

NATIONAL INSTITUTE OF OCEANOGRAPHY
WORMLEY, GODALMING, SURREY

M. V. "SURVEYOR"

Cruise 71/1

February - April, 1971

Tide Gauges

**Geology and Geophysics on the Hebridean
Shelf and on the Rockall Plateau**

N. I. O. CRUISE REPORT No. 38

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DATES

<u>Leg 1</u>	Leave Barry, S. Wales	February 26th	Day 057
	Arrive Stornoway, Isle of Lewis	March 8th	Day 067
 <u>Leg 2</u>	 Leave Stornoway, Isle of Lewis	 March 9th	 Day 068
	Arrive Stornoway, Isle of Lewis	March 28th	Day 087
 <u>Leg 3</u>	 Leave Stornoway, Isle of Lewis	 March 31st	 Day 090
	Arrive Barry, S. Wales	April 11th	Day 101

SCIENTIFIC PERSONNEL

		<u>Affiliation</u>	<u>Leg 1</u>	<u>Leg 2</u>	<u>Leg 3</u>
D.G.Roberts (Princ.Scient.Leg 2)	BM,SRP,MAGS,BS	NIO		x	
J.B.Wilson (Princ.Scient.Leg 1+3)	BS	NIO	x	x	x
B.S.McCartney	SRP	NIO		x	
D.G.Bishop	SRP	NIO		x	
C.Fluelen	SRP	NIO		x	
N.Olliff	BM,MAGS,BS	NIO	x	x	
C.Pelton	BS	NIO	x	x	x
P.Collar	TG	NIO	x		x
R.Spencer	TG	NIO	x		x
P.Gwilliam	TG	NIO	x		x
R.Kerr	TG	ICOT	x		
D.Thomas		RVU	x		x
A.Harrison	TG	ICOT			x

BM = Bathymetry

BS = Bottom sampling

MAGS = Magnetics

SRP = Seismic reflection

TG = Tide Gauge

NIO = National Institute of Oceanography,
Wormley, Godalming, Surrey

ICOT = Institute of Coastal Oceanography and Tides
The Observatory, Bidston, Birkenhead, Cheshire

RVU = Research Vessel Unit, N.E.R.C.,
No. 1 Dock, Barry, Glamorgan

Master, M.V. SURVEYOR

J. Postill

SUMMARY OF CRUISE INTENTIONS

1. Tide Gauge Measurements on the outer shelf, West of the Hebrides (Legs 1+3)

Two sea floor pop-up tide gauges to be laid near St. Kilda and the Flannan Isles. The objective is to obtain a month's continuous tide record on the outer part of the shelf as part of a continuing programme of tide and current observations. The tide gauges will be laid early in Leg 1 and recovered during Leg 3.

2. Seismic reflection studies across the Rockall Plateau and Trough (Leg 2)

Several seismic reflection profiles will be made and will include:

- (a) Seismic section from Barra Head over the Hebrides Terrace Seamount into the Rockall Trough.
- (b) From the Rockall Trough over the S. end of Rockall Plateau.
- (c) Two traverses across the S. part of the Hatton-Rockall Basin.
- (d) From Rockall Bank to Hatton Bank via George Bligh Bank.
- (e) Sections across the Rockall Bank and its eastern margin to define the outcrop geology.

3. Magnetic measurements (Leg 2)

Total magnetic field will be measured throughout Leg 2 except during station work.

4. Noise Level Measurements on the NIO Hydrophone and Flexotir (Leg 2)

The aim is to measure accurately noise levels in both the Flexotir and NIO array at different speeds and at different stays both for comparative purposes and to provide data useful in hydrophone design.

5. Underwater Photography (Leg 2)

The aim is to reconnoitre outcrop areas, detected by seismic profiles, for detailed evidence of structure, bedding, etc., in preparation for drilling in summer 1971. In addition, data on benthos will aid the bottom sampling programme.

6. Benthos and Bottom Sediment Sampling Programme (Legs 1,2,3)

As part of an investigation into biogenic carbonate sedimentation on the Hebridean shelf and Rockall Bank, grab and dredge samples have previously been collected from RRS John Murray and MV Surveyor. The programme is designed to obtain samples from the Hebridean shelf and Rockall Bank in areas not covered by the 1968 and 1970 cruises and to extend cover northwards on the shelf. The purpose of the study is to compare the living faunal distribution with that deduced from the biogenic carbonate fraction of the sediments and to investigate the processes involved in its production.

NARRATIVE

Leg 1 Barry to Stornoway: February 26th to March 8th. Day 057 - Day 067.

The 'Surveyor' sailed from Barry at 16.30 GMT on 26th February (057). Completion of the fitting of the vessel for the cruise delayed sailing by 7 hours.

The P.E.S. fish was streamed at 1800 hrs (058) in the North Channel. As weather conditions were suitable acoustic tests were carried out on the two NIO tide gauges immediately after this.

The acoustic testing was completed and we were underway by 2120. The magnetometer was streamed at 1200 on 28th February (059). Bad weather on the 1st March (060) delayed the laying of the first tide gauge until 1555. The lay position was $58^{\circ}03.9'N$ $08^{\circ}32.6'W$, at a depth of 72 fms, the position being fixed by Loran C, Decca and a radar bearing on Boreray.

On completion of the lay we steamed to the site of tide gauge no. 2. Further acoustic tests on tide gauge 2 revealed a fault. During the time taken to repair the fault 1 grab station was worked. We then returned to the lay position where the second tide gauge was successfully laid at 1723 on 2nd March (061). The position - $58^{\circ}46.1'N$ $07^{\circ}30.3'W$ - was fixed by Loran C and Decca. The depth was 56 fms.

The rest of the first leg₂ was devoted to bottom sediment and faunal sampling using the $0.1m^2$ Smith McIntyre grab and the rock dredge. The grab was operated from the aft A frame using 6 mm wire from the double barrelled winch. The dredge was operated from the welldeck using the forward winch. The 13 mm wire ran from the winch through the dynamometer frame and up to the derrick where the wire was suspended over the starboard side using a 10 ton block.

Samples were collected from 57 stations on the Hebridean Shelf north of St. Kilda. The most northerly stations were on the edge of the continental shelf west of North Rona.

During the grabbing programme a pronounced thumping sound was heard from the hydraulics of the double barrelled winch. The noise could be reduced but not completely eliminated by reducing the boost pressure.

The P.E.S. fish was brought inboard at 2115 on 7th March (066) and Surveyor docked in Stornoway at 0700 GMT on 8th March (067). Replacement parts flown to Stornoway were fitted to the hydraulic system of the double barrelled winch.

J.B.W.

Leg 2 Stornoway to Stornoway: March 9th to March 28th. Day 068 - Day 087.

On arrival in Stornoway the tide gauge party left to return to NIO. Mr. D. Thomas (RVU) also left since no relief was available but described the operation and maintenance of the EG G Sparker equipment. Installation of the NIO profiling equipment was completed smoothly.

during the 8th and 9th March although the compressor third stage pressure began to malfunction intermittently. We sailed from Stornoway around 1830Z on the 9th March (067) slowing to 2 knots outside the roads to test stream and fire the airgun before steaming south down the Minch to Barra Head.

