Internal Report
Marine Geology Unit
83/11

M.V. Whitethorn
LEG 7
CRUISE REPORT
27 JULY - 10 AUGUST 1983

by

A CROSBY & L JOBSON

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Contents

M.V. Whitethorn Leg 7 Cruise Report 27 July - 10 August 1983

1. Personnel

A Crosby (Geologist) Party Chief

J G O Smart (Geologist) Day

L Jobson (Geologist) Surveyor

J B Pheasant (Technician)

P Wiggins (Technician)

W Lonie (Technician)

H Johnson (Geologist) Night

A Thompson (Geologist) Night

2. Area

Survey operations were carried out in the following 1:250,000 geology areas:

(i) Silver Well, (ii) Spurn, (iii) Dungeness-Boulogne, (iv) Wight

3. Objectives

(i) Silver Well Sheet

To investigate the Quaternary geology of the south west part of Silver Well and test formations identified on shallow seismic records. A gravity core and shipek grab to be used and attempt to recover cores with the rotary drill.

(ii) Spurn Sheet

To collect cores from the bottom of the closed basin called the Sole Pit using the rotary drill. The Sole Pit has been cut through till either into Pleistocene silts or into Jurassic rocks. The floor is covered with shelly sand and it is one of the few areas of the Southern North Sea where the till cover is thin enough or absent to allow penetration of a 5 metre rock drill into the underlying bedrock. A small sample of rock recovered in a vibrocore from the Sole Pit proved to be Kimmeridgian mudstone, however it remains uncertain if this was an erratic preserved in till or a sample of bedrock. A longer core recovered with the rotary drill should help to prove whether or not Kimmeridgian mudstone outcrops at the bottom of the Sole Pit.

(iii) Dungeness-Boulogne Sheet

The main objective of the survey would be to recover continuous cores, up to 5 metres of bedrock, to identify reflectors interpreted on IGS shallow seismic records and so improve the accuracy and content of the 1:250,000 Dungeness-Boulogne solid geology maps. Additional objectives would be:

1. Provide more information on the stratigraphy and lithology of the Upper Jurassic of the Eastern Channel; cores would be obtained for palaeontological analysis and hydrocarbon source rock analysis.

2. Core the Cretaceous Jurassic boundary.

3. Provide more information on the Lower Cretaceous (Wealden)

4. Core the base of the Upper Cretaceous and top Lower Cretaceous.

5. Core selected sites across the Tertiary Basin to recover a representative section of the Eocene and Palaeocene. The basal section of the Tertiary may include volcanic tuffs, limestones and sandstones.

A secondary objective will be to collect seabed sediment samples particularly from the near shore area and the vicinity of the banks. This should help to fill in the gaps to complete the cover of samples for compilation of the 1:250,000 seabed sediment map.

4. Equipment

1. IGS 5 metre rotary drill.
2. Gravity corer with 1 metre rock barrel or sediment barrel.
3. Shipek grab.
4. Atlas Deso echo sounder.
5. Decca Main Chain navigation system with a Racal Decca 10355 lat/long converter and 350TS plotter.

Accurate positions were plotted during the survey at 1:100,000 scale and accurate records were maintained. Planning charts were updated as the survey progressed.

5. Equipment Performance

The gravity core and shipek grab functioned as normal with no problems. Two gravity core barrels were lost, probably due to pin clip coming loose.

The Rotary Drill operated successfully throughout the leg. It is apparent that the technical expertise and operational experience gained this year now enables faults to be quickly diagnosed and rectified. One fault developed with the retraction system; this proved to be a faulty hydraulic hose in the hydraulic box. Approximately four hours were lost while repairs were carried out and the system serviced.

The TV camera developed a fault early in the leg but the excellent monitoring of the drill functions with the microcomputer meant that the TV camera was not necessary for the operation. The microcomputer was fault free throughout the leg. The printer and penetrometer now provide valuable records of the drill's performance.

Tungsten carbide, Geoset and surface set diamond bits were interchanged where necessary, to improve penetration and recovery.

