INSTITUTE OF GEOLOGICAL SCIENCES
CONTINENTAL SHELF NORTHERN UNIT
Internal Report No. 80/5

Cruise Report on 3rd Leg of "Whitethorn", Cruise No 80/WH/04 3rd - 16th July 1980

by

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July 30, 1980

CONTENTS

1. Introduction

The object of Leg 3 or cruise 80/WH/04 was to continue sampling in the area 56°-58°N, 2°W and East to the Median Line. Priority was given in this leg to completion of the Forties Sheet, 57°-58°N, 0°-2°E. In addition to this work some sites were occupied in the Peterhead SE 1:100,000 sheet to complete the sampling of leg 2 in that area.

Weather was mixed during the trip, either being very good or very bad. Two complete days were lost owing to bad weather but there were no serious losses of time due to equipment failures. A total of 152 sites were occupied. See Appendices I and II for the survey log and a time analysis.

2. Personnel

A C Skinner	IGS CSNU	Senior Scientist
S Brown	IGS CSNU	Day Lab/Deck
C Graham	IGS CSNU	Survey or day lab/Deck
P Wiggins	IGS CSNU	Technical
H S Robertson	IGS CSNU	Technical
R Sutherland	IGS CSNU	Night Deck
D Long	IGS EGU	Night Lab
M Stuart	IGS A + C	Day Lab/Geochemistry
L Tarbet	QMC	Day lab/Deck microbiology
M Love	BRE/Keele University	Day Deck/Engineering geology

3. Equipment

A. Ship's

Diesel - hydraulic anchoring and vibrocoring handling systems

Rolls Royce/Wardpower electric power supply

Atlas Deso Echosounder

B. IGS

6m vibrocorer equipped with retraction and penetration indication

Gravity corer with Lebus winch and Nylon hoist line

Shipek grab and shipek camera grab with Lebus winch

4. Ship's Performance

a) Anchoring

Generally very satisfactory indeed. The Bruce anchors held well in all types of material but on some occasions seemed to slide along the bottom without digging in. After digging in they rarely moved. The winches themselves had slippage on occasion but this caused problems only on two occasions. There should however be a hand brake fitted to the winches if the hydraulics allow slippage as they do.

b) "A" Frame and Winch

These items were not satisfactory being too slow in operation and further attention was requested at the next port call to rectify this.

c) Rolls Royce/Wardpower Generator

Functioned well until a complete power cut-out occurred. Some eight hours was spent getting the generator into a working condition again to complete the leg. Again attention was requested at the next port call and the sampling continued without an earth leakage protection circuit. Consideration should be given to mounting a separate fuel tank to the generator as the present tank requires to be more than half full at all times when there is a heavy sea - otherwise the generator cuts out when the roll of the ship starves the fuel feed.

d) Atlas Deso Echosounder

Some time was spent cleaning up the power supply to this equipment and ensuring the batteries were fully charged. After that the unit seemed to function better. Consideration should be given to R. Cross's idea of a power pack to eliminate the batteries - this would also reduce the heat and battery fumes on the bridge.

e) Bow Thrust

The bow thrust is not viable for our operations. Serious thought will have to be given to this item before a free vibrocoring operation is a reality for everyday use.

f) General

The overall performance of the ship was excellent. The competence, quality and approachability of the Captain, Officers and crew were a major contribution to a very successful leg.

5. IGS Equipment Performance

a) Lebus Gravity Coring Winch. New brake linkage pins and grease points had been installed in Aberdeen prior to the start of the leg and this item functioned well. The nylon line had to be respliced towards the end of the leg for the first time in the cruise. Gravity coring was controlled and trouble-free.

b) Lebus Shipek Winch. The operating lever locking mechanism has been removed completely. No winch should ever be left running unattended and consequently there is no need for a lock for the operating lever. This also allows the 'fail safe' neutral position to automatically engage should the winch be left unattended and the motor running for any reason.

c) Vibrocorer. Some retraction wires were broken and an earth leakage trip occurred when an electric plug connection failed underwater. Generator problems necessitated the operation of the vibrocorer in the latter part of the leg without an earth protection circuit but did not cause any problems. The "penetrometer" performed extremely well. Two strong plates were welded on the vibrocorer deck at the feet of the

vibrocorer to assist in launching.

