# R.V. FRANKLIN

## NATIONAL FACILITY
## OCEANOGRAPHIC RESEARCH VESSEL

*RV FRANKLIN*

RESEARCH SUMMARY

**CRUISE FR 3/89**

Sailed Port Adelaide 0800 Wednesday 8 March 1989
Arrived Port Adelaide 1000 Wednesday 22 March 1989

**Principal Investigators**

Prof. C.C. von der Borch
Flinders University of South Australia
&
Dr. V.A. Gostin
The University of Adelaide

**Sedimentation and Quaternary Geological History of the South Australian Continental Shelf**

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Dr. A. White
The Flinders University of South Australia

**Geomagnetic Soundings of the Ocean-Continental Transition Zone**

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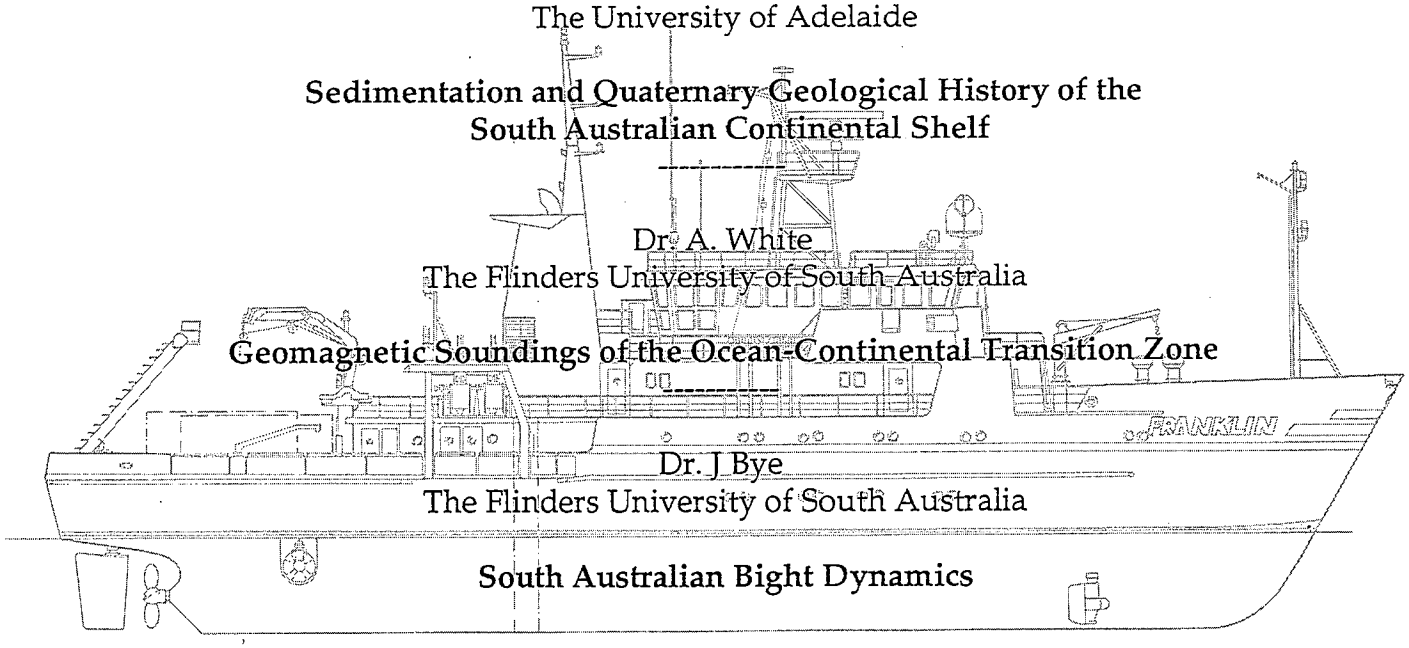
Dr. J Bye
The Flinders University of South Australia