On the morning of March 10th (068), we arrived off Barra Head and slowed to stream the PDR fish, airgun and hydrophone arrays. Although the compressor continued to malfunction intermittently, we steamed westward over the continental margin and Hebrides Terrace Seamount into the Rockall Trough in gale conditions, reaching the end of section around midday on March 11th (069). The weather had now deteriorated to Gale 8 and we steamed south down the Rockall Trough recovering the arrays and airgun whose weights had sheared off. During March 12th (070), the compressor third stage pressure switch was repaired and we ran onto the southern part of Rockall Plateau to begin the profiling programme on Rockall Plateau. By mid-morning on March 13th (071), we had recommenced profiling on a WSW heading to traverse the south west margin of the Plateau although the weather was again severe. During March 14th (072), the compressor failed totally, due to necking and snapping of the vee-belt drive and the line was abandoned at 0200 on March 14th (072). The sparker was then rigged and weighted to match the array depth in order to maximise the signal of the low power (8000J) sparker. By midday we had recommenced profiling, heading north westward across the southern part of the Hatton-Rockall Basin to the S. end of Hatton Bank, and crossing over several large sediment ridges and a broad, deep, valley of non-depositional origin at the S.W. edge of the Hatton-Rockall Basin. At 0200/ 15th March (073), we turned eastward to cross the Hatton-Rockall Basin and, despite the low power of the sparker and rough weather, obtained over 1.25 seconds penetration and evidence of buried reef-like structures in the West edge of Rockall Bank. During this traverse, we slowed to service the sparker and repair the now frequently intermittent NIO array. However, during the 16th March (074), the NIO array ceased functioning due to the heavy weather but we were able to continue profiling over the south end of Rockall Bank using the EG&G array. Around midday, we commenced grabbing eastward across the Bank taking samples at 5 mile intervals (Stns. 59-69). Around 2400/16th March we began profiling across rock outcrop areas finally turning to run north along the long axis of the Bank in heavy seas, passing within $1\frac{1}{2}$ mls of Rockall at 2000 on 19th March (078). After crossing the 100 fathom line, we turned S.W. then east to run across the north end of the Bank and crossed over a very large slump on the east margin. The weather had moderated by morning on March 20th (079) and we began a series of grab and dredge stations (Stns. 70-77) down the eastern edge of the Bank. Stn. 76 yielded 169 pieces of basalt, the dredge and profiler data suggest much of the N. end of the Bank is underlain by basalt. At 2142, we steamed east into deeper water to carry out noise level measurements on the NIO and Flexotir arrays. This experiment was completed at midday on March 21st (080) and we profiled back to the Bank to begin a new line of grab stations (Stns. 78-82) Heavy weather prevented further grabbing and we therefore began profiling over the Bank and up the east margin to investigate the large slump noted on earlier profiles. The weather gradually moderated enabling grabbing to recommence at 1805/March 22nd (081). The loss of the sparker was discovered during the recovery of the profiling equipment, although deterioration of the record due to using the frayed cable was not apparent. (Stns. 83-94) Grabbing continued throughout the night but a dredge (Stn. 93) on the west side of the bank near an RV Explorer

Otter trawl station yielded a rich haul including coral ophiuroids and other echinoderms. The weather had again deteriorated and we began profiling north to George Bligh Bank before turning west to traverse the North end of the Hatton-Rockall Basin and reaching the slopes of Hatton Bank at 1400/March 25th (084) in a severe gale. At the end of this traverse, the second sparker was found to be damaged beyond repair. The heavy seas prevented further grabbing on Rockall Bank but we were able to occupy a reflection profile over Anton-Dohn seamount and the continental margin 1240/March 26th (085) using the bared ends of the sparker cable as an arcer. We terminated all profiling at 0100/March 27th and commenced grabbing northward along the shelf edge to St. Kilda (Stns. 95-104). Since increasing swell prevented further grabbing we steamed into deeper water to complete the noise level experiment but interference aborted the experiment. Finally, we steamed toward the Flannan Isles to occupy a further series of grab stations completing all station work at 0855/March 28th. The vessel docked in Stornoway at 1900/March 28th (087).

Severe weather conditions throughout this leg of the cruise reduced the ground covered during the profiling programme and curtailed bottom sampling programmes. We were able however to occupy some 1400 miles of reflection profile and 47 bottom sampling stations.

D.G.R.

Leg 3 Stornoway to Barry: March 31st to April 11th. Day 090 - Day 101.

An engineer from Hydrostatic Transmissions Ltd. arrived at 1200 hrs on March 30th (089) to investigate the cause of the knocking sound in the double barrelled winch. The fault appeared to be wear in the Fenner transmission belt. No spare belt was carried and so arrangements had to be made with Fenner Ltd. in Glasgow to have spare belts flown to Stornoway on 31st March. The sailing on 31st March (090) was delayed until 1500 when the spare belt arrived. During the preparations for the streaming of the PES fish the forward winch and windlass failed due to water shorting between the drum contacts on the deck controller. The water entered the controller through a bolt hole on the cover plate. The fault was rectified by isolating the windlass. The PES fish was then streamed and we steamed to the position of tide gauge 2. Tracking of the tide gauge proceeded throughout the night but without success partly due to navigational difficulties and partly due to failure of the external command pinger to switch on. When the internal command pinger was switched on the gauge was located easily. The acoustic release was fired successfully and the tide gauge was brought inboard at 1245 on April 1st (091). The grappling line of the tide gauge had numerous Loligo egg capsules attached to it.

We then proceeded to the site of tide gauge 1 arriving there in the evening of 1st April. Tracking commenced and the external and internal command pingers were switched on. We then have to until first light when repeated attempts to fire the acoustic release failed. Dragging for the tide gauge was then commenced by laying 900 metres of 6 mm wire on the bottom weighted at each end with chain. This was towed in circles round the tide gauge repeatedly.

The courses and course changes made during this operation were based on Loran C fixes plotted at 2-5 minute intervals. The wire was wound in at dusk to find that the weighted length of wire had been lost. The position of the tide gauge was then checked using hydrophones and a further length of weighted 6 mm wire was paid out and circling of the tide gauge position continued. On 4th April (094) 1200 metres of 13 mm wire was transferred to the double barrelled winch. The weighted length of 6 mm wire was shackled onto the end of this and approx 900 metres of the 13 mm wire was paid out. Further circling of the position was commenced and at 1730 the tide gauge was spotted on the surface. As the 13 mm wire was brought inboard the ballast frame was seen to be entangled with the end of the wire. The tide gauge was brought inboard at 1900 hrs.

Dredging was commenced at first light at Station 106 near St. Kilda and 78 stations were worked from St. Kilda southwards to Malin Head in areas not sampled during the 'Surveyor' 1970 cruise. The last station - Stn. 184 - was occupied at 0310 on April 10th (069). The PES fish was then brought inboard and the ship sailed directly to Barry to arrive at 1630 on 11th April (101).

J.B.W.

PROJECT REPORTS

1. Tide Gauges

Two tide gauges were laid and successfully recovered as part of a tidal acquisition programme on the continental shelf edge around the British Isles.

P.C.

2. Biogenic carbonate investigations

Samples of the living and dead benthonic faunas were obtained from 184 stations (see station position list) to supplement existing samples collected from RRS John Murray in 1968 and MV Surveyor in 1970 on the Hebridean Shelf south of St. Kilda and on the Rockall Bank. On the present cruise samples were also collected on the Hebridean Shelf between St. Kilda and the shelf edge west of North Rona.

Station positions were fixed by Loran C and/or Decca and where applicable, by radar bearings. At each station two grab samples were normally taken using the 0.1m² Smith McIntyre Grab. At stations where the grab samples indicated the presence of shelly material where larger samples would be useful the rock dredge was used. The dredge was lined with 4 mm mesh terylene in order to retain the coarse carbonate.

The samples collected on this cruise, together with those collected previously, enable a picture of the distribution of the major carbonate producing organisms to be obtained for the Hebridean Shelf and for Rockall Bank. The purpose of the study is to compare the living faunal distribution with that deduced from

the biogenic carbonate fraction of the sediments thus giving an indication of the processes involved in the formation of biogenic carbonate sediments.

The samples obtained include glacial erratics many of which support a rich epifauna, gravels, grits, coarse medium and fine sands and rarely silts. At several stations on the northern Hebridean Shelf coarse carbonate grits were obtained which are superficially similar in appearance to the sediments present on the top of Rockall Bank.

J.B.W.

3. Seismic Reflection

The seismic reflection profiling programme was primarily oriented toward obtaining traverses over the northern and southern parts of the Hatton-Rockall Basin, the Rockall Bank, the continental margin and Rockall Trough.