d) Shipek Grab. One shipek grab was lost when the bottom half "fell off" the top half on the outward swing of the davit prior to taking a sample.. Presumably the retaining pin on the shipek shaft had become weakened by sampling in rough weather the previous day and night.
The shipek camera grab was completely rebuilt and is now operational on a routine basis in reasonable weather. Photos developed on board are of good quality.

e) Decca Navigator and Track Plotter. No problems occurred with the navigator but the plotter required attention for the same cursor problems which occurred on leg 2. However, these were resolved and the plotter functioned well after that.

f) General. A new block was set up for bowsing the gravity corer. This allowed a better pull to the winch and avoided crossing of wire on the bowsing winch drum. Likewise another block was substituted for the existing arrangement handling both the vibrocorer and gravity coring bowsing to be used for the vibrocorer only

A core extraction line using the Lebus winch capstan was also set up thus eliminating the use of the bowsing line and winch with a much lighter but equally effective unit.

6. Geological Results

The sites occupied are summarised below. Given the long steaming distances between sites and the days idle through bad weather the trip

compares faviourably with past performances.

Sheet No.	Total Stations	Shipek	Vibrocorer	Gravity Corer
57/-01	2	2	-	2
57/+00	102	102	32	70
57/+01	48	48	21	27
	152	152	53	99

The majority of these sites are infill sites and thus cannot easily be correlated. However the area of "Witch Ground Beds" can now be defined more clearly. At least three geotechnical units can be identified within the present sampling and thus will enable further correlations to be made with samples previously collected. In areas of seemingly monotonous sediment the penetration indication on the chart recorder can be used to identify various changes which should be related to the eventual core log. In this way we may be able to make a geological use of the penetrometer.

7. Conclusions

The leg was very successful with no major problems occurring. Those problems which did occur were able to be solved speedily and the presence of two technicians on board certainly helped here.

Maintenance and refurbishing can be carried out at sea but only in reasonable weather - it is unrealistic to hope that we can do much repair/painting work in bad weather, even under cover as the ship moves about too much. Accidents could have been expected if we persisted in trying this out on leg 3. A number of small problems exist on the ship side - such as slippage of the anchor winches, faulty electrics especially on the deck lights, slow 'A' frame and winch and fuel feed to the main generator. One considered to be serious is the inadequacy of the bow thrust.

8. Recommendations

I endorse R Owens' suggestion of a Post Cruise Meeting of technical and senior scientist staff for constructive appraisal of this year's work and suggestions for the future.

I think the system of having two technicians on board is valuable as two heads are always better than one when it comes to sorting out problems. This obviously has to be put in the context of getting all the shore work done also but merits this year's trial. There should however always be an overlap to provide continuity not available in even the best of port calls.

With the quality of the watch keeping and awareness of our work programme shown by the officers a full time surveyor is not necessary. A day surveyor/deck hand is now a viable proposition. Should a system of 24 hour vibrocoring become a reality then the situation will become easier still as night sites will not have to be plotted. The surveyor on this leg made a running track plot for seven sites plus detailed anchor plots on a separate area of the same chart roll. The bridge officer utilised the large anchor plots himself as and when required within the context of the running plot. Night sites were put on the track plotter by the Surveyor and plotted on the Admiralty Chart by the Officer of the watch. The positions were extracted from the Coe log sheets the following morning by the surveyor and entered on the IGS chart and Log sheets.

I need to be convinced that there is a case for a PSA and archived grab sample to be taken on the ship from the shipek grab. It may be scientifically unsound and, in the case of small samples entails putting the grab down again for no good reason other than filling another jar.

The minor problems on the ship are of no concern to us provided they are readily repaired, which they are at present. However, I think in the interests of the ship's engineers we should continue to bring these problems to the attention of the owners as the goodwill of the engineers, especially at odd hours of the night can not be infinite. A simple example is the excellent deck lighting which is fitted with inferior quality switches most of which have now had to be wired out to keep the system going. The switches kept failing and an engineer had to be called to re-instate the lighting on a number of occasions.