**South Australian Bight Dynamics**




28 March 1989

**For further information contact**

**ORV Operations Manager**
**c/- CSIRO Division of Oceanography**
**GPO Box 1538, Hobart, Tas. 7001**
**Telephone (002) 20 6222**
**Telex AA 57182**

AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

# RV FRANKLIN
# RESEARCH CRUISE Fr03/89

## CRUISE SUMMARY

1. Itinerary

| | | |
|---|---|---|
| Departed | Port Adelaide 0800 hrs, | Wednesday, 8/03/89 |
| Arrived | Port Adelaide 1000 hrs, | Wednesday, 22/03/89 |

2. Scientific Programs

There were two scientific programs:

Program 1. Quaternary geological history of Gulf St. Vincent and adjacent continental shelf, and

Program 2. Recovery of four seafloor magnetometers, previously deployed during Franklin Cruise FR 01/89

The objectives were:

Program 1:

High-resolution sub-bottom profiles were to be collected from Gulf St. Vincent and continental shelf off the River Murray mouth and south of Kangaroo Island, using a "Geopulse" boomer sound source. Two transects were planned across Gulf St. Vincent to provide sub-bottom profiles along previously vibrocored sites. A grid of seismic lines was planned over the continental shelf, seaward of the River Murray mouth and Kangaroo Island. This grid was designed primarily to track the drowned palaeodrainage system and depocenters of the Murray, and secondly, to provide cross-shelf seismic lines that would delineate shoreline features developed during former lowstands of sealevel.

Vibrocore and dredge sites were to be based on results of the profiling. A suite of surface dredge samples was also planned to cover the entire shelf region [ Lacepede Shelf, Fig.1] to provide material for a preliminary sedimentological study of a temperate carbonate shelf. A sea floor camera system was available to photograph selected sites on the seafloor.

Basic physical oceanographic measurements [XBT & CTD] were planned for the continental shelf edge region to gain insight into oceanographic parameters.

Program 2:

Two days of the cruise had been allocated for recovery of four ocean floor magnetometers which were previously deployed in January 1989 on Franklin Cruise FR 01/89. These instruments lay on a transect across the continental shelf from AW4 [Lat 37° 30.1', Long 139° 30.3', depth 140m] to AW1 [Lat 38° 33.4', Long 138° 38.0', depth 4950m] and were due to float to the sea surface at predetermined times on 16 March 1989. Fluctuations of the magnetic field were sampled and recorded by these instruments every minute. These data are to be used to characterize the geomagnetic response function of this ocean-continent transition zone, and to delineate its geoelectric structure. The knowledge gained will place important constraints on models of the composition and temperature structure of the crust and upper mantle in this region.

3. Principal Investigators

Program 1: Prof. C.C. von der Borch
School of Earth Sciences
Flinders University
Bedford Park
S.A. 5062

Dr. V.A. Gostin
Department of Geology and Geophysics
University of Adelaide
Box 498, Adelaide
S.A. 5000

Program 2: Dr. A. White
School of Earth Sciences
Flinders University
Bedford Park
S.A. 5062

4. Results

Program 1.

The aims of Program 1 were largely realised. The "Geopulse" boomer worked well, and the sea-state was mostly ideal for seismic profiling. However, problems with the electrodes and Ignitron eventually terminated the seismic work. Sub-bottom penetration in excess of 100m was achieved in some areas. Approximately 475 n.m.[880km] of seismic line were recorded, with tracks that traversed many topographic features on the shelf, as well as some possible terraces from sealevel lowstands on the outer shelf.