Two seismic profiling systems were used on the cruise. The system loaned by RVU consisted of an EG&G 8000 Joule sparker, Alden recorder and EG&G hydrophone array. The NIO system consisted of a modified Lamont-type air-gun, triggered 18" Mufax recorder and two hydrophone arrays 200 ft and 100 ft in length, towed some 1600 ft astern of the vessel. The 200 ft array and gun depths were matched at 30 ft to maximise the signal. High pressure air was supplied by a newly reconditioned Williams and James diesel driven compressor. The compressor continually gave trouble due to malfunction of the third stage pressure switch and this reduced the available high pressure to less than 2000 psi. Finally, the vee-belt drive to the compressor snapped causing air-gun profiling to be abandoned midway through the second seismic section. All subsequent seismic profiles were taken using the 8000J sparker weighted to match the NIO array depth and maximise on the low power of this source. The sparker profiles were also recorded on the Alden recorder via the EG&G hydrophone array. Due to the severe weather conditions, one sparker was lost and the second damaged beyond shipboard repair. The last profile was taken using the bared ends of the sparker cable as an arcer. The profiling equipment behaved well although large low frequency signals overloading the pre-amp caused some intermittency on the NIO array.

A total of some 1400 miles of seismic profile was obtained and included some 1200 miles on the Rockall Bank and Rockall Plateau.

D.G.R.

4. Magnetic measurements

Total magnetic field was continuously recorded throughout Leg 2 except during station work and for a brief period when the towed fish became unserviceable. During Leg 1, a short traverse was made near St. Kilda to test the equipment.

D.G.R.

5. Noise Level Recordings

The noise levels of the NIO 200 ft array and the Flexotir 60m array towed simultaneously were recorded on magnetic tape and as $\frac{1}{2}$ octave spectra using the B&K analyser. Recordings were made at various ship speeds and for the NIO array at different distances from the ship. The main objective was to attempt to determine the cause of higher low frequency noises on the NIO array at low frequencies. The results suggest that the main reason is the stiffer spring section preceding the active section; our array appears to have a mechanical longitudinal resonant frequency in the region of 15 Hz which is too near our working band for comfort, whilst the Flexotir data sheet quotes a frequency of $\frac{1}{13}$ Hz, which is well below the measurement bands of our equipment. The mode of coupling to the hydrophones may be via acceleration forces or via a squeezing action as the array is stretched in length. It is significant that the Flexotir spring section is thinner walled, more compliant, and three times as long as our array, and also the drag force on the rest of the system is higher. All these factors lower the natural frequency.

In addition to measuring noise voltage levels it was necessary to make a cross-comparison of sensitivities of the two arrays. This was done using the bottom echo from the spark source in deepish water. The results confirmed the calculated sensitivities.

An experiment to record noise levels simultaneously from pairs of hydrophone sensors at different spacings for noise coherency measurements was unsuccessful due to high electrical interference, made more evident because of the high impedance level of a single sphere hydrophone and the lack of pre-amplifiers for this experiment.

B.S.M.

6. Navigation

On the continental shelf, the ship's position during bottom sampling was fixed by Decca although Loran-C was also used as a back up and a more precise navaid for laying and recovering the tide gauges. Beyond the shelf and on Rockall Plateau, Loran-C was used continuously. The Loran-C receiver was operated with some difficulty. Extensive interference due to local radio and Loran-A stations on the Hebrides was experienced on the shelf. Elsewhere heavy skywave interference made it difficult to lock correctly onto the third cycle. Surprisingly, the severe motion of the ship also made the third cycle difficult to acquire:- the whip in the aerial caused by high winds and ship motion caused the gate to drift continuously and lock could only be achieved by using the Doppler procedure recommended for aircraft. In improved conditions, the Loran-C gave consistent, accurate fixes enabling previous positions to be reoccupied easily. A rotating commutator (Walker) log loaned by RVU, was also used. No calibration data were available and it was accurate only at speeds between 7 and 10 knots. The log also fouled the arrays and magnometer on several occasions in rough weather. A better way of recording

speed might be to use the NIO 2-component EM log rigged from a mid-ships boom. In this way accurate speed data would be continuously available, especially during station work.

D.G.R.

7. Mark III Precision Echo-Sounder

The new NIO transistored Precision-echo-sounder system was used throughout the cruise. The system performed faultlessly except for a minor problem associated with the time marks.

D.G.R.

Acknowledgements

Captain J. Postill, the officers and crew of SURVEYOR provided splendid help and co-operation at all times. Mr. R. Weaver, Mr. B. King and others of the RVU provided generous help and advice during kitting out in Barry and contributed to the success of the cruise.

KEY TO STATION LIST

AG	Air Gun	G	Grab
CF	Corrected Fathoms (by Matthews Tables)	TG	Tide Gauge
CM	Corrected Metres (by Matthews Tables)	UCF	Uncorrected Fathoms (at 800 fathoms/sec)
D	Dredge		

TIDE GAUGE LAY AND RECOVERY

Type and N.I.O. Moor- ing No.	Date and Time (GMT) of Lay	Date and Time (GMT) of Recovery	Depth			Lat.	Long	Nav. Aid	Comments
			UCF	CF	CM				
TG (086)	1.3.71 (060)	4.4.71 (094)	72	74	136	58°03.9'N	8°32.6'W	Loran	<u>Recovery</u> Steamed to this mooring on 1.4.71 (after successfully releasing 2nd mooring) and confirmed it was still in position. Attempted unsuccessfully to release at 0600 hrs. Dragging commenced a.m. on 2.4.71 and apart from a break during night of 2.3.71 continued through-out. Ballast frame recovered with T.G. which was undamaged. Failure solely in release bolts.
	Into water 1525 Released on to bottom 1555	Released 1800				58°03.6'N	8°34.4'W	Decca	
						+ Radar bearing Boreray			
TG (087)	2.3.71 (061)	1.4.71 (091)	56	58	105	58°47.15'N	7°29.1'W	Decca	Recovery was trouble-free.
	Into water 1715 Released 1723	Out of water 1245				58°46.1'N	7°30.3'W	Loran	

M.V. SURVEYOR 1/71 - LEG 2

SEISMIC REFLECTION PROFILES

Traverse No. & Dist.	Equipment Used	Date	Time Z/Day No. From To	Lat. N Long. W to	Lat. N Long. W	Depth Range			Comments
						UCF	CF	CM	
1 (96 nm)	AG NIO 200' Array NIO Mufax NIO 100' Array	10.3.71 to 11.3.71	1605(069) - 1145(070)	56°36'N 8°37.5'W	56°30'N 11°34'W	76-1361	78-1392	143-2546	Continental Margin - Hebrides Terrace - Rockall Trough
2 (65)	AG NIO 200' Array NIO Mufax	13.3.71 to 14.3.71	1200(072) - 0130(073)	55°01'N 17°46'W	54°48'N 19°36'W	464-780	474-496	867-1455	S. part of Rockall Plateau
3 (76)	Sparker (8KJ) NIO 200' Array NIO Mufax Alden Recorder EG&G Array	14.3.71 to 15.3.71	1300(073) - 2200(073) 2200(073) - 0200(074)	55°13'N 20°27'W 56°04.5'N 20°46.5'W	56°04.5'N 20°46.5'W 56°22'N 21°16'W	636-1038	649-1059	1188-1956	S.W. Hatton - Rockall Basin
4 (115)	Sparker (8KJ) NIO 200' Array NIO Mufax Alden Recorder EG&G Array	15.3.71 to 15.3.71	0200(074) - 1515(074) 1515(074) - 1915(074)	56°22'N 21°16'W 56°02'N 18°35'W	56°02'N 18°35'W 56°03'N 17°53'W	902-694	920-708	1683-1295	S. Hatton - Rockall Basin
5 (35)	Sparker (8KJ) NIO 200' Array NIO Mufax Alden Recorder EG&G Array	15.3.71 to 16.3.71	1915(074) - 0145(075)	56°03'N 17°53'W	56°00'N 18°56'W	694-884	708-902	1295-1649	S. Hatton - Rockall Basin