The bow thrust needs a careful scrutiny if "Whitethorn" is to be used with free floating cables and no anchoring vibrocoring. At present it is incapable of holding the ship's head, for less manoeuvering it in any but the calmest of wind and tide conditions.

The anchor winches slip under strain. A hand brake should be installed if the anchor wire stops are not to be used. I understand they are not used because of possible damage to the wire. The present item on the winches which looks like a handbrake is a lock for putting the hydraulic brakes in the off position and is of no use in assisting the hydraulics to hold the winch drum.

Figure 1 - Location of Sampling Area

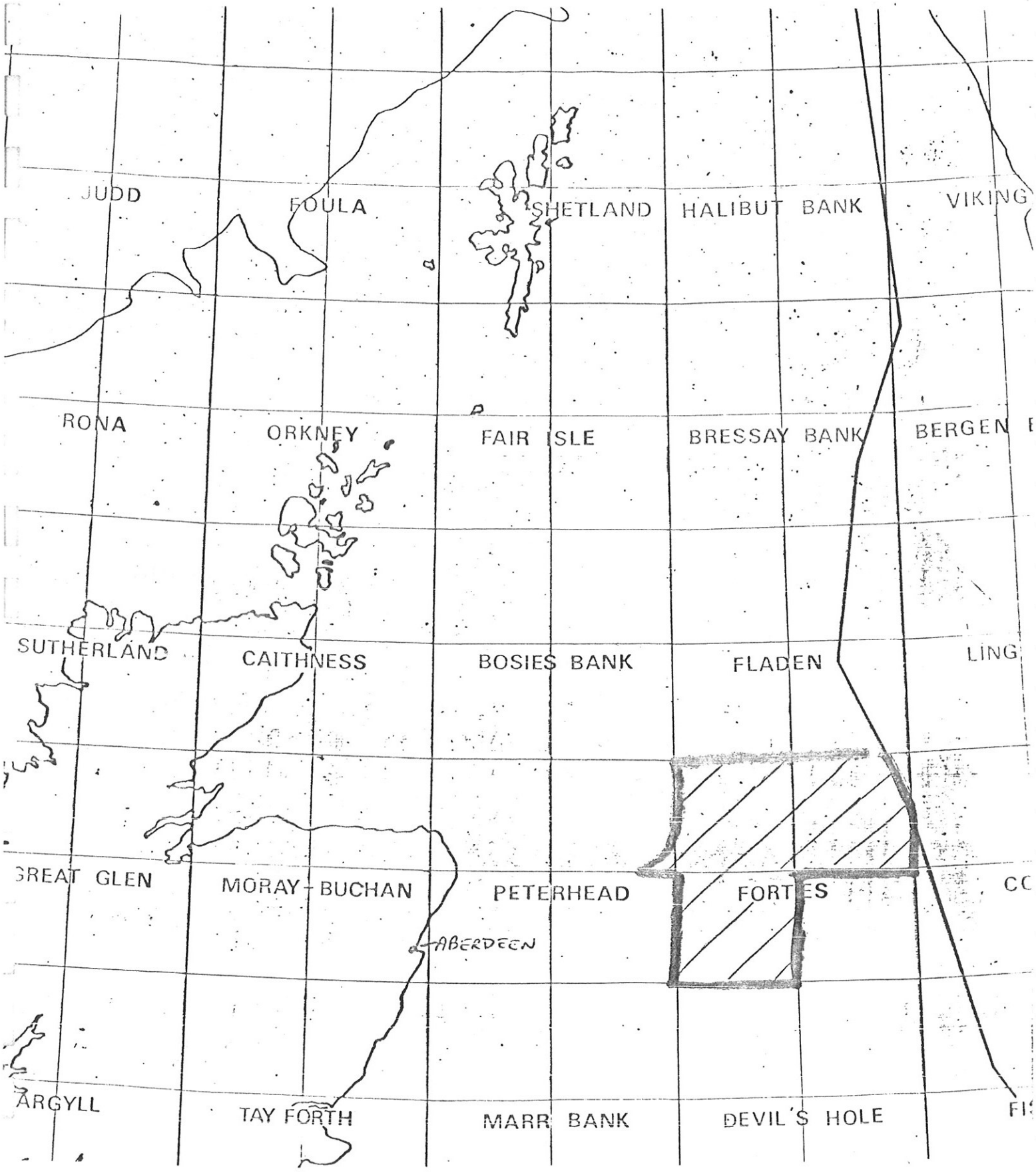

TABLE I TIME UTILISATION ANALYSIS

DATE	IN PORT	ON PASSAGE	BETWEEN STATIONS	ANCHORING	ON STATION	DOWNTIME			NO.V/E STATIONS	NO.GS/CS STATIONS	REMARKS
						WEATHER	EQUIP'T	SHIP			
July 3	20.5	3.5									
4		3.9	7.6	6.7	3.8				5	8/3	
5			10.8	7.3	5.9				6	15/9	
6			11.4	4.4	8.2				7	17/10	
7			10.6	5.6	6.3			1.5	7	15/8	
8			10.2	3.3	5.0			5.5	5	14/9	
9			4.1		0.7	13.2				4/4	Start of unworkable weather.
TOTAL %										(CONTINUES NEXT PAGE)	

TABLE I TIME UTILISATION ANALYSIS

DATE	IN PORT	ON PASSAGE	BETWEEN STATIONS	ANCHORING	ON STATION	DOWNTIME			NO.V/E STATIONS	NO.GS/CS STATIONS	REMARKS
						WEATHER	EQUIP'T	SHIP			
July 10						24.0					
11			7.1	5.0	4.7	7.2			7	9/2	End of unworkable weather
12			13.1	5.0	5.9				6	15/9	
13			14.5	3.9	6.6				5	21/16	
14			12.7	5.5	5.8				5	18/13	
15		7.6	13.5		2.9					16/16	
16	16.5	7.5									
TOTAL	37	22.5	60.9	46.7	55.8	44.4		7	53	152/99	
%	13.5	8.2	22.2	17.0	20.3	16.2		2.6	0.88 hrs/site average anchoring time		

APPENDIX I Survey Log

Wed 2 July

1100 A Skinner aboard

1300 Remainder of Leg 3 crew aboard

1500 Tour of ship with R Owens completed. Points for checking/ clarification before sailing noted.

