CONTINENTAL SHELF NORTHERN UNIT

INTERNAL REPORT NO. 79/14

# Cruise Report on 2nd Leg of Whitethorn. Cruise No. 79/03 29th May - 18th June 1979.

by

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JULY 10th 1979

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## 1. INTRODUCTION

The primary objective of this leg of the cruise was to sample the superficial sediments of the Halibut Sheet (Fig. 1). The Orkney Sheet was also a priority area and parts of the Shetland and Fair Isle Sheets were areas that could be sampled during bad weather. The equipment on board was a vibrocorer system, gravity corers, and shipek grab, and a shipek grab camera.

Although the Wimpey anchor winches gave trouble throughout the cruise the excellent weather allowed continuous working from May 30th to June 15th and towards the end vibrocoring was being carried out using only one stern anchor and the bow thrust to hold station. In all 264 stations were occupied, mostly in the Halibut Sheet.

## 2. PERSONNEL

| | | | |
|---|---|---|---|
| C.E. Deegan | IGS | CSNU | Chief Scientist |
| R. Holmes | IGS | CSNU | Night Geologist |
| H.S. Robertson | IGS | CSNU | Technical Officer |
| C. Graham | IGS | CSNU | Day Navigation |
| J. McGuigan | IGS | CSNU | Day Laboratory |
| G. Tulloch | IGS | CSNU | Night Laboratory |
| N. Campbell | IGS | CSNU | Technical Assistant |
| B. Tait | IGS | ACU | Geochemical Analysis |

## 3. IGS EQUIPMENT

The following IGS equipment was on board;

20 foot vibrocorer system with penetrometer Gravity corers (rock and sediment) including launching trough and Sykes winch.

Shipek Grab

Shipek Grab with camera

Cone dredge.

## 4. SHIPS PERFORMANCE

The ship performed very well during the whole cruise. The working platform and A frame are spacious and efficient and their proximity to the containers, which are on the same deck level, is very convenient.

The only unsatisfactory item of ships equipment was the radio. The set is very old and apparently is scheduled for replacement by a single side band set. Contact with Wick Radio could only be achieved at the extreme western edge of the Halibut Sheet and some time was lost steaming westwards to make essential phone calls. In the eastern part of the Halibut Sheet we were nearer to Bergen radio but did not have the crystals to operate on their working frequencies.

## 5. IGS EQUIPMENT PERFORMANCE

(a) The vibrocorer with the penetrometer performed very

successfully throughout the cruise. The penetrometer allows much more effective use of the system. When the vibrocorer is brought inboard its resting position, with the top of the core below the base, allows sediment to be lost through the valves in the piston. In extreme cases up to 1 foot of well sorted olive sand was lost from the top of the core. It was often difficult to extract the liner tube and core from the barrel, and quite a bit of time and physical effort was often needed.

(b) One gravity corer was lost. It apparently became stuck into overconsolidated clay and the wire broke at the splice just above the corer when the winch operator was trying to extract it.

(c) The Shipek Grab camera was only tried about 3 or 4 times and worked successfully on one station. Initial problems were experienced with the batteries not holding their charge long enough to take more than about three photographs. However this was overcome by wiring in an extra battery. On the one station where it worked the grab unfortunately cut through the cord holding the weighted compass after the picture had been taken and the compass was lost.

## 6. GEOLOGICAL RESULTS

During this leg 264 stations were occupied as shown in the table below;

| | EQUIPMENT | | | | |
|---|---|---|---|---|---|
| SHEET NO. | VE | CS | GS | CD | TOTAL SITES PER SHEET |
| 59-01 | 3 | 25 | 28 | 1 | 28 |
| 60-02 | 1 | - | - | - | 1 |
| 60+00 | 44 | 72 | 117 | - | 118 |
| 60+01 | 48 | 63 | 109 | 1 | 117 |
| EQUIPMENT TOTALS | 96 | 160 | 254 | 2 | 264 |

Owing to the good weather the ship was working continuously and there was little time for shipboard analysis of the results. Consequently no summary maps are produced with this report but some general observations are noted.