Traverse No. & Dist.	Equipment Used	Date	Time Z/Day No. From To	Lat. N Long. W	to Lat. N Long. W	Depth Range			Comments
						UCF	CF	CM	
6 (30)	Sparker (8KJ) NIO 200' Array NIO Mufax Alden Recorder EG&G Array	16.3.71	0145(075) - 0645(075)	56°00'N 18°56'N	55°29.5'N 18°58.5'W	884-758	902-773	1649-1414	S. Hatton - Rockall Basin
7 (147)	Sparker (8KJ) NIO 200' Array NIO Mufax Alden Recorder EG&G Array	16.3.71 to 16.3.71	0645(075) - 0200(076)	55°29.5'N 18°58.5'W	55°50'N 14°43'W	758-497	773-508	1414-929	S. Hatton - Rockall Basin
8 (41)	Sparker (8KJ) NIO 200' Array NIO Mufax Alden Recorder EG&G Array	17.3.71	0200(076) - 0735(076)	55°50'N 14°43'W	56°17.5'N 15°37.0'W	497-195	508-201	929-367	S. Rockall Bank
9 (10)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71	0035(077) - 0215(077)	56°38'N 15°04'W	56°37.5'N 14°50'W	127-105	131-108	239-198	S. Rockall Bank (section across outcrops)
10 (15)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71	0215(077) - 0400(077)	56°37.5'N 14°50'W	56°37'N 15°14.5'W	105-166	108-171	198-313	S. Rockall Bank (section across outcrops)

11 (32)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71	0423(077) - 1030(077)	56°35.5'N 56°19.5'N 15°19.5'W 14°29.2'W	182-109	187-112	343-205	S. Rockall Bank
12 (45)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71	1030(077) - 1555(077)	56°19.5'N 56°24'N 14°29.2'W 15°49'W	110-235	113-242	207-442	S. Rockall Bank
13 (6)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71	1555(077) - 1632(077)	56°24'N 56°20.5'N 15°49'W 15°56.0'W	235-242	242-249	442-455	S. Rockall Bank
14 (30)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71	1632(077) - 2200(077)	56°20.5'N 56°10.25'N 15°56.0'W 15°03.5'W	237-108	244-111	446-203	S. Rockall Bank
15 (53)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	18.3.71 to 19.3.71	2200(077) - 0900(078)	56°10.25'N 56°40.5'N 15°03.5'W 13°46.0'W	127-489	131-500	239-914	S. Rockall Bank
16 (80)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	19.3.71	0900(078) - 2230(078)	56°40.5'N 57°59.0'N 13°46.0'W 13°43.0'W	489-50	500-52	914-94	N-S section along Rockall Bank. Section across Rockall Complex

Traverse No. & Dist.	Equipment Used	Date	Time Z/Day No. From To	Lat. N Long. W to Lat. N Long. W	Depth Range			Comments
					UCF	CF	CM	
17 (16)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	19.3.71 to 20.3.71	2230(078) - 0015(079)	57°59.0'N 57°50.5'N 13°43.0'W 14°07.5'N	108-102	111-104.	203-190	N. Rockall Bank
18 (46)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	20.3.71	0015(079) - 0555(079)	57°50.5'N 57°24.0'N 14°07.5'W 12°51.5'W	66-570	68-582	124-1065	N. Rockall Bank
19 (8)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	20.3.71	0555(079) - 0712(079)	57°29.0'N 57°20.5'N 12°51.5'W 12°54.0'W	570-677	582-691	1065-1263	Section parallel to East margin of Bank
20 (11)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	20.3.71	0712(079) - 0840(079)	57°20.5'N 57°24.0'N 12°54.0'W 13°13.0'W	677-115	691-118	1263-217	Section over margin of N. Rockall Bank
21 (15)	Sparker (5KJ) NIO Mufax NIO Array EG&G Array	21.3.71	1413(080) - 1620(080)	56°59'N 57°02'N 13°32.0'W 13°04.0'W	902-110	920-113	1683-207	Section over E.margin of Rockall Bank
22 (53)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	21.3.71 to 22.3.71	2327(080) - 0730(081)	57°12.2'N 57°04.0'N 14°29.5'W 12°54.5'W	84-988	87-1008	158-1843	Section across Bank and E. margin

23 (35)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	22.3.71	0730(081) - 1153(081)	57°04.0'N 57°36.0'N 12°54.5'W 13°16.0'W	988-100	1008-103	1843-188	Section over E. margin
24 (28)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	22.3.71	1153(081) - 1535(081)	57°36.0'N 57°54.0'N 13°16.0'W 12°42.0'W	100-802	103-818	188-1496	Section over E. margin
25 (15)	Sparker (5KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	22.3.71	1535(081) - 1805(081)	57°54.0'N 57°56.5'N 12°42.0'W 13°09.0'W	802-124	818-128	1496-234	Section over E. margin
26 (80)	Sparker (8KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	23.3.71 to 24.3.71	1356(082) - 1430(082) 1425(082) - 1500(082) 1500(082) - 0645(083)	57°33.2'N 57°31.5'N 14°10.0'W 14°06.0'W 57°31.5'N 57°33.9'N 14°06.0'W 14°09.5'W 57°33.9'N 58°53.0'N 14°09.5'W 14°02.0'W	85-681	87-692	159-1265	Rockall Bank - George Bligh Bank section
27 (120)	Sparker (8KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	24.3.71 to 25.3.71	0645(083) - 1315(084)	58°53.0'N 58°46.5'N 14°02.0'W 17°29.0'W	298-630	304-310	556-567	George Bligh Bank - Hatton Bank - N. Hatton - Rockall Basin
28 (15)	Sparker (8KJ) NIO Mufax NIO Array Alden Recorder EG&G Array	26.3.71 to 27.3.71	1240(085) - 0100(086)	57°19.0'N 57°12.0'N 12°10.0'W 09°18.0'W	1236-176	1263-181	2309-332	Section across Anton- Dohrn seamount and continental margin

M.V. SURVEYOR CRUISE 1/71 - STATION LIST

Station No.	Type	Date	Day No.	Time (GMT)		Lat. Long.	to	Lat. Long.	Depth Range				No. of Hauls		
				From	To				UCF - UCF	CF - CF	CM - CM				
2	G	2.3.71	061	1200	1300	58°46.7'N 7°31.0'W			60	-	62	-	113	-	2
3	G	"	"	1340	1410	58°48.0'N 7°31.0'W			92	-	95	-	173	-	3/1,3/2
4	G	3.3.71	062	0730	0800	58°48.0'N 7°32.5'W			54	-	56	-	102	-	4/1,4/2,4/3
5	G	"	"	0855	0915	58°43.5'N 7°08.0'W			47	-	48	-	89	-	5/1,5/2
6	G	"	"	0950	1010	58°35.0'N 7°24.5'W			58	-	60	-	109	-	6/1,6/2
7	G	"	"	1032	1100	58°35.0'N 7°32.5'W			64	-	66	-	121	-	7/1,7/2
8	G	"	"	1145	1241	58°35.0'N 7°43.0'W			72	-	74	-	136	-	8/1,8/2
9	G	"	"	1406	1430	58°34.6'N 7°53.5'W			71	-	73	-	134	-	9/1,
10	G	"	"	1500	1540	58°37.7'N 7°52.5'W			78	-	80	-	147	-	10/1,10/2
11	G	"	"	1650	1715	58°31.5'N 8°02.0'W			82	-	84	-	154	-	11/1,11/2
12	G	"	"	1800	1835	58°30.7'N 8°07.0'W			87	-	90	-	164	-	12/1,12/2,12/3
13	G	"	"	1935	2000	58°26.8'N 8°16.2'W			95	-	98	-	179	-	13/1,13/2
14	G	"	"	2115	2205	58°23.5'N 8°29.0'W			101	-	104	-	190	-	14/1,14/2,14/3
15	G	4.3.71	063	1635	1655	58°14.2'N 8°39.25'W			90	-	93	-	170	-	15/1,15/2