1600 R Owens off

Agree sailing 1800hrs tomorrow. Decca repairs to Navigator and plotter completed. Lebus gravity core winch being repaired. Main vibrocore hoist wire respliced. 'A' frame and winch hydraulics speed questioned and asked J. Hunt of Coes to give them some attention. Copies of reports by J Pheasant and R Cross given to Captain as some items connected with the ship. BRE samples from Leg 2 off.

Thurs 3 July

0800 General stores replenishing and tidying up commences.

1300 Lebus engineer ashore with repairs to winch complete

1355 Weather forecast not good. Advised D Evans (shore liaison) of sampling programme proposed

1805 Cast off for fuel bunkers

2005 Cast off from fuel jetty for 1st sample site - Peterhead SE sheet approx. 7hrs steaming

Fri 4 July

0355 Commence 1st night site

0500 Steam for 1st day site

0700 Vibrocorer on sea bed but anchoring problems. Poor penetration and ship moves. Broken retraction cable and bent barrel.

0930 2nd vibrocorer station. No anchor holding even with 1000m of cable out. Take gravity core and commence to pull in anchors. Bottom sandy with some mud and shell fragments.

1255 3rd vibrocore site - anchoring OK. Routine radio call to office

2340 Finished vibrocoring and on to 1st night site

Sat 5 July

0540 Finish last night site

0700 On 1st vibrocorer site

2230 Steaming to 1st night site

Dayshift progressed well, good recovery despite some anchoring problems. 'A' frame winch constant at 16m/min in high or low speed position and not satisfactory. One electric tail blown underwater but remade as spare. Spare deck cables and retraction cables made up

Sun 6 July

0544 Finish last night site

0615 Commence anchoring on 1st vibrocorer site

1220 Completed 3rd site. No retraction and on recovery find that the retraction cable is jammed in the top pulley. Cable replaced and pulley repaired.