There is no obvious relationship in the Halibut Sheet between bathymetry and surface sediment type. The distinctive olive sand seems to be virtually ubiquitous with a number of other lithologies underlying it. In places a clean, grey, very coarse, extremely shelly sand is present beneath the olive sand and could represent the deposit of a lower sea level. Locally, pink and grey pebbly clays occur below the olive sand and in places the vibrocorer bottomed in a very stiff, dark grey, pebbly, overconsolidated clay. The pebbles in this latter material are well rounded and isolated suggesting they may have been dropped from floating ice.

The olive sand is a very distinctive surficial deposit and the colour seems to be derived from the quartz grains which frequently have a partial olive green/brown surface colouration. This may be useful in provenence studies since it often contrasts markedly with underlying sands where the

quartz grains are very clear and glassy.

Care should be taken in preparation of a surficial sediment map for the following reasons;

(a) As noted above the top of the vibrocore sample may be severely modified or lost altogether through the piston valves. As the olive sand noted above is quite mobile it could frequently be seen streaming out of the top of the barrel as the vibrocorer was brought into its resting position on deck. The position of the piston confirmed that loss had occurred.

(b) Shipek Grab samples are modified by removal of fines at both the point of initial impact (when a cloud of mud is sent into suspension and lost) and during the passage up through the water column.

## 7. CONCLUSIONS

1. Overall the leg was extremely successful and the sampling of the Halibut Bank Sheet was almost completed.

2. The Wimpey anchor winches were in a dreadful state of repair at the start of the leg and no spare parts were available. They were so bad that Coe's commissioned an independent report on them at Lerwick by a marine surveyor, presumably with a view to claiming against Wimpey for down time. The surveyors verbal opinion confirmed that the anchor winch situation was extremely unsatisfactory. (NB. A separate log of the problems

encountered with the winches during the leg is available.)

With one notable exception the Wimpey men on board were unhelpful and totally disinterested in the job to the extent that their carelessness contributed to breakdowns (e.g. tangling of anchor wires, loss of gravity corer, and damage to trough by thoughtless manipulation of the Sykes winch).

3. In marked contrast to the service obtained from Wimpey the ship's officers and crew could hardly have done more to assist the programme.

## 8. RECOMMENDATIONS

1. The ship is such an excellent working platform that it should certainly be used in future years if possible.

2. If possible Wimpey should be excluded from future sampling arrangements. Given the right incentives Coe's would acquire their own anchor winches and have them operated by their own crew. In addition they would ensure the staffing level is adequate to permit 24 hour vibrocoring. This would maximise the potential of the ship.

3. It would be worth investigating whether it is possible to recover the vibrocorer without tilting the top of the barrel down below the level of the base and thus losing sample from the top of the core and causing

disturbance. If it could be recovered with the barrel horizontal it would be an improvement.

4. Some thought should be given to the extraction of cores from the barrel. This wastes time and effort and the accident potential of this activity is high.

5. The points made above about the unreliability of both vibrocorer and Shipek Grab to adequately recover the surface sediment makes the development of the Shipek Grab camera even more of a necessity.