16	G	4.3.71	063	1730	1745	58°14.5'N 8°30.0'W	67	72	69	74	126	136	16/1,16/2
17	G	"	"	1815	1832	58°14.5'N 8°20.7'W	63	-	65	-	119	-	17/1,17/2
18	G	"	"	1905	1930	58°14.5'N 8°11.5'W	66	-	68	-	124	-	18/1,18/2
19	G	"	"	1955	2022	58°14.7'N 8°00.5'W	65	-	67	-	122	-	19/1,19/2,19/3
20	G	"	"	2055	2117	58°14.7'N 7°51.0'W	55	56	57	58	104	105	20/1,20/2,20/3
21	G	"	"	2155	2212	58°14.5'N 7°43.0'W	23	-	24	-	43	-	21/1,21/2
22	G	"	"	2245	2301	58°11.5'N 7°32.0'W	32	-	33	-	60	-	22/1,22/2
23	G	"	"	2330	2345	58°08.7'N 7°29.5'W	35	-	36	-	66	-	23/1,23/2
24	G	5.3.71	064	0024	0100	58°09.2'N 7°17.0'W	62	-	64	-	117	-	24/1,24/2,24/3
25	G	"	"	0145	0157	58°14.5'N 7°10.5'W	64	-	66	-	121	-	25/1,25/2
26	G	"	"	0715	0735	58°17.5'N 7°03.5'W	42	-	43	-	79	-	26/1,26/2
27	G	"	"	0810	0825	58°19.5'N 6°54.0'W	33	-	34	-	62	-	27/1,27/2
28	G	"	"	0855	0915	58°23.0'N 6°46.0'W	23	-	24	-	43	-	28/1,28/2
29	G	"	"	0945	1000	58°26.25'N 6°37.5'W	23	-	24	-	43	-	29/1,29/2
30	G	"	"	1025	1043	58°29.5'N 6°30.0'W	30	-	31	-	57	-	30/1,30/2

Station No.	Type	Date	Day No.	Time (GMT)		Lat. Long.	to	Lat. Long.	Depth Range						No. of Hauls			
				From	To				UCF	-	UCF	CF	-	CF		CM	-	CM
31	G	5.3.71	064	1100	1125	58°32.0'N 6°24.5'W			32	-		33	-		60	-		31/1,31/2
32	G	"	"	1235	1249	58°34.0'N 6°32.5'W			43	-		44	-		81	-		32/1
33	G	"	"	1322	-	58°36.0'N 6°41.0'W			48	-		49	-		90	-		33/1,33/2
	D	"	"	-	1715	58°35.7'N 6°43.5'W			49	48		50	49		92	90		
34	G	"	"	1920	1937	58°34.5'N 6°50.0'W			50	-		52	-		94	-		34/1,34/2
35	G	"	"	2015	2045	58°34.25'N 7°02.0'W			44	-		45	-		83	-		35/1,35/2
36	G	"	"	2100	2125	58°34.5'N 7°11.0'W			69	-		71	-		130	-		36/1,36/2
37	G	"	"	2155	2220	58°30.5'N 7°15.5'W			33	50		34	52		62	94		37/1,37/2
38	G	6.3.71	065	1130	1155	58°37.5'N 6°30.5'W			66	-		68	-		124	-		38/1,38/2
39	G	"	"	1225	1240	58°43.25'N 6°26.0'W			64	-		66	-		121	-		39/1,39/2
40	G	"	"	1315	1342	58°49.7'N 6°26.5'W			64	-		66	-		121	-		40/1,40/2
41	G	"	"	1412	1440	58°54.0'N 6°27.0'W			69	-		71	-		130	-		41/1,41/2
42	G	"	"	1520	1545	58°59.7'N 6°24.5'W			47	-		48	-		89	-		42/1,42/2
									(variable due to rock outcrops)									
43	G	"	"	1615	1640	59°05.5'N 6°25.5'W			56	-		58	-		105	-		43/1,43/2
44	G	"	"	1720	1741	59°10.2'N 6°24.5'W			64	-		66	-		121	-		44/1,44/2
45	G	"	"	1820	1841	59°15.5'N 6°26.0'W			84	-		87	-		158	-		45/1,45/2

46	G	"	"	1910	1952	59°21.0'N 6°27.0'W	90	-	93	-	170	-	46/1,46/3
47	G	"	"	2020	2100	59°25.5'N 6°26.5'W	89	-	92	-	168	-	47/1,47/2
48	G	"	"	2150	2220	59°19.5'N 6°33.0'W	135	-	139	-	254	-	48/1,48/2
49	G	"	"	2245	2310	59°15.5'N 6°36.5'W	132	-	136	-	249	-	49/1,49/2
	Dredge	"	"			59°14.5'N 6°36.5'W	"		"		"		49/3
50	G	6.3.71 /7.3.71	065/066	2335	0005	59°14.0'N 6°46.0'W	88	-	91	-	166	-	50/1,50/2
51	G	7.3.71	066	0037	0056	59°12.0'N 6°54.5'W	102	-	105	-	192	-	51/1,51/2
	Dredge	"	"	1155	1350	59°12.8'N 6°54.8'W	131	-	135	-	247	-	
52	G	"	"	1427	1455	59°06.5'N 7°01.8'W	100	-	103	-	188	-	52/1,52/2
53	G	"	"	1520	1552	59°02.0'N 7°02.0'W	104	-	107	-	196	-	53/1,53/2
54	G	"	"	1630	1700	59°01.0'N 6°53.5'W	86	-	89	-	162	-	54/1,54/2,54/3
55	G	"	"	1745	1810	59°01.5'N 6°45.5'W	72	-	74	-	136	-	55/1,55/2
56	G	"	"	1830	1900	59°00.8'N 6°35.0'W	76	-	78	-	143	-	56/1,56/2
57	G	"	"	1945	1958	59°00.0'N 6°14.7'W	28	-	29	-	53	-	57/1,57/2
58	G	"	"	2030	2045	58°59.8'N 6°04.0'W	40	-	41	-	75	-	58/1,58/2,58/3

M.V.SURVEYOR CRUISE 1/71 - LEG 2

STATION LIST

Station No.	Type	Date	Day No.	Time (GMT)		Lat. Long.	to	Lat. Long.	Depth Range						No. of Hauls
				From	To				UCF	-	UCF	CF	-	CF	
59	G	17.3.71	076	1217	1255	56°47.1'N 14°57.5'W			116	-	119	-	219	-	59/1,59/2,59/3
60	G	"	"	1313	1337	56°45.9'N 14°43.0'W			97	-	100	-	183	-	60/1,60/2
61	G	"	"	1411	1435	56°43.3'N 14°34.5'W		56°43.5'N 14°33.0'W	98	-	101	-	185	-	61/1,61/2
62	G	"	"	1510	1532	56°41.0'N 14°35.0'W		-	102	-	105	-	192	-	62/1,62/2
63	G	"	"	1620	1644	56°39.0'N 14°25.5'W		56°39.7'N 14°25.2'W	104	-	107	-	196	-	63/1,63/2
64	G	"	"	1716	1744	50°38.2'N 14°16.9'W		56°37.9'N 14°15.7'W	117	-	121	-	220	-	64/1,64/2
65	G	"	"	1754	1834	56°37.1'N 14°13.2'W		56°36.8'N 14°12.9'W	150	-	155	-	283	-	65/1,65/2
66	G	"	"	1941	2030	56°31.5'N 14°25.5'W		-	116	-	119	-	219	-	66/1,66/2
67	G	"	"	2105	2141	56°33.8'N 14°34.5'W		56°33.8'N 14°36.0'W	105	-	108	-	198	-	67/1,67/2
68	G	"	"	2227	2252	56°36.5'N 14°47.1'W		56°36.3'N 14°48.0'W	95	-	98	-	179	-	68/1,68/2
69	G	"	"	2316	2345	56°36.6'N 14°55.0'W		56°36.3'N 14°56.0'W	96	-	99	-	181	-	69/1,69/2
70	G	20.3.71	079	0915	1000	57°24.6'N 13°11.7'W		57°24.0'N 13°12.0'W	115	-	118	-	217	-	70/1,70/2
71	G	"	"	1023	1048	57°23.5'N 13°09.5'W		-	119	-	123	-	224	-	71/1,71/2