The vibratory motor was run at some sites when the rotary motor was off, to improve penetration and to overcome tight spots. This was successful in both soft and hard rocks and also assisted penetration through sediments. The vibratory and rotary systems were run together at some sites (Appendix D). This was again successful and the drill appeared not to develop faults as a result.

The drill had difficulty in penetrating through very coarse shell gravels proved on the Tertiary outcrop but did penetrate and recover cores from formations covered by lithic gravels. Three attempts were made at some sites to recover core. The efficient handling, deployment and shallow water 30-60 metres meant that this could be carried out with little loss of time.

Extraction of the cores from the barrel was at times difficult because the powered pump was not operational and a hand operated hydraulic pump was used.

One core barrel was bent during the leg due to ship moving at anchor in strong tide and wind. On two days at the end of the leg it was not possible to drill because of strong tides and poor visibility. (See Appendix D & E for graphic logs and drilling summary).

6. Ship's Performance

Departure was delayed because of a fault in generator supplying power to IGS laboratories and equipment. The bow thruster was not operational for much of the leg but this did not affect progress as with good weather and tides anchoring proved not to be difficult. The Decca went down on three nights due to atmospheric interference. The A frame winches gave trouble at two sites, the hydraulics were suspect. On one occasion the ship moved at anchor, resulting in a bent barrel. Throughout the leg station keeping was adequate except during the last 2 days when the stronger spring tides with fresh NE winds were experienced.

7. Weather

Good weather persisted for most of the leg, with light winds, never more that force 5, and good visibility for most of the time. Rotary drilling was not possible on the last two days because of strong tides, 5-6 locally 7 NE winds and poor visibility. The decision was made to work further west away from the crowded shipping lanes off Dungeness. The final day was spent gravity coring on the Wight sheet in poor visibility. The leg ended in 6-7 north easterly winds and poor visibility.

8. Results

(i) Silver Well Sheet

16 sites were occupied and sampled with shipek grab and gravity core sediment barrel. At one site the rock drill was used but with no recovery after several attempts. Quaternary sediments were recovered including sands, gravel, till and silty clay. The formations recovered proved unsuitable for coring with the rock drill. A vibrocore will be necessary to obtain longer samples of these Quaternary sediments.

(ii) Spurn Sheet

Two rotary drill sites were completed in the floor of the Sole Pit, +53/+01/602 & 605, recovering 3.15 metres of mudstone and siltstone. These would appear to be Jurassic in age based on lithology; samples will be submitted for biostratigraphical analysis to determine their stage within the Jurassic.

(iii) Dungeness-Boulogne Sheet

The main objective of the use of the rotary drill was successful. Cores were recovered which will enable reflectors interpreted on shallow seismic to be identified and then to be mapped and so improve the accuracy and content of the 1:250,000 sheet.

The cores obtained will provide more useful stratigraphic and lithological information for the Tertiary, Cretaceous and Jurassic of the eastern English Channel. (See Appendix D and Fig 3).

The sites did not core the major boundaries between the Cretaceous and Jurassic and the Upper Cretaceous and Lower Cretaceous.

The coring of selected sites across the Tertiary Basin to recover cores of Eocene and Palaeocene was not entirely successful because of the presence of a cover of very coarse shell gravels which the drill could not penetrate. Two good cores of Tertiary rocks were recovered probably of Eocene age, one a clay near the base of the Eocene and one a very hard calcareous sandstone probably higher in the Eocene.

One core of Upper Cretaceous chalk was recovered providing information to supplement that from gravity core samples. A core of Lower Cretaceous Greensand will enable a more precise mapping of this on the geology map. A core provisionally identified as Gault Clay will supplement this information.

Cores of Wealden clays, silts and sandstone were recovered. If these can be identified by comparison with known onshore formations, it may be possible to tie in the onshore and offshore geology more precisely.

A core recovered south east of Dungeness proved to be a limestone provisionally identified as Lower Cretaceous Hythe Beds. This area had been interpreted as a fault bounded outcrop of Lower Cretaceous from seismic records, the core now confirms the interpretation.