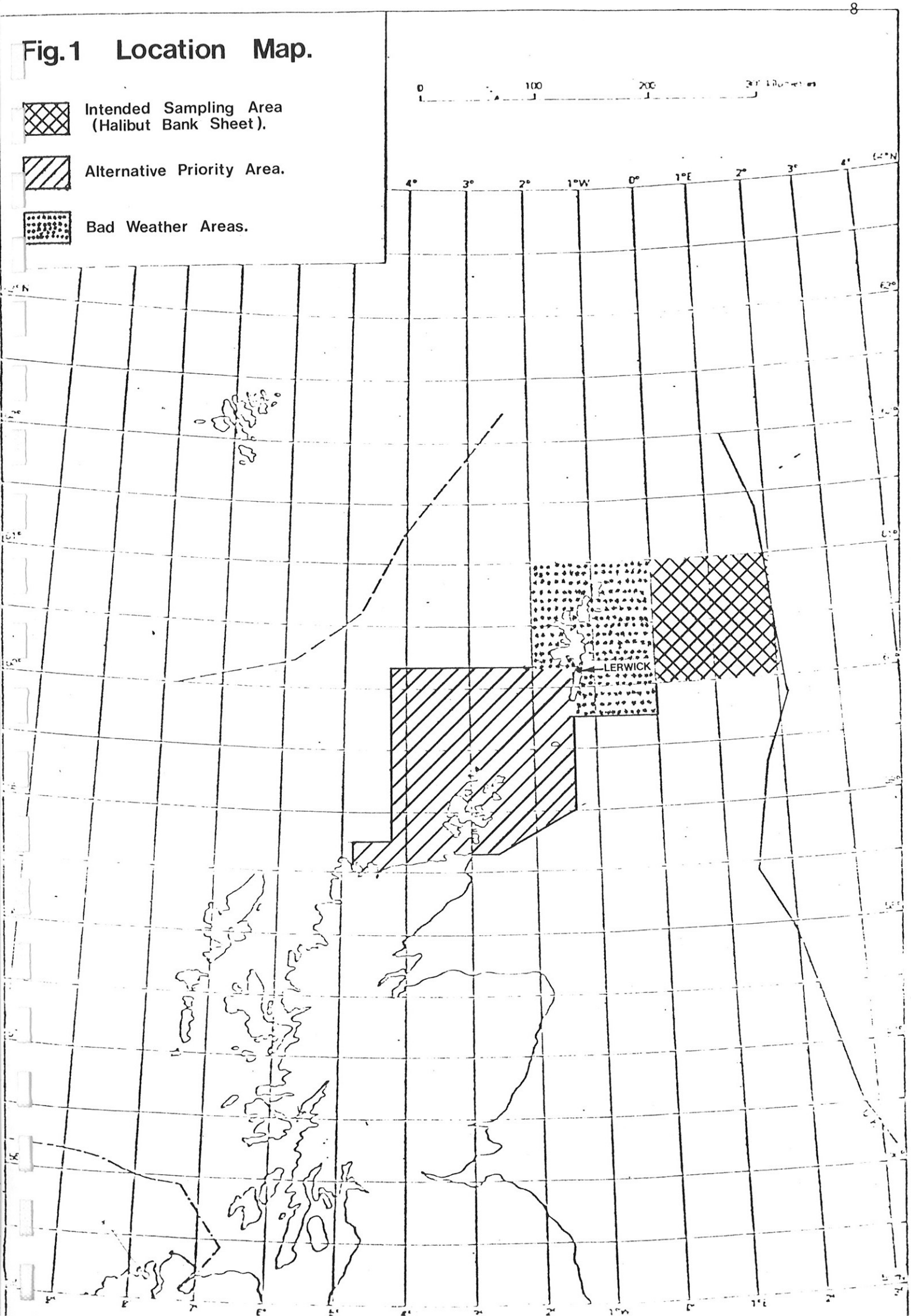
6. Communication between the bridge and the anchor winch operator should be improved as should that between the bridge and the working platform.

# Fig. 1 Location Map.

Intended Sampling Area (Halibut Bank Sheet).

Alternative Priority Area.

Bad Weather Areas.



## Survey Log

Tuesday May 29

| | |
|---|---|
| 1 | Housing for generator organised from Malacoff's. |
| 2 | Dawson Keith generator (IGS) taken off. Agent to arrange repair in time for next port call. |
| 3 | Triplates for gravity corer and vibrocorer collected from LHD Net mending Ltd. (Delivery note to be taken to Edinburgh). |
| 4 | 165 metres of non-stretch rope bought from LHD Net mending Ltd. |
| 5 | 1000 metre cable for gravity corer failed to arrive from Aberdeen on ferry. LHD advise that it should be on tomorrows ferry. |
| 1400 | Amended sailing time to midnight. Forecast 6-8 SW rain and fog. |
| 1615 | Advised that hydraulic pipe on Wimpey stem anchor winch is fractured. No spare is available but fitter has contacted Wimpey who are putting spare on first plane tomorrow morning. There is no possibility of anchoring until this repair is effected. Therefore from 2000 hrs tonight (29.5.79) until sailing time tomorrow morning is to be logged as down time. Wimpey are also taking the opportunity to send up spares for compressor. The position regarding spares for Wimpey equipment is regarded as highly unsatisfactory. |