72	G	20.3.71	079	1058	1132	57°22.8'N 13°06.5'W	-	140	-	144	-	264	-	72/1,72/2
73	G	"	"	1218	1234	57°15.5'N 13°11.5'W	-	124	-	128	-	234	-	73/1,73/2
74	G	"	"	1251	1311	57°14.0'N 13°08.2'W	-	129	-	133	-	243	-	74/1,74/2
75	D	"	"	1445	1600	57°12.8'N 13°07.2'W	57°12.5'N 13°09.0'W	130	142	134	146	245	267	
76	D	"	"	1804	2000	57°08'N 13°14.0'W	57°07.8'N 13°19.0'W	143	124	147	128	269	234	
77	G	"	"	2117	2142	57°09.7'N 13°24.0'W	57°09.3'N 13°23.0'W	116	-	119	-	219	-	77/1
78	G	21.3.71	080	1655	1726	57°02.5'N 13°38.0'W	-	100	-	103	-	188	-	78/1,78/2
79	G	"	"	1810	1833	57°07.8'N 13°46.9'W	57°08.5'N 13°47.3'W	94	-	97	-	177	-	79/1,79/2
80	G	"	"	1910	1930	57°12.7'N 13°54.5'W	57°13.0'N 13°55.5'W	86	-	89	-	162	-	80/1,80/2
81	G	"	"	2000	2030	57°15.5'N 14°02.5'W	57°16.0'N 14°04.0'W	84	-	87	-	158	-	81/1,81/2
82	G	"	"	2110	2140	57°15.2'N 14°15.0'W	-	93	-	96	-	175	-	82/1
83	G	22.3.71	081	1857	1947	57°54.1'N 13°08.1'W	57°53.0'N 13°07.0'W	124	-	128	-	234	-	83/1,83/2
84	G	"	"	2021	2053	57°50.2'N 13°09.5'W	57°49.5'N 13°09.0'W	120	-	124	-	226	-	84/1,84/2
85	G	"	"	2134	2159	57°48.7'N 13°17.0'W	-	95	-	98	-	179	-	85/1,85/2
86	G	"	"	2232	2245	57°48.2'N 13°24.0'W	57°48.0'N 13°25.0'W	86	-	89	-	162	-	86/1,86/2
87	G	"	"	2336	2356	57°47.5'N 13°34.0'W	-	75	-	77	-	141	-	87/1,87/2

Station No.	Type	Date	Day No.	Time (GMT)		Lat. Long.	to	Lat. Long.	Depth Range						No. of Hauls
				From	To				UCF	-	UCF	CF	-	CF	
88	G	23.3.71	082	0040	0100	57°50.9'N 13°40.0'W	-		79	-	81	-	149	-	88/1,88/2
89	G	"	"	0140	0207	57°54.2'N 13°47.5'W	57°54.7'N 13°47.2'W		90	-	93	-	170	-	89/1,89/2
90	G	"	"	0245	0310	57°57.5'N 13°54.7'W	57°58.1'N 13°54.7'W		111	-	114	-	209	-	90/1,90/2
91	G	"	"	0440	0500	57°52.0'N 14°05.0'W	-		110	-	113	-	207	-	91/1,91/2
92	G	"	"	0600	0623	57°43.5'N 14°07.2'W	-		92	-	95	-	173	-	92/1,92/2
93	D	"	"	0910	1023	57°36.0'N 14°30.9'W	57°36.5'N 14°28.2'W		133	-	137	-	251	-	
94	G	"	"	1227	1232	57°35.5'N 14°23.2'W	-		122	-	126	-	230	-	94/1
95	G	27.3.71	086	0309	0338	57°17'N 9°16'W	-		87	-	90	-	164	-	95/1,95/2,95/3
96	G	"	"	0409	0445	57°22.4'N 9°11'W	-		78	-	80	-	147	-	96/1,96/2,96/3
97	G	"	"	0520	0545	57°27.2'N 9°14.0'W	-		79	-	81	-	149	-	97/1,97/2
98	G	"	"	0617	0638	57°32.2'N 9°15.0'W	57°33.6'N 09°14.5'W		80	-	82	-	151	-	98/1,98/2
99	G	"	"	0730	0802	57°41.0'N 9°14.0'W	-		75	-	77	-	141	-	99/1,99/2
100	G	"	"	0826	0850	57°47.0'N 9°11.5'W	-		77	-	79	-	145	-	100/1,100/2
101	G	"	"	0921	0956	57°51.0'N 9°06.0'W	-		75	-	77	-	141	-	101/1,101/2

102	G	28.3.71	087	0215	0238	58°24.0'N 7°58.0'W	-	75	-	77	-	141	-	102/1,102/2
103	G	"	"	0312	0330	58°23.4'N 7°47.0'W	-	65	-	67	-	122	-	103/1,103/2
104	G	"	"	0400	0425	58°22.2'N 7°36.2'W	58°22.2'N 7°34.0'W	54	-	56	-	102	-	104/1,104/2, 104/3
105	G	"	"	0455	0525	58°21.5'N 7°23.0'W	-	48	-	49	-	90	-	105/1,105/2 105/3
23	D	"	"	0721	0830	58°09.5'N 7°29.5'W	58°08.0'N 7°34.0'W	43	34	44	35	81	64	
106	D	5.4.71	095	0820	1030	57°52.7'N 9°01.0'W	-	-	-	-	-	-	-	
107	G	"	"	1100	1140	57°49.5'N 8°52.5'W	-	72	-	73	-	134	-	107/1,107/2
108	G	"	"	1207	1247	57°46.5'N 8°45.5'W	-	70	-	71	-	131	-	108/1,108/2, 108/3,108/4.
109	D	"	"	1337	1540	57°41.5'N 8°39.5'W	-	82	-	84	-	153	-	
110	G	"	"	1615	1635	57°39.25'N 8°20.5'W	-	78	-	80	-	145	-	110/1,110/2
111	G	"	"	1725	1741	57°40.0'N 8°13.25'W	-	66	-	67	-	123	-	111/1,111/2
112	G	"	"	1812	1827	57°39.75'N 8°05.0'W	-	66	-	67	-	123	-	112/1,112/2
113	G	"	"	1855	2000	57°38.75'N 7°54.0'W	-	50	30	51	31	93	56	113/1,113/2
114	G	"	"	2038	2110	57°45.0'N 7°53.5'W	-	70	-	71	-	131	-	114/1,114/2
115	G	"	"	2144	2210	57°49.5'N 7°53.0'W	-	44	-	45	-	82	-	115/1,115/2 115/3
116	G	"	"	2237	2300	57°52.0'N 7°50.5'W	-	51	-	52	-	95	-	116/1,116/2
117	G	"	"	2332	2353	57°58.4'N 7°44.0'W	-	48	-	49	-	90	-	117/1,117/2