Jurassic rocks were proved in the eastern part of the area which on lithological identification could be of Kimmeridgian or Portlandian age. The drill recovered good cores of these rocks.

Rotary drill site 504 was completed to test for Jurassic rocks, as micropalaeontological analysis had provided evidence from gravity core samples that the Jurassic may outcrop at this site. A core of clay lithologically similar to clays of the Wealden was recovered at site 504.

The rotary drill at some sites penetrated to maximum penetration without reaching bedrock (see Appendix D). Lack of precise resolution in the top 5 metres of the seismic record, particularly in areas of near horizontal reflectors, resulted in a misinterpretation of the seismic records, the thick sediment cover not being identified. Experience using the drill will enable more precise identification of rock head on the seismic records of the area.

A possible outcrop of Jurassic rocks approximately 1 mile off Dungeness was investigated with a gravity core. Silts and clays of Wealden lithology were recovered. Subsamples from all the cores have been submitted for biostratigraphical analysis.

Seabed sediment samples were collected to provide information for the compilation of the seabed sediment map. Samples recovered near shore in Rye Bay proved to be high in mud content probably derived from the Lower Cretaceous clays. Further offshore large areas of gravel were proved.

(iv) Wight Sheet

A start was made on a sampling programme on the Wight sheet because spring tides and poor visibility prevented drilling on Dungeness-Boulogne. 9 sites were occupied recovering chalk and gravel. The remainder of the sites will be completed on the final Whitethorn leg.

Appendix A

Summary Ship's Log

Wednesday 27 July

0545 Docked in Blyth
1130 IGS crew change
Fault in generator supply power to IGS equipment

Thursday 28 July

In port at Blyth, planned departure 1800 hrs.
Delayed in port for second night because of fault to generator.
IGS drill assembled.

Friday 29 July

Repairs to generator completed, tested. IGS drill tested.
0945 Depart Blyth bound for Silver Well area.
1800 Boat drill.
1900 Final preparations to rock drill, hung in water and tested.
1945 Tests completed, passage resumed to Silver Well.

Saturday 30 July

0300 At first site Silver Well SW. Night shift on watch.
Gravity coring.
Decca unstable, dawn affect. Operation delayed.
Samples proving muddy sand and boulder clay.
0900 +54/+02/198. attempt with rock drill to check if formation in the area can be cored with rotary drill.
Penetration of drill 2 metres, recovery nil. Probably gravel.
+54/+02/202 site attempted with vibrocore barrel on gravity corer.
No improvement in recovery.
1700 Continue survey work on Silver Well.

Sunday 31 July

Sampling completed on Silver Well. Steam to Spurn area $53^{o}.5$ N 01^{o}E.
Operations stopped during night shift 0110 hrs - 0518 hrs because of unstable Decca.

0518 Sampling resumed
0700 Near Well Hole en route to Sole Pit, decide to attempt rotary drill site.
0730 Decca unstable, decide wait for improvement before occupying site at Sole Pit.
0805 Surveying Well Hole area with echo sounder. Site chosen at 77-80 m water depth.
0913 +53/+01/601 Gravity core attempt. 0.60 m of dark grey clayey sand.
1143 3 attempts made with rotary drill in Well Hole. Probable layer of gravel stops penetration by drill.
1324 Steaming to site in Sole Pit.
1402 Arrived Sole Pit. Gravity core attempt proved traces of black sand.
4 attempts with rotary drill in Sole Pit. Ship's position moved on anchors for 3 attempts, anchors relayed for final attempt.
2 cores of mudstone recovered.
2245 Anchors up at final site, depart for English Channel.

Monday 1 August

0800 On passage to English Channel.
Forecast: N-NW 4 to 5 becoming 6 to 7.
1012 Phone call to office with present position.
1400 Phone call from office with message for J Pheasant.
1800 Off Ramsgate.
2055 North West of Varne weather deteriorated, strong south westerly blowing.
2132 At first site in English Channel +50/+01/851 just east of Varne.

