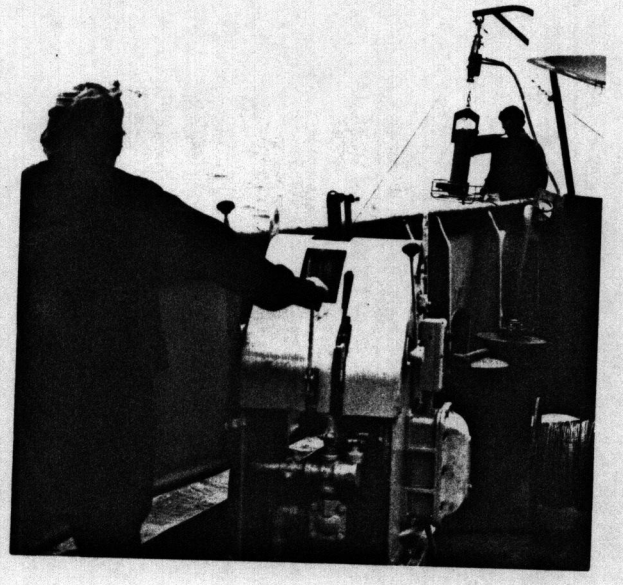
APPENDIX A



The NARWHAL in Sept Iles. The davit is visible at the starboard accommodation ladder, halfway down the starboard side.

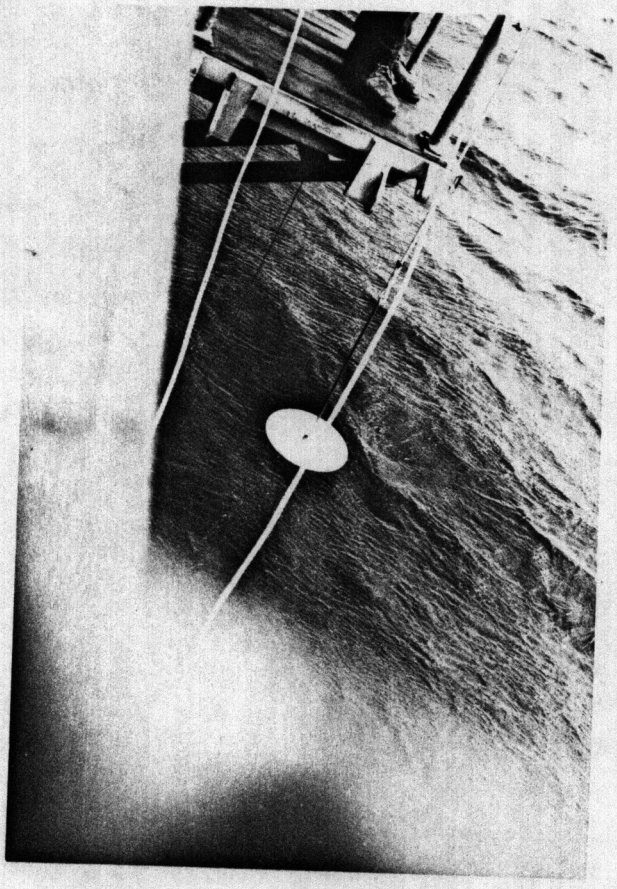
Looking forward from the boat deck. Visible is the landing of the accommodation ladder used as a working platform. Also visible are the blocks hung from the davit, the lead off for the meter wheel reading, the guy, the weight and a spotlight used for night illumination.



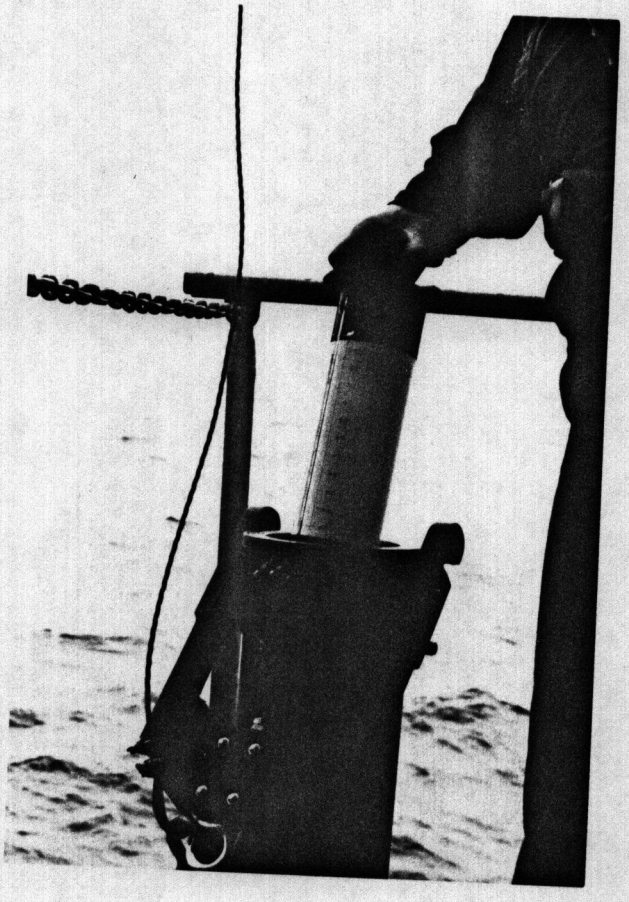


The Swann winch. This view shows the winch position, enabling the operator to see the platform clearly, and with little effort to look over the side to watch the cast approach the ship. Also visible, the Bissett-Berman and the meter dial, which was modified later.