1320 on 4th site. No retraction again. Pull up a full barrel and recover with difficulty as it bends over when the vibrocorer is tilted. A few novel ideas have to be used. No retraction because cable had parted at tailunit splice. 3rd and 4th site had been done on one anchor and bow thrust but that did not cause the retraction problems.

1612 On 5th site. completely successful

2140 Depart last day site (7th) to commence night sampling

No more retraction problems after 4th site.

Two plates installed on outboard end of vibrocore deck to assist launching of vibrocorer.

Mon 7 July

0532 Last night site completed

0630 On 1st vibrocorer site

2250 Off last vibrocorer site (7th)

2326 Commence 1st night site

Good recovery throughout day. Approx 2hrs downtime due to anchoring. Spooling gear problems and pin out of aft anchor. No damage. Routine radio telephone call to office, working positions until Wednesday given.

Tues 8 July

0630 Commence 1st vibrocorer site

1630 5th vibrocorer site. Vibrocorer launched and down 132m. Total power cut out on Rolls Royce Wardpower generator. Generator still running but AVR fuse blown. Attempted with another fuse but blown again. Changed AVR but fuses still blown. Checked phases on generator and all shorted out to earth. Chief Engineer contacted J. Hunt (Coes) who said to disconnect all circuits from the generator and try the generator alone. It soon became apparent that the neutral to earth link installed by R. Cross was causing the earth short as everything worked if this was removed. The fuse box with this link was isolated and the large Lebus winch on a separate circuit was tried. It functioned correctly and the generator kept running.

Each connection to the other fuse box was then checked but no fault could be found with any circuit which would allow us to

disconnect that connection and retain the neutral to earth linkage.

The purpose of the neutral/earth linkage was to provide an earth leakage circuit for the vibrocorer according to R. Cross. I therefore requested that the generator be run with this link disconnected and all power circuits switched off, then carried out the following:-

1. Tested large Lebus winch - all OK, switched off
2. Switched in second fuse box
3. Switched on shipek winch - OK
4. Switched on vibrocorer retraction - OK
5. Switched on vibrocorer motor - OK
6. Stopped vibrocorer using earth circuit button - OK. We do not think this should have worked without the link in if R. Cross thought it necessary.
7. Switched on welder - OK
8. Switched on lab equipment and lights - OK
9. Switched on stores containers lights - OK
10. Switched on large Lebus winch again and vibrocorer motor - OK
11. Switched off all equipment replaced all panels, safety covers, etc. and retested - all OK.

Decision taken by myself to continue work with link removed and see how things go. J. Hunt to contact IGS/R Cross tomorrow to find out more about this linkage. It seems strange that the system should have worked for six weeks before developing a fault and it may still be in the generator.

2200 Steaming for 1st night site. Instructed night staff to keep a close watch on the generator and if power should go off to try and record the sequence of events.

Note from conversation with Chief Engineer and Harry Robertson.

At Fleetwood there was an earth leakage problem on the new vibrocorer switch boxes but not on the old blue box which tripped out. The same circuit wires ran to all three boxes so there must have been some sort of earth leakage return. The Chief Engineer reported that after the neutral/earth linkage had been installed some rewiring in the new boxes was done by R. Cross. The circuits were modified - was it because the earth leakage still did not work?

Wed 9 July

0440 Night work stopped as weather becoming too bad. NE'ly 5-7 with force 8 forecast. Steam into weather

0600 Weather worsening. Steam into 1st anchoring position

0730 Heave to weather too bad to work

0900 Call to office on R/T advising position and generator problem. Contact to be made with R. Cross and Coes via office.

1530 Still hove to. J. Hunt of Coes advises on generator: earth leakage circuit will not operate without neutral/earth link. Try replacing it with a fused section first confirming with a test lamp that there is no earth protection. Confirmed this then connected the link and blew the fuse.

1630 Contacted R Cross via R/T and asked him about the generator problem direct. The earth leakage test button only tests the relays - hence our ability to cut out the motor under test. We can go ahead without the earth leakage with a slight risk of shocks in the cable if it is live and faulty at the same time. Otherwise it is OK. Robin feels the problem is at the generator end and we will look into this again.