Dover Coast Guard informed of start of operations.

2340 Four sites completed in Dymchurch Bay area.
Weather improved.

Tuesday 2 August

0040 On first site +50/+01/855.
0700 Anchoring at first drill site, No.5.
0800 Rock drill +50/+00/460.
1008 Rock drill back on deck.
1049 0.65 m of mudstone recovered.
1124 Anchored at drill site No.6.
1211 Launching rock drill.
1315 Moving on anchors for 3rd attempt at No.6 +50/+00/461.
1323 Rock drill launched.
1350 Moving on anchors for 4th attempt at No.6.
Anchors not holding.
1415 Moving 1 mile SE to try again +50/+00/462.
1505 Anchoring.
1525 Rock drill over +50/+00/462.
1815 Rock drill over +50/+00/463.
Moved on anchors to try site again.
2000 50/+00/463 Rock drill adapted for vibratory function.
2015 Drill vibrated to increase penetration, was successful but no core was recovered. Drill penetrated to maximum depth to prove sediment too thick to penetrate.
2145 Drill back onboard.
Gravity coring for remainder of day.

Wednesday 3 August

Weather good.
0615 First drill site 15. +50/+00/476.
0649-0855 3 attempts with drill.
1158 4th attempt, recovered 3.20 m limestone.
1310 +50/+00/477 rock drill 1st attempt.
Recovery 2.54 m
1400 Core recovered stuck in barrel. Extruded with difficulty.
1630 On site 3 +50/+01/863.
1735 Drill back on deck. Core recovered.
Moving to site 2.
1833 At site 2, +50/+01/864. 1.25 m recovered.
2055 Anchoring at site 2A (1 mile away from site 2)
2300 Rotary drill back on deck.
Gravity coring during night shift.

Thursday 4 August

0600 Coming up to site 1 off Dungeness.
0615 Laying anchors.
0739 Site +50/+01/873, drill back on deck. Gravel on limestone.
Move site on anchors.
0820 +50/+01/873. 3 attempts, gravity core taken.
1000 Gravity coring near Dungeness.
1145 Site 8 for drilling - decide too shallow, gravity core taken.
1230 Gravity core at site 8. Move on to later gravity cores in near shore area of Rye Bay. Site 7 too shallow for drilling.
1540 Anchored at drill site 9; clay recovered.
1730 Launched rock drill at site 10; clay silt ?Wealden recovered.
1900 Anchors up.
1950 Anchoring at site 10A. +50/+00/486.
2100 Rotary drill on deck. Core recovered.
Started night shift gravity coring.

Friday 5 August

0600 Site 19; weather good.
0700 1st attempt complete - no recovery. Small sample of shell gravel, penetration 4 metres, all gravel.
0815 Bringing drill on deck, to move east to next site.
0915 At site 17, +50/+00/500, 1st attempt, no recovery.
0935 Moving on anchors. 2nd attempt.
1010 Moving to site 16, +50/+00/501, no recovery, gravel.
1115 Moving to site 24, +50/+00/502.
1200 Phone call to office.
1320 Site 24, +50/+00/502. Launching drill for first attempt.
1340 Bringing drill inboard. Moving ship on anchors for 2nd attempt. Gravel causing problems in recovery.
1615 Anchoring at site 14. +50/+00/503. No recovery.
1710 Moving on anchors at same site +50/+00/504.
1745 Bringing rock drill onto deck; moving to area of site 42, +50/+00/504.
1930 Launching rock drill near to site 42, +50/+00/504.
2005 Full penetration achieved. Bringing drill back on deck, nothing recovered. 2nd attempt recovered 0.23 m silty clay.
2045 Start of night gravity coring.