Wednesday May 30

| | |
|---|---|
| 0900 | Weather forecast Viking/Forties South backing East 4-5 rain, fog patches. |
| 0940 | Call to IGS Edinburgh from agents. Spare part for anchor winch is on plane this morning. |
| 1015 | Spare parts apparently not on plane - still stuck at Heathrow. |
| 1030-1200 | Conversations with J. Ball (Wimpey) and T. Hart (Coe). J. Ball might manage to locate spare parts in Aberdeen and have it brought up by a Wimpey fitter on plane this evening. This seems unlikely and the earliest realistic time to get the spare here is midday tomorrow (31/5/79). Decided to leave tonight at 1800 hours to gravity core and shipek in Sheet 59.5N/1°W (i.e. in extreme south of the designated bad weather area). We will come in tomorrow and pick up the spare from a small boat. |
| 1715 | Left Lerwick to sample in Fair Isle North East sheet. |
| 2015 | Started gravity coring. |

Thursday May 31

| | |
|---|---|
| 0000-1130 | Continuing gravity coring. |
| 1130-1405 | Steaming to Lerwick to pick up Wimpey fitter who will fix new hydraulic pipe on anchor winch. He has managed to make a new pipe in Lerwick since his arrival yesterday. The proper spare in the package from London will not arrive today as weather has closed all airports on Shetland. The time from 1130 until completion of repairs to winch is certainly down time. |
| 1405-1545 | Repair to Wimpey winch carried out by fitter brought aboard from pilot cutter. |
| 1545 | Decided to do test vibrocore sample just outside Lerwick in order to test the repair job on the stern winch. |
| 1605 | Started laying anchors for test. |
| 1750 | Completed vibrocorer test successfully over 4m recovery. |
| 1800-1845 | Raising anchors - problems with stern winch again but not serious (oil seal). |
| 1845-1855 | Moving towards Lerwick to put Wimpey fitter ashore. |
| 1900-2400 | Steaming out to Halibut Bank Sheet. |

Friday June 1

| | |
|---|---|
| 0000-0040 | Steaming to Halibut Bank Sheet |
| 0040-0655 | Gravity coring. |
| 0655-0730 | Steaming from last gravity core station to first vibrocore. |
| 0730-0955 | Vibrocoring. |
| 0955-1030 | Stern anchor jammed on sponson ? down time. |
| 1030-1055 | Freed anchor steamed to next site. |
| 1055-2340 | Continuing vibrocoring. Problems with earth leakage in vibrocorer cable caused delay of about 1 hour on station 167. |
| 2340-2400 | Gravity coring. |

Saturday June 2

| | |
|---|---|
| 0000-0730 | Gravity coring. |
| 0730-0745 | Vibrocoring |
| 0745-0835 | Bowsing line broke during launch, time spent resplicing. |
| 0835-2230 | Vibrocoring. Problems encountered with a gravel horizon on four sites during the day (see samples 60+01/42 to 60+01/45). Penetration was severely inhibited by this. Weather excellent all day (SE 3-4). On last site one forward anchor became entangled in wire. Will have to use one of the others from now on. |

2230-2400 Gravity coring.

Sunday June 3

0000-0615 Gravity coring.

0710-2300 Vibrocoring - problems with forward anchor not holding on second station. Managed to complete site by using one stern anchor plus bow thrust to hold ship steady. Continued throughout day using only stern anchor plus bow thrust to hold ship steady. However weather has been good - Force 3 with only about 2 feet wave height. Problems of penetration occur in this area due to a dense hard packed olive grey sand near or at the surface which probably becomes thixotropic on vibration. At shallow depths with confining pressures it would be extremely difficult to penetrate.

2300-2400 Gravity coring.

Monday June 4

0000-0750 Gravity coring.