Station No.	Type	Date	Day No.	Time (GMT)		Lat. Long.	to	Lat. Long.	Depth Range						No. of Hauls
				From	To				UCF	-	UCF	CF	-	CF	
118	G	6.4.71	096	0035	0045	58°02.5'N		-	42	-	43	-	78	-	118/1,118/2
						7°43.7'W									
119	G	"	"	0730	0800	58°02.8'N		-	91	-	93	-	170	-	119/1,119/2
						8°56.0'W									
119	D	"	"	0900	0945	58°00.25'N		-	91	-	93	-	170	-	
						8°53.7'W									
120	G	"	"	1045	1103	58°00.75'N		-	77	-	79	-	144	-	120/1,120/2
						8°46.5'W									
121	G	"	"	1135	1158	58°00.5'N		-	72	-	73	-	134	-	121/1,121/2
						8°36.0'W									
122	G	"	"	1227	1248	58°01.5'N		-	72	-	73	-	134	-	122/1,122/2
						8°27.0'W									
123	G	"	"	1315	1338	58°01.5'N		-	73	-	74	-	136	-	123/1,123/2
						8°16.5'W									
124	G	"	"	1414	1435	58°01.0'N		-	63	-	64	-	118	-	124/1,124/2
						8°04.75'W									
125	G	"	"	1507	1525	58°01.0'N		-	36	30	37	31	67	56	125/1,125/2
						7°54.5'W									
126	G	"	"	1630	1650	57°56.5'N		-	65	-	66	-	121	-	126/1,126/2
						8°04.6'W									
127	G	"	"	1720	1735	57°54.5'N		-	65	-	66	-	121	-	127/1,127/2
						8°17.5'W									
128	G	"	"	1815	1832	57°50.4'N		-	33	-	34	-	62	-	128/1,128/2
						8°30.0'W									
129	G	"	"	2005	2050	57°33.0'N		-	83	-	85	-	155	-	129/1,129/2
						8°37.5'W									
130	G	"	"	2105	2138	57°30.75'N		-	83	-	85	-	155	-	130/1,130/2
						8°37.0'W									

131	G	6.4.71	096	2202	2235	57°24.5'N 8°36.0'W	-	77	-	79	-	144	-	131/1,131/2
132	G	"	"	2318	2342	57°20.0'N 8°47.0'W	-	74	-	75	-	138	-	132/1,132/2
133	G	7.4.71	097	0015	0050	57°19.7'N 8°58.5'W	-	73	-	74	-	136	-	133/1,133/2
134	G	"	"	0730	0740	57°05.75'N 8°34.75'W	-	67	-	68	-	125	-	134/1
135	G	"	"	0852	0915	57°06.0'N 8°40.0'W	-	65	-	66	-	121	-	135/1
	D	"	"	1022	1100	57°05.0'N 8°38.5'W	-	65	66	66	67	121	123	
136	G	"	"	1358	1413	57°03.25'N 8°12.4'W	-	72	-	73	-	134	-	136/1,136/2
137	G	"	"	1445	1510	57°03.25'N 8°02.0'W	-	68	62	64	63	118	116	137/1,137/2
138	G	"	"	1536	1548	57°03.0'N 7°51.0'W	-	34	40	35	41	63	75	138/1,138/2
139	G	"	"	1618	1630	57°01.75'N 7°40.25'W	-	24	14	24	14	45	26	139/1,139/2
140	G	"	"	1705	1720	56°57.75'N 7°46.2'W	-	34	31	35	36	63	65	140/1,140/2
141	G	"	"	1750	1813	56°54.25'N 7°53.5'W	-	38	-	39	-	71	-	141/1,141/2 141/3
142	G	"	"	1903	1927	56°44.8'N 7°54.5'W	-	44	-	45	-	82	-	142/1,142/2
143	G	"	"	1958	2027	56°40.0'N 7°58.5'W	-	62	-	63	-	116	-	143/1,143/2 143/3
144	G	"	"	2057	2115	56°35.5'N 8°02.25'W	-	64	62	65	63	119	116	144/1,144/2
145	G	"	"	2144	2204	56°29.0'N 7°58.0'W	-	76	73	78	74	142	136	145/1

[illegible]

159	G	"	"	2330	2345	56°00.25'N 8°05.5'W	-	78	-	80	-	145	-	159/1
160	G	9.4.71	099	0016	0026	56°00.25'N 8°15.0'W	-	78	-	80	-	145	-	160/1
161	G	"	"	0058	0113	56°00.5'N 8°24.0'W	-	72	-	73	-	134	-	161/1,161/2
162	G	"	"	0146	0207	56°00.25'N 8°31.5'N	-	76	-	78	-	142	-	162/1,162/2
163	G	"	"	0650	0700	56°15.00'N 9°03.0'S	-	92	-	94	-	172	-	163/1,163/2
164	G	"	"	0745	0809	56°09.00'N 9°00.5'W	-	86	-	88	-	160	-	164/1,164/2
165	G	"	"	0839	0905	56°04.0'N 9°02.0'W	-	96	-	98	-	179	-	165/1,165/2
166	G	"	"	0934	1000	55°59.5'N 9°08.5'W	-	112	-	114	-	209	-	166/1,166/2
167	G	"	"	1031	1059	55°53.6'N 9°05.0'W	-	102	-	104	-	190	-	167/1,167/2
168	G	"	"	1125	1145	55°49.0'N 9°09.5'W	-	82	-	84	-	153	-	168/1,168/2
168	D	"	"	1220	1302	55°48.0'N 9°10.5'W	-	67	-	68	-	125	-	
169	G	"	"	1422	1455	55°43.5'N 9°17.25'W	-	96	-	98	-	179	-	169/1,169/2
170	G	"	"	1552	1607	55°38.1'N 9°03.0'W	-	54	-	55	-	101	-	170/1,170/2
171	G	"	"	1640	1656	55°34.7'N 8°54.0'W	-	53	-	54	-	99	-	171/1,171/2
172	G	"	"	1725	1740	55°32.5'N 8°45.0'W	-	52	-	53	-	97	-	172/1,172/2
173	G	"	"	1808	1834	55°30.6'N 8°37.5'W	-	50	-	51	-	93	-	173/1,173/2

Station No.	Type	Date	Day No.	Time (GMT)		Lat. Long.	to	Lat. Long.	Depth Range						No. of Hauls
				From	To				UCF - UCF		CF - CF		CM - CM		
174	G	9.4.71	099	1910	1934	55°33.0'N 8°28.5'W	-		50	-	51	-	93	-	174/1,174/2
175	G	"	"	2006	2021	55°35.5'N 8°22.5'W	-		45	-	46	-	84	-	175/1,175/2
176	G	"	"	2055	2114	55°38.25'N 8°14.5'W	-		46	-	47	-	86	-	176/1,176/2
177	G	"	"	2145	2203	55°41.0'N 8°07.0'W	-		48	-	49	-	90	-	177/1,177/2
178	G	"	"	2235	2255	55°44.0'N 8°00.0'W	-		49	-	50	-	91	-	178/1,178/2
179	G	"	"	2330	2344	55°44.0'N 7°49.0'W	-		46	-	47	-	86	-	179/1,179/2
180	G	10.4.71	100	0014	0032	55°43.7'N 7°40.0'S	-		34	-	35	-	63	-	180/1,180/2, 180/3
181	G	"	"	0103	0111	55°43.7'N 7°31.0'W	-		29	-	30	-	54	-	181/1
182	G	"	"	0138	0151	55°43.5'N 7°21.0'W	-		34	-	35	-	63	-	182/1,182/2
183	G	"	"	0224	0234	55°43.7'N 7°10.5'W	-		26	-	27	-	48	-	183/1,183/2
184	G	10.4.71	100	0308	0322	55°44.5'N 7°03.0'W	-		26	-	27	-	48	-	184/1,184/2

Figure 1 . General Track Chart. Tracks shown in heavy line gauge depict seismic reflection profiling. Only passage tracks through survey areas are shown. Bold numerals along tracks indicate Day No. at 0001 GMT. Contours are in fathoms.