Sediment dredging was subsequently conducted, using a simple pipe-bucket dredge with a heavy chain bridle. Sediments, some with biota and rock fragments were retrieved in all dredge hauls. A total of 85 dredge samples was collected, covering the entire shelf from south of central Kangaroo Island to south of Robe [Fig.1], an area we wish to name the Lacepede Shelf. Although various sediment and rock types were sampled, the entire shelf is sand-rich and lacks any significant mud. The sands vary from being mollusc-bearing and quartz rich on the inner and middle shelf regions, to bryozoal sands [100% carbonate] on the outer shelf. In addition, several high areas [knolls or ridges] have living sponges and bryozoans, suggesting that these highs are the source of some of the carbonate rich sands. Sanders Bank [Fig.1 ] appears to be a cuesta of older shelf sediment [?Tertiary] which is colonized by various carbonate-producing organisms. Debris from this area is apparently shed downcurrent to form carbonate-rich sand and gravel sediment. Although hard substrates hindered vibrocoring, the five sites occupied showed that Pleistocene and ?Tertiary sediments were present close to the seafloor.

A series of five XBT launchings collected oceanographic water-column data in a transect across the continental slope south of Robe. Five CTD lowerings were made at selected sites on the outer continental shelf. Data from both these deployments will be subsequently analysed on shore.

Program 2.

Only three of the four magnetometers were recovered. Radio beacon failure at the innermost site [AW4] meant that the xenon flasher was the only means of locating the

magnetometer. The light was spotted within ten minutes and the magnetometer was on board 15 minutes later. At site AW3 a very weak radio signal was detected about 8 minutes after scheduled surfacing. The magnetometer was visually located about 30 minutes later, and was on board in a further 25 minutes. At site AW2, no radio beacon was heard. After a one hour search, we proceeded to site AW1. Again no radio beacon was heard, but the magnetometer was sighted about 50 minutes after scheduled surfacing, and was on board 25 minutes later. Returning to site AW2, a prolonged search during darkness [ 2030hrs 16 March to 0700hrs 17 March] failed to locate the magnetometer by its flashing light. Owing to the difficult sea-state it was thought unlikely that the magnetometer could be located visually during daylight [assuming it had, in fact, surfaced at the appropriate time]. Accordingly the search was abandoned, and the magnetometer presumed lost.

Of the three magnetometers recovered, all appeared to have worked successfully. The electronics were operational and the data cassette tapes had advanced appropriately. Data quality cannot be assessed until the tapes are read back in the laboratory, but indications are that it will be good.

## 5. Cruise Narrative

Cruise 03/89 departed from Port Adelaide on schedule at 0800hrs, 8/3/89. The seismic profiler was deployed in flat calm conditions at the Fairway Beacon opposite Outer Harbour, and two transects of excellent quality were conducted at 5 knots across the Gulf to Edithburgh [NE to SW], and then to Carrickalinga Head [NW to SE].

Seismic gear was then secured at 0300hrs[CSumT] on 9/3/89, and the Franklin steamed for a locality near Victor Harbor, to begin the major seismic profiling portion of the cruise. Seismic profiling began at 0900hrs on the same day and was completed and gear secured on board by 0930hrs on 12/3/89, after three full days of successful use. During this period, relatively calm conditions favoured seismic work, although occasional 20-25 knot winds and associated chop and swell caused slight deterioration of a minor portion of the records.

Sediment dredging commenced along the continental shelf edge around 1200 hrs on 12/3/89, following completion of the seismic survey. A heavy pipe-bucket dredge with a chain bridle was deployed from the stern A-frame, and this system functioned very well. Dredging continued until late 15/3/89, when the Franklin steamed to the innermost seafloor magnetometer site [AW4], south of Robe.

At this stage, the southeast winds and swell increased, but the flashing light on the first magnetometer [AW4] was sighted before first light, and the instrument was retrieved using the side A-frame. The second magnetometer [AW3] located some 25 n.miles seaward, was likewise retrieved on schedule. The third magnetometer [AW2] was not sighted and no radio contact was achieved, so the Franklin proceeded to the fourth magnetometer [AW1] which was some 75 n.miles offshore. This instrument was located without difficulty, and the Franklin then steamed back to the site of AW2. A deliberate search pattern was then commenced during darkness, and persisted until dawn on 17/3/89. The search was then abandoned, and the vessel returned to a locality near Margaret Brock Reef [Fig.1] in order to complete the planned dredging program.