0750-2230 Vibrocoring - 8 stations completed in excellent weather. Some penetration problems due to dense hard packed sand. Recovery only averaging 35-40% through the day after long vibration times.

2230-2400 Gravity coring.

Tuesday June 5

0000-0710 Gravity coring.

0710-2325 Vibrocoring - same problems of penetration caused by dense sand and over consolidated clay (?till). Penetration average about 35%.

1815 Problems anchoring - wind about force 4.5 wave height c 3-4' at most. Forward winch still seems to be giving trouble; apparently a valve is faulty which does not allow wire to pay out freely. This seems to be compounded by inexperience on the part of the Wimpey fitters who are driving the winches.

2325-2400 Gravity coring.

Wednesday June 6

0000-0725 Gravity coring.

0725-2315 Vibrocoring. Now using 2 stern anchors plus the bow thrust to hold station. This seems successful and allows the Wimpey fitters to attempt to repair the forward anchor winch.

(1925-2055 problems with anchors - bad winching in caused wires to become entangled on two stem anchors. One hour time lost).

2315-2400 Gravity coring.

Thursday June 7

0000-0715 Gravity coring. Gravity corer lost on last station. It stuck into stiff clay/mud and wire broke trying to pull it out.

0715-2225 Vibrocoring. Spent time on last station changing wire on bowsing winch which had frayed - also changing chackles on new gravity corer. Vibrocorer cable pinched on recovery at last site, repair to cable required (time 1 hour).

2225-2400 Gravity coring.

Friday June 8

0000-0750 Gravity coring.

0750 Vibrocoring-minor problems caused by need to renew jubilee clips on cable sheath and electrical fault with penetrometer. First site completed without penetrometer working but 2.06m recovered.
Weather freshening Force 5-6 from N. Decided to change from system of anchoring with two stern anchors to using one forward and one stern anchor. Forward anchor winch needed further attention before starting. Also one piston in the stern anchor winch appears to be faulty.

0922-1000 Anchors being lifted excess time taken because of faulty piston in stern winch.

1045-1110 25 minutes lost trying to get forward winch started.

1320-1454 Trying to anchor force 5-6 wind, wave height c 10 feet. Problems with anchors not holding and winches not braking effeciently.

1454-1550 Vibrocoring

1550-1620 Lifting anchors wind freshening to force 7.

1620-1820 Steaming slowly towards gravity core sites and waiting on weather.

1820-2400 Gravity coring.

Saturday June 9

0000-0430 Gravity coring.

0430 Finished gravity coring due to bad weather (force 6-7).

0430-0841 Sailing slowly towards next vibrocorer site and waiting on weather. Forecast indicates decrease in wind speed. Conditions moderating.

0841-0904 Anchoring on first vibrocore site.

0904-0940 Vibrocoring.

0940 Pulling anchors (2 stern anchors).

0940-1030 Pulling starboard stern anchor winch not functioning efficiently - down time.

1020 Starboard aft anchor home. Clutch on port aft anchor failed - cannot raise anchor. Removing spare off forward starboard anchor to put on aft anchor winch. Wind speed Force 4 very moderate sea wave height 4-5 feet (Captains estimate).

1100 Fitter reported blocked air line on aft winch. Repairs continuing.

1300 Starter motor on aft winch seized. Motor from forward winch removed and put into aft winch to attempt to raise anchor. This means forward winch is totally out of commission and no forward anchors can be used.

1400 Aft winch also has slight hydraulic leak from the pipe that was "repaired" at Lerwick.

1440 Stern anchor retrieved. Unable to contact Wick Radio to get spares organised by Wimpey. Decided to steam to western edge of Halibut Sheet into Radio contact to organise spares. Situation now is that we have no forward anchoring capacity. The port quarter anchor cannot be used because of faulty clutch the aft center anchor can be used but wire is badly frayed and the starboard quarter anchor is OK. However if the hydraulic pipe fails again (as it shows signs of doing so) then we will have no anchoring capacity at all.

NB- A more powerful radio set on the ship would have obviated the need to steam closer to Lerwick to phone for spares.

1804 Anchor laid on vibrocorer site. Down time from 1030-1804.

1804-2215 Vibrocoring.