Saturday 6 August

Core barrel lost during night shift.
0600 Anchoring at site 12.
0715 Back on deck first attempt; barrel empty.
0745 3.83 m penetration - no recovery, possibly on sand wave, may try 12 again after survey with echo sounder.
0845 Site 13, run onto site using echo sounder to select location. No recovery. ?thick deposit of sand, drill has maximum penetration.
0950 Move to site 496, site which was gravity cored during this leg. 0.58 m of chalk core recovered.
1200 Anchored. Launchibg drill.
1300 Drill recovered, no core recovery. Pebbles lodged in barrel, moved NE on anchor spread to make 2nd attempt.
1400 On 2nd attempt 0.58 m chalk recovered, flint blocked barrel, otherwise might have recovered more.
1500 Moved to site 74, +50/+00/521, rock drill launched.
1525 Gravel prevents penetration. Moving on anchors for second attempt.
1545 3rd attempt, flint & chalk gravel.
1730 Launching drill at site 216, +50/+00/522. Greensand recovered. Decide on 2nd attempt at this site to compare performance of drill bits. Tide too strong so attempt aborted.
1900 Finished at +50/+00/522.

2130 Site 216A 1 mile to NE. Drill back on deck.
2200 Core description and tidying up. Gravity coring during night shift.
Decca malfunction/interference during shift.

Sunday 7 August

0600 Coming up to anchor at site 28.
Forecast NE 3-4.
0730 Corer back on deck, dark grey mudstone/clay. Decide to take gravity cores every ¼ mile northwards towards chalk outcrop to select a site for drilling lower in the sequence.
0845 Gravity core had traces of clay on one site but located on a wreck, unable to anchor.
1100 Attempted site 28. Thick sand, no recovery.
1200 Steaming to 238, gravity core test before anchoring.
1315 Gravity core at site 238, 2nd gravity core to east, trace of clay.
Decide to drop anchors and try rock drill.
Unable to occupy site further west because of telephone cable within 2 miles.
1505 Gravel prevents penetration.
Steam to site 39 18 miles to south.
1835 Launching drill at site 39, 50/+00/541.
1930 Drill not retracting fully. Brought drill back on deck. Testing drill to find fault. Core recovered. Gravel and trace of clay.
Start of night's gravity coring.
Fault was located in hydraulic hose, motor stripped and repaired.
Completed by 2400 hrs.
Gravity coring in south west of area.

Monday 8 August

0201-0330 Decca unstable, survey delayed. Gravel recovered at each night site.
0600 At site 366. Completion of repairs to drill while ship at anchor.
Gravity core taken at this site as tides prove too strong to anchor for drilling. Decide to continue to gravity core until slackwater.
1005 Telephone call to Leeds.
Wind freshening from north east.
1200 Attempting to hold anchors in strong tide and freshening wind.
Site +50/+00/561. Took gravity core here and recovered soft sandy limestone.
Tide too strong for drill, had to abort early. Decide to continue gravity coring for remainder of afternoon.
1800 Forecast: NE veering E 4 to 6 with poor visibility.
Decide not to continue to rotary drill sites in eastern Channel because of north east winds, poor visibility and strong tides.
Plan to work westwards finishing off Dungeness gravity core sites and then to start sampling on the Wight sheet. It may be possible to do remaining rotary drill sites during final leg.
2100 Gravity coring working westwards.

Tuesday 9 August

0230 Survey stopped because of instability of Decca.
0545 Resumed gravity coring.
0720 Continuation of work towards west.
1330 Sighted coastal vessel (approximately 1000 tons) giving off red distress flares. Whitethorn stands by to render assistance. Coaster on fire in after cabin accommodation. Coastguard alerted and lifeboat on the way from Newhaven.