Four dredge sites were then successfully occupied until the afternoon of 17/3/89, when heavy seas and southwesterly winds gusting to 40 knots caused Franklin to heave-to. A decision was made to proceed to sheltered waters in nearby Lacepede Bay [Kingston] so as to vibrocore. The initial attempt, in 8m of water, was unsuccessful due to a rocky and uneven sea floor. The vibrocorer tipped over and bent the barrel in the process. A second attempt was made in 28m of water, with a sandier, smoother bottom.

A one meter core of detrital and bioclastic sand together with some fossil lacustrine mud was obtained.

The final seismic line planned for the cruise, a cross-shelf transect south of Robe [Fig.1], was initiated on 18/3/89. All systems performed very well until the terminals on the acoustic source finally corroded through, approximately two thirds of the way across the shelf. This marked the end of seismic profiling for this cruise, since a spare power cable was not at hand. However most of the planned profile was successfully recorded.

On 19/3/89, sea-state moderated sufficiently to allow deployment of the deep-sea camera system. Accordingly, a series of camera and dredge stations were run at depths of 96m to 158m, approximately along the shelf break and in a westerly direction, to a locality south of central Kangaroo Island. At this stage the sea became calm, with virtually no swell, for the first time on the entire cruise outside of Gulf St. Vincent. Three shallow banks, Carter Knoll, Sanders Bank and Threshold Bank were all photographed.

The calm sea also allowed us to vibrocore on the open shelf, and this was first done on the flank of Threshold Bank [Fig.1]. Here the seismic had indicated some outcrops of tilted and possibly faulted strata, apparently related to a widespread unit seen in the seismic profiles. The vibrocore penetrated a surprising 10cm directly into a hard marine limestone of possible Tertiary age. If substantiated, this will prove to be quite significant to the geological nature and distribution of Tertiary sediments in this region.

On the inner shelf plain, outside the Murray River mouth, both camera and vibrocore stations were selected using the seismic profiles, in order to determine the nature of sediments along the former river course. Both gravel and tightly packed, very fine sands, proved a hindrance to the vibrocorer. At two sites, only about 70cm of core were recovered. Yellow, lithified sandstone fragments were obtained at a third site. It appears, therefore, that wide areas of this shelf region may consist of pre-Recent, very fine grained quartz sands and coarse gravels, originally derived from the Murray River. Unfortunately, during retrieval of the vibrocorer, the electric cable became jammed and was severely damaged. Repairs would have taken over 4 hours, and it was decided to abandon further vibrocoring.

The final stages of the cruise took advantage of the calm sea-state to complete the seafloor photography component. Six final camera and dredge stations were selected on the inner shelf plain and associated topographic features at depths of 40 to 60m, in order to test for the presence of current- and wave-produced sediment bedforms. The results of this study will become apparent when all films have been developed, and should determine whether the widespread sand-plains of the ancestral Murray River system are relict, or whether they are undergoing significant current reworking and modification.

## 6. Summary

Franklin Research Cruise 03/89 was a complete success, with much more data collected than had originally been planned. This in no small way was due to the vessel, its systems, and the highly experienced and motivated ship's crew and CSIRO personnel [Cruise manager and electronics specialist].

The data set is of considerable magnitude. It includes high-resolution seismic profiles, sediment dredge samples, vibrocores, sea-bottom photographs, and XBT & CTD casts. Obviously a large amount of follow-up laboratory research and data processing will be required, and this report can only summarize the ship-board conclusions as follows:

High-resolution seismic profiles.