1755 Forecast NE 6-8 reducing to 5 so perhaps by morning we shall manage to work again.

1900 Attempted to trace generator fault again. Forced to conclude

that generator is OK and we will use without link until port call

2325 Still hove to. Night sites planned but unlikely that we will be doing anything tonight. Forecast better NE 6.

Thurs 10 July

0600 Still hove to. N'ly 7

1200 Call on radiotelephone to office (D Evans) re generator and odds and ends. Advised office we will use vibrocorer without earth leakage protection circuit until Aberdeen if weather improves and we can work. We will take added precautions. Dan had been in touch with Robin again and he had been in touch with Wardpower. Request to check insulation on AVR. We did this and it is plastic! Work is progressing on shipek camera and contactor in cable hauling winch.

2000 Weather possibly moderating and forecast giving Nl'y 6 moderating and backing 3-4 tommorrow

Fri 11 July

0200 Attempted night site but had to abandon

0500 Attempted night site but had to abandon

0700 Anchor up and attempt vibrocorer site - OK

1200 At 3rd vibrocorer site. Link call to office. Commence 1st night site.

Sat 12 July

0600 Finish last night site

Alternate gravity and vibrocorer sites all day to complete Forties NW sheet

2330 Completed last day site and heading for 1st night site. Shipek grab camera ready for trials. New shipek line spliced. New bowsing line for gravity corer installed and effective.

Sun 13 July

0545 Finished last night site and on to 1st day site

Alternated with vibrocoring and gravity coring throughout day

2205 Steaming to 1st night site

Shipek camera tested and all working but water in housing and possible switching in mid water. Harry Robertson developing film tonight. Spare vibrocorer switching box tried- worked for a few minutes then failed. Repair in progress.

Mon 14 July

0600 Finished night sites steaming for 1st vibrocorer site.

Weather calm but heavy swell. Wind increasing throughout day but able to continue. Forecast N'ly 5-6 occ. 7

2100 Commence gravity coring and night sites

Shipek camera now fully operational. Contactor faulty in spare vibrocorer switch box and can be repaired. Link call to office for arrangements for port call and drilling ships.

Tues 15 July

Gravity coring continued throughout morning on route to next vibrocore site. Weather freshening but just workable.

1000 Nylon hoist line on gravity corer outer sheath parted at 70 metres up where there had been a fray due to spooling gear problems on 1st leg. 100m removed and new eye respliced in with hard eye on end.

1120 Shipek grab "dropped off" end of hoist wire. Weight left. Respliced with a new grab.

1635 Stopped work - weather deteriorating rapidly N1'y 7-8.

Head for Aberdeen in very bad weather.

Repairs to spare vibrocorer switch box completed.

Wed 16 July

0715 Off Fourway buoy at entrance to Aberdeen Harbour

0745 Alongside Blaikies Quay

0800 Lab cleaned and stores ledgers completed

0945 All offloading/loading completed

Generator problem diagnosed as breakdown of insulation in excitor coil windings and repairs in progress. May have to be rewound.

Repairs in progress to 'A' frame and winch hydraulics.

1200 D Evans on

1500 A Skinner off.

Appendix II - Samples collected by BRE/Keele University from IGS cores.

Sample	Depth (metres)	Type
57 + 00 410	1.75 - 1.95	VE
419	1.00 - 1.20	VE
420	4.80 - 5.00	VE
445	4.57 - 4.77	VE
451	4.05 - 4.25	VE
467	2.05 - 2.25	VE
486	3.7 - 3.9	VE
57 + 01 242	3.80 - 4.00	VE
252	4.80 - 5.00	VE
256	3.75 - 3.95	VE
270	2.75 - 2.95	VE
272	1.05 - 1.25	VE
273	1.75 - 1.95	VE
57 + 00 430	4.00 - 4.02	Disturbed & remoulded
57 + 00 430	4.00 - 4.02	Freeze dried for electron microscopy
57 + 00 469	0.87 - 0.89	Dense sand
57 + 00 446	4.77 - 4.79	Freeze dried for electron microscopy.