1430 Whitethorn standing by. Vessel is named Dellstedt of Renesberg, a German coaster.
Whitethorn standing by to fight fire in ship's engine room.
Vessels 18 miles south of Shoreham.
Whitethorn comes alongside burning ship, hoses from the Whitethorn are passed across and water pumped into engine room. Ship's master and chief engineer come aboard to make phone calls. Rescue helicopter arrives from Lee on Solent, crew man is lowered to stricken vessel and the German crew are winched aboard the helicopter.
1500 The Royal Navy minesweeper Crighton arrives on the scene and a fire fighting team are put aboard the burning vessel.
The Navy consider the fire out of hand.
1505 The Newhaven lifeboat arrives on the scene.
1510 The Whitethorn pulls away because of the danger of exploding fuel tanks. The RN vessel Crighton comes alongside the German vessel. Shipping companies informed by phone.
1530 Whitethorn standing by to offer further assistance to vessel if necessary.
Fire worsens as RN enter burning part of ship allowing in air; Whitethorn had contained fire with water and the German crew closed down the burning area.
Standing by for arrival of tug.
1550 Small coaster arrives on the scene, the Roy Clemo, tries to get a line onboard the burning ship to claim salvage.
The line is not taken by the German ship.
Whitethorn still standing by unable to get a line aboard now Navy in control.
1555 Tug 'Meeching' comes alongside burning vessel.
1600 RN vessel requests foam from Whitethorn, unable to supply as would put Whitethorn at risk.
1610 Whitethorn supplies Crighton with breathing apparatus and some fire extinguishers via lifeboat.
1630 South African ship the SA Waterberg passes close to scene.
1630 Whitethorn relaying messages to RN vessel.
1640 The tug and RN vessel pull away as situation worsens.
Position 50°27.98'N 00°22.99'W.
1710 Tug 'Meeching' puts line aboard Dellstedt and takes her in tow. Ship to be towed to Newhaven to be beached in shallow water so that the local fire brigade can get aboard.
1715 Back on survey. Steaming to next site.
1805 Coming up to first site.
1838 On next site. Visibility poor.
2213 Finished last site.
2230 Start steam for Shoreham.

Wednesday 10 August

0145 Anchored off Shoreham.
0730 Breakfast.
0800 Cleaning laboratory and clearing equipment in preparation for docking at Shoreham.
Weather NE 5-6 occ. 7, poor visibility.
1110 Pilot aboard.
1240 Tying up alongside at Shoreham.
1400 IGS crew change.
1500 M Stewart of Geochemistry severely cuts hand while removing vacuum pump from ship, traps hand between pump and rung of ladder. Requires 3 stitches at the local hospital.

APPENDIX B

SHIP: WHITETHORN DATES: 27/7/83 – 10/8/83 LEG NO. 7 SHEET NOS. +53/+01, 54/+02, 50/+00, 50/+01, 50/-01

	DATE	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	TOTALS
Working Time	In Port	18.75	18.00													11.5	48.25
	On Passage	5.25		14.25	3.5	1.25	21.5								1.75	12.5	60.00
	Traversing				12.5	11.75	1.5	8.0	8.0	11.5	10.0	9.0	13.0	13.0	11.75		110.00
	Anchoring				0.5	3.0		3.0	3.5	3.0	5.0	6.0	3.0	1.5			28.50
	On Station				7.5	8.0	1.0	13.0	12.5	9.5	9.0	9.0	6.0	5.5	3.5		84.50
Down Time	Weather																
	SHIP																
	Propulsion																
	Power Supply		6	9.75													15.75
	Anchoring																
	Handling Systems																
	IGS																
	Camera																
	Grab																
	Gravity Corer																
	Vibrocorer																
	Rock Drill												2	2			4.00
	Other DECCA													2	3		5.00
	Winches																
	Power Cables																
	ASSISTING SHIP IN DISTRESS														4		4.00
No. of Stations	Grab		—		20	6	4	16	15	18	19	17	14	20	20		169
	Rock Corer / Sediment Corer				20	6		10	1	11	1	5	11	19	14		98
	Vibrocorer																
	Drill				1	5		3	5	5	6	3	10	1			39
	Other																

Complete to nearest 0.1 hour (6 min)

REMARKS

DRILL FIGURES INCLUDES NO RECOVERY ATTEMPTS

9th AUGUST. 3 hours lost due to problems with Decca.
4 hours lost assisting ship on fire.

8th AUGUST 2 hours lost due to problems with Decca.
2 hours lost due to failure to retraction mechanism of drill.

7th AUGUST 2 hours lost due to failure to retraction mechanism of drill.