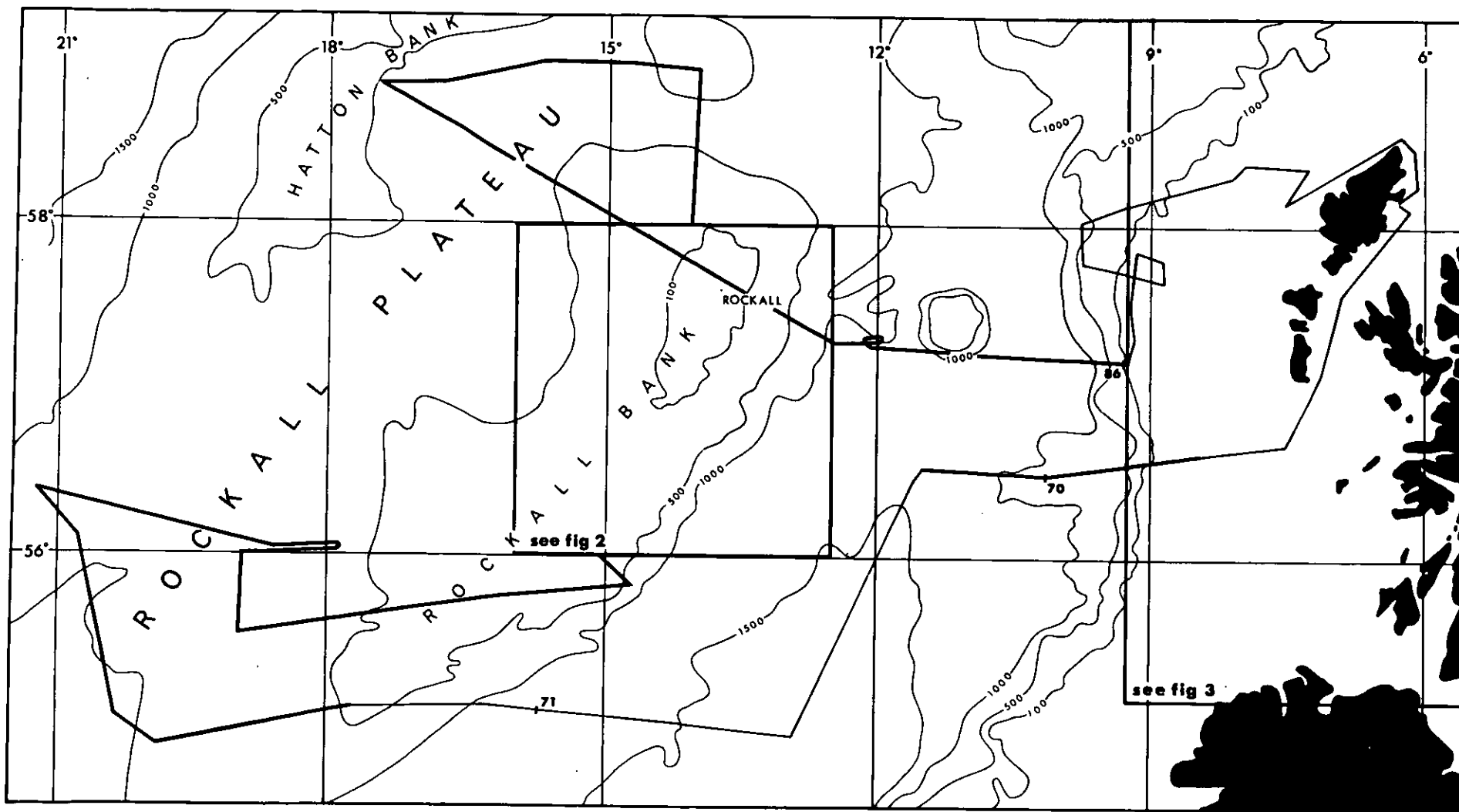


Figure 2 Tracks and Stations on Rockall Bank. Tracks shown in heavy line gauge depict seismic reflection profiling. Bold numerals along tracks indicate day number at 0001 GMT. Stations are shown by large dots with station numbers. Contours are in fathoms.

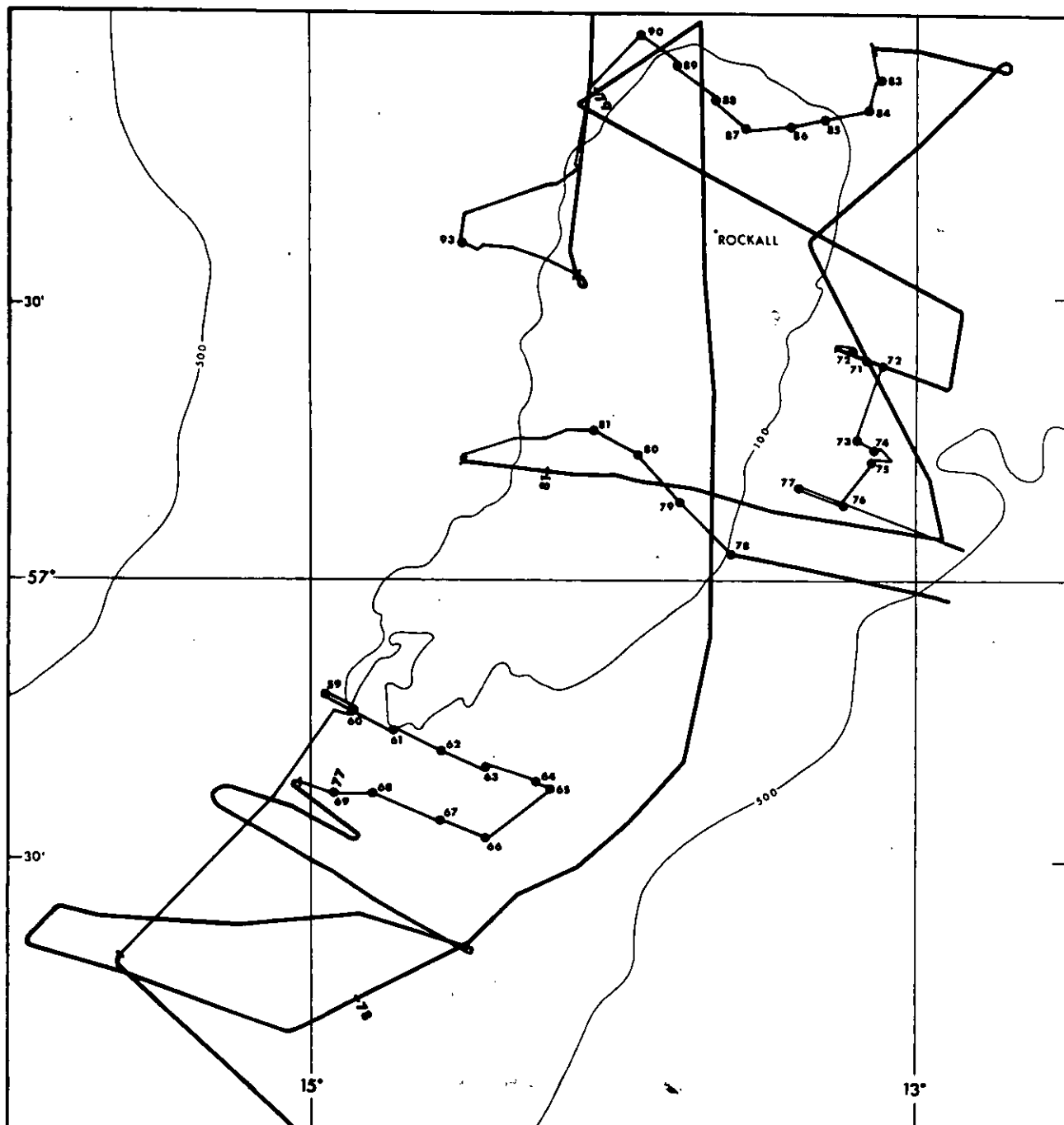


Figure 3 Stations on the Hebridean Continental Shelf. Stations are shown by dots with station numbers. Station numbers with a 'd' suffix indicate dredge stations. Contours in fathoms.