2215-2400 Gravity coring.

Sunday June 10

0000-0716 Gravity coring.

0716 Vibrocoring

NB- 1650-1750 delay in anchoring caused by the two anchor wires becoming crossed. 2020-2105 delay caused by badly laid anchor two attempts to anchor up.

2215-2400 Gravity coring.

Monday June 11

0000-0712 Gravity coring.

0712-0845 Vibrocoring.

0845 Trying to raise anchors after first vibrocore site. Hydraulic pipe on aft anchor winch failed. Pipe from forward winch taken off to try and use as spare in order to get anchor up.

1000 Anchors up proceeding south towards sample site 55 to get into radio contact with Wimpey to see if spares ordered on Saturday 9th are on the way. A spare hydraulic pipe is in Lerwick but if the other spares have not arrived then it may be better to stay out and avoid two trips to Lerwick. In the meantime the ships engineer is attempting to make a new hydraulic pipe. Captains advice is that it would not be advisable to attempt to anchor with the hydraulic pipe in its present condition (NB a decent radio on the ship would have obviated the need to steam south however in this case it takes us nearer to Lerwick if we have to go in. It is imperative to get a new radio on board) Wimpey fitter also reports leak in fuel tank for aft anchor winch. Weather conditions perfect wind 2-3 no sea.

1250 Having made phone calls to ensure that spares will be available at Lerwick, started anchoring on vibrocore site. The hydraulic pipe from the forward winch seems to be holding.

1300-1320 Bow thrust developed fault 20 minutes time lost.

1320-2300 Continued vibrocoring.

2300-2400 Gravity coring.

Tuesday June 12

0000-0718 Gravity coring.

0718-2115 Vibrocoring

NB- At 1045 clutch on the starboard anchor winch failed. Managed to tighten it up sufficiently to raise anchors however the only stern anchor now operational is the center one with the frayed wire. However new hydraulic pipe made by Chief Engineer is being fitted to forward winch to try and get that going as one anchor forward is still potentially usable. Presently vibrocoring with only one stern anchor and maintaining station with bow thrust weather luckily allows this (force 1-2 no swell).

2115-2400 Gravity coring.

Wednesday June 13

0000-0715 Gravity coring.

0715-0900 Vibrocoring.

0900 Faulty spooling gear on forward port winch caused anchor wire to become fouled on drum. Fitter removing clutch piston from forward port anchor back to forward starboard anchor to try and achieve a forward anchoring capability.

1006 Carrying on vibrocoring.

1305 Hydraulic pipe on forward anchor winch leaking again. The chief engineer's new pipe is obviously not holding but can continue vibrocoring on one stern anchor. Wind force 2-3 almost - no significant swell.

1305-2230 Vibrocoring

2230-2400 Gravity coring

Thursday June 14

0000-0820 Gravity coring

0820-1706 Vibrocoring with only one stern anchor. This was reasonable successful but on the fourth site the wind and swell made recovery so difficult that decided it was no longer practical. Since port call has been brought forward to 0700 tomorrow decided to continue gravity coring until 0100 tomorrow, and then steam to Lerwick.

1112-1325 Steaming westwards to get into radio contact with Shetland radio to organise things for port call.

1536-1706 Vibrocorer developed fault in cable time spent on site repairing it. NB; penetrometer has not been working on all vibrocore stations today. HSR engaged in repairs and samples are being taken without the penetrometer running.

1706-2400 Gravity coring.

Friday June 15

0000-0100 Gravity coring.

0700-0730 Steaming to Lerwick.

0730 Alongside in Lerwick.

Saturday June 16

0000-2400 Alongside in Lerwick repairing anchor winches.