A Knudsen bottle ready to be cast. Note the open valves, and the messenger hanging underneath (see left hand). Visible also, are the two thermometers in the bracket on the bottle.

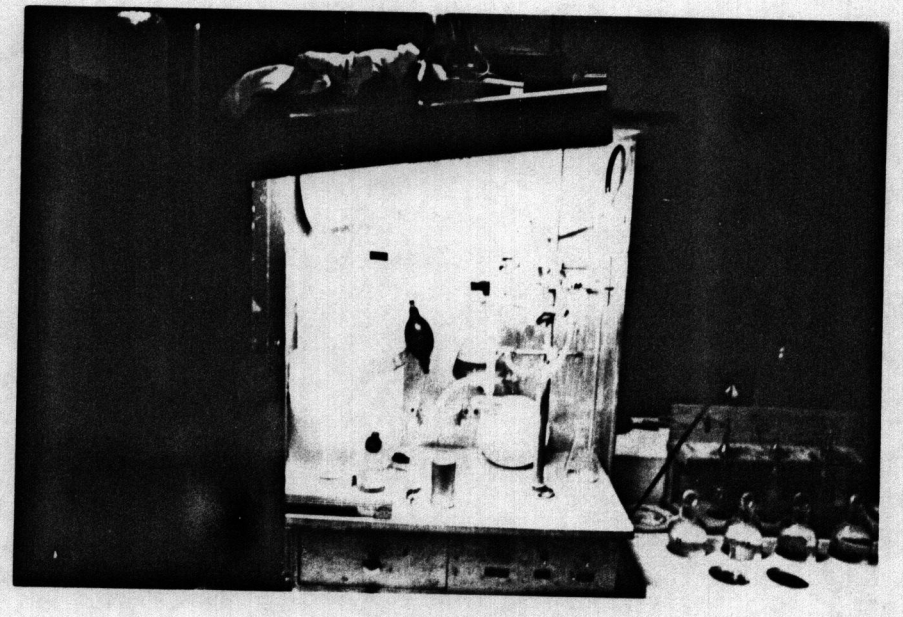


The Secchi Disc



The chart recorder being loaded into the Bissett-Berman std. prior to a cast being taken.

The plankton net hung from 'Crossbow' to keep it from fouling wire. Flowmeter is visible inside mouth of net. Note bracket for meter dial.



Oxygen titration set up. Large case contains buret, automatic pipet, on right and chemicals. At right are the pickling reagents #1,#2,#3 and some sample bottles in front of them. In the background is the Hytech salinometer.

APPENDIX B

LIST OF EQUIPMENT

APPENDIX B

List of Equipment

Quantity	Description
1	Plankton net on hoop with meter, swivel, etc.
1	Spare net
1	Crossbow
1	Box: labels, 2 wire clamps #1750, Jubilee clamps, swivels, etc.
1	Wire angle indicator
1	Wire bridle
2	Rods for Secchi discs (discs sheared from rods during operations)
1	Hytech 621 Salinometer #4, manual and tables
1	Safety line
19	Cases Mason jars - unused
5	Cases Mason jars with stored plankton samples
5	Cases Salinity bottles - empty
10	Cases Salinity bottles - stored samples - one per observed level
1	Saml1 carboy buffered formaldehyde
2	Cases Methanamine - 2 jars used
1	Plastipak of Formaldehyde used once.
1	Box chemicals - also beakers, vol. flask, grad. cylinders, etc.
1	O_2 kit
1	Box assorted glassware
1	Box miscellaneous - 3 lab coats, bucket, siphon, etc.
2	Cases standard sea water
1	50# concrete weight
1	Bissett/Berman STD, with charger, simulator, and paper
3	Mechanical B.T.s: 30m-#652; 60m-C71; 60m-6218

Quantity	Description
2	Alpine corers with two 6' lengths, two 2', and one 1 foot length
1	Bucket of valves and end pieces for Alpine corer
11	PVC tubing, 1¼" dia. for Alpine corer
1	Large Van Ween grab
1	Small Van Ween grab
1	Dietz Lafond grab
3	RS/5 Salinometers and sensing cables. Serials #1060, #1082, 1135.
2	Meter blocks
2	Lengths tubing for meter blocks
1	Meter wheel
12	Knudsen bottles with thermometer racks
1	Key for Knudsen bottles
12	Brackets for hanging Knudsen bottles
1	Box of 24 Reversing Thermometers for Knudsen bottles
1	Flashlight and magnifier for thermometers
1	Bag of rubbers for thermometers
1	Bag of 10 Messengers for bottles
1	Bottle of oil for bottles, with small brush
1	Bucket thermometer
1	BT Winch, Swann, Serial #1241, Series 315

Equipment Lost or Broken

2 of messengers - lost over side
2 of Secchi discs - lost over side - rod sheared at disc
1 case of Mason jars - broken during a gale
1 Burette - broken
2 of BOD bottle - broken

Equipment Malfunctioning

2 of Reversing thermometers

1 Bissett-Berman STD instrument - work satisfactory for 70% of the cruise, then the pen drive cords commenced slipping on the pulleys, creating erroneous tracings

1 Salinometer (Hytech). The drive belt on the water pump severed. It was replaced with an O-Ring, scrounged from the engine room as an emergency measure.