Approximately 475n.m.[880km] of seismic line were recorded in Gulf St.Vincent, the Lacepede Shelf [shelf area between Kangaroo Island and the Robe region], and across the Bonney Coast shelf. Virtually all records were of high quality. In Gulf St.Vincent, correlation between seismic profiles and pre-existing vibrocores is now possible. On the Lacepede Shelf, notable channel structures can be identified in inner and mid-shelf regions, probably related to the River Murray and Gulf St.Vincent palaeo-drainage systems. Sealevel lowstand shoreline features occur at the shelf-edge, and a gently folded sub-bottom seismic unit, of possible Tertiary age, has been mapped over a considerable area of the inner shelf. This unit, which appears to outcrop against a fault next to Threshold Bank [Fig.1], was subsequently sampled by the vibrocorer. The single seismic transect of the Bonney Coast Shelf indicates considerable bottom topography and highly reflective material, possibly related to Pleistocene lowstand shorelines. In mid-shelf, a folded and possibly faulted seismic unit of possible Tertiary age was detected.

Sediment dredge samples.

A total of 85 dredge-hauls was achieved between Kangaroo Island and the Bonney Coast Shelf [Fig.1], and the simple pipe-bucket dredge worked very well. Some of the dredge hauls were made on specific topographic features, in an attempt to determine the nature of certain seismic reflectors. Others were located on a grid in order to achieve a useful sample coverage of the entire Lacepede Shelf. Qualitative sample descriptions were made aboard ship. Results show that the inner shelf is dominantly a relict terrigenous clastic province, with quartz sands and local gravels [and only minor molluscan debris], whereas the outer shelf is a carbonate province, dominantly bryozoan grainstones and local wackestones. Hard substrates, usually localized "banks", appear to harbour highest organic growth in the region, and probably contribute bioclastic carbonate sediment to surrounding areas.

Vibrocores.

Hard substrates at vibrocore locations [indurated rock, very fine sands and gravels], hindered vibrocoring, although results of this program are highly significant. In particular, the indurated limestone cored near Threshold Bank is likely to be an outcropping portion of the regional sub-bottom seismic unit. This may be of Tertiary age.

Seafloor Magnetometers.

Three of the four seafloor magnetometers were retrieved from the line south of Robe. Results of the magnetotelluric program await onshore analysis.

Recommendations.

R.V. Franklin is considered to be an ideal vessel for the type of work carried out on Research Cruise 03/89. Franklin is a "quiet" platform for high-resolution seismic work. Winch and A-frame capabilities are adequate for sediment dredging, vibrocore deployment, and bottom photography. However, it is recommended that:

1. A precision depth recorder and a 3.5 k.Hz pinger be installed,
2. A suitable medium-weight sediment grab [Van-Veen type or other] be aquired and remain on board,
3 The davits be modified, to allow them to be extended up to about 10m from the vessel's sides, for deployment of hydrophone streamers away from the wake.

7. Personnel

| | | |
|---|---|---|
| Chris von der Borch<br>Tony White<br>Liz Barnett | [Co-Chief Scientist ] | School of Earth Sciences<br>Flinders University<br>Bedford Park, S.A. 5062 |
| Vic Gostin<br>Yvonne Bone<br>Bobbie Rice | [Co-Chief Scientist ] | Department of Geology & Geophysics<br>University of Adelaide<br>P.O. Box 498 Adelaide,<br>S.A. 5000 |
| Noel James | | Department of Geological Sciences<br>Queen's University<br>Kingston, Ontario,<br>Canada K7L 3N6 |
| Kim Gaard | | S.A. Department of Mines and Energy<br>Greenhill Road<br>Parkside, S.A. 5063 |
| Graham Heinson | | Research School of Earth Sciences<br>Australian National University<br>P.O. Box 4, Canberra,<br>A.C.T. 2600 |
| Dave Vaudrey<br>Erik Madsen | [Cruise Manager] | CSIRO - ORV<br>CSIRO - ORV |