Sunday June 17

0000-1210 Alongside in Lerwick.

| | |
|---|---|
| 1210 | Set sail for NE Fair Isle Sheet to test anchors and vibrocore. |
| 1405 | Started anchoring on first station. |
| 1405-2240 | Vibrocoring. |
| 2240-2400 | Gravity coring. |

Monday June 18

| | |
|---|---|
| 0000-0645 | Gravity coring. |
| 0645-0910 | Proceeding to Lerwick for port call. |
| 0910 | Alongside in Lerwick. |

## Log of Anchor Winch Problems

29.5.79

1615 — In port advised that hydraulic pipe on stern anchor winch is fractured. No spares available. All stern anchors unusable. Wimpey attempting to get spares to Lerwick. Down time begins at 2000 (on 29.5.79). Since this fault prevents sailing. NB: Wimpey were notified of the requirements for this spare on 28.5.79 but little seems to have been done about it owing to the Bank Holiday. On Tuesday the spare pipe together with other spares was sent in a container weighing 100 kilos but British Airways could not take it because of the weight. It is apparent that there are very few, if any, spares on board for the anchor winches.

31.5.79

1405 — Picked up Wimpey fitter from pilot boat after a night's gravity coring. The spares from London have still not arrived. Wimpey fitter (K. Sawkill) has repaired the old one in Lerwick by welding it. Thus repair was tested by anchoring up for a trial vibrocore station just off Lerwick and it seemed to be satisfactory.

1800-1845 — Oil seal failed on stern anchor winch when raising anchors - repaired on board.

1.6.79

0955-1030 — Stern anchor jammed in sponson due to inexperienced winch operator. Time lost in cleaning it.

2.6.79

2215 — Center forward anchor entangled in wire during recovery (inexperienced operator?). Thus anchor now unusable.

5.6.79

1815 — Fault in spooling gear (?value) prevented wire from paying-out from aft anchor winch. Repair effected.

6.6.79

1925-2055 — Inexperience caused the two aft anchor wires to become crossed when lifting them in. One hour time lost untangling them.

8.6.79

0922-1000 — Excess time taken to lift anchors due to faulty piston in stern anchor winch.

1045-1110 — 25 minutes lost trying to get forward anchor winch started. Problem not specified probably water in deisel.

1320-1454 — Anchors not holding satisfactorily and winches not braking efficiently wind force 5-6, swell about 10 feet.

9.6.79

1030 Clutch failed in port aft anchor. Spare piston removed from forward starboard anchor in order to raise stern anchor. However this did not cure the basic fault, till clutch was tightened up sufficiently to get anchor back.

1100 Blocked air line on aft winch - repairs continued.

1300 Starter motor on aft winch seized up. Starter motor removed from forward winch to use as spare to raise anchor. Forward winch now out of commission.

1400 Hydraulic leak developed from the pipe on after winch that was supposed to have been repaired at Lerwick.

1440 Anchors eventually all on board. Situation at this time is that no forward anchoring capability is available and the port aft anchor cannot be used because of faulty clutch (i.e. cannot pay out wire). The centre aft anchor wire is frayed also so there is only one good anchor remaining. (starboard quarter)

10.6.79

1650-1750 Delay caused by the two stern anchor wires becoming crossed.

2020-2105 Delay caused by fouled wire - badly laid, two attempts taken to anchor up.

11.6.79

0845 Hydraulic pipe on aft anchor winch fouled, pipe taken off forward winch to use as spare to get anchors up. (Anchors retrieved 1000 hrs.) Ship's engineer is attempting to make new pipe. Leak in fuel tank reported on aft winch - repaired by fitter.

12.6.79

1045 Clutch on starboard aft anchor fouled. Managed to tighten it sufficiently to raise anchor. Only the stern center anchor with the frayed wire is now usable.

Attempting to fit pipe made by Chief Engineer to forward winch to get that going again as one anchor is still potentially usable. Starter motor taken from aft winch has been repaired by fitter and can now be used on forward winch. This operation seems successful.

13.6.79

0900 Faulty spooling gear on forward port anchor caused wire to become fouled on drum. This anchor is now unusable. Fitter is removing parts (clutch piston) from forward port anchor drum to the forward starboard anchor to replace the parts that were removed on 9.6.79 to the stern port anchor to recover that anchor, in the hope that the forward

starboard anchor can be made operational.

1305 Hydraulic pipe on forward anchor winch made up by chief engineer failed. Thus all forward anchors are now unusable, and only one stern anchor remains.