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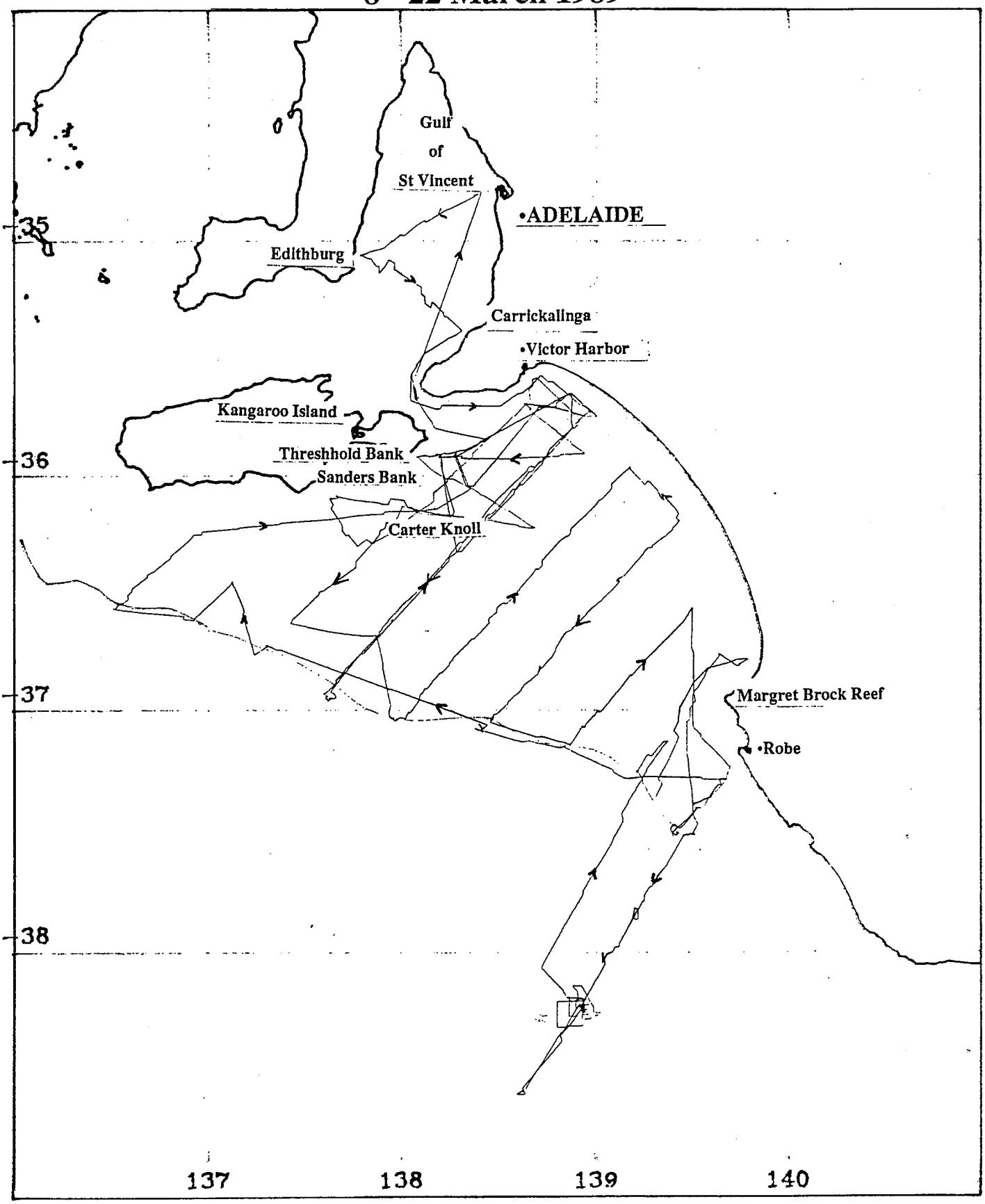
C. von der Borch
Co-Chief Scientist

V. Gostin
Co-Chief Scientist

# FIG 1.
# CRUISE TRACK
# RV FRANKLIN
# FR 03 / 89
# 8 - 22 March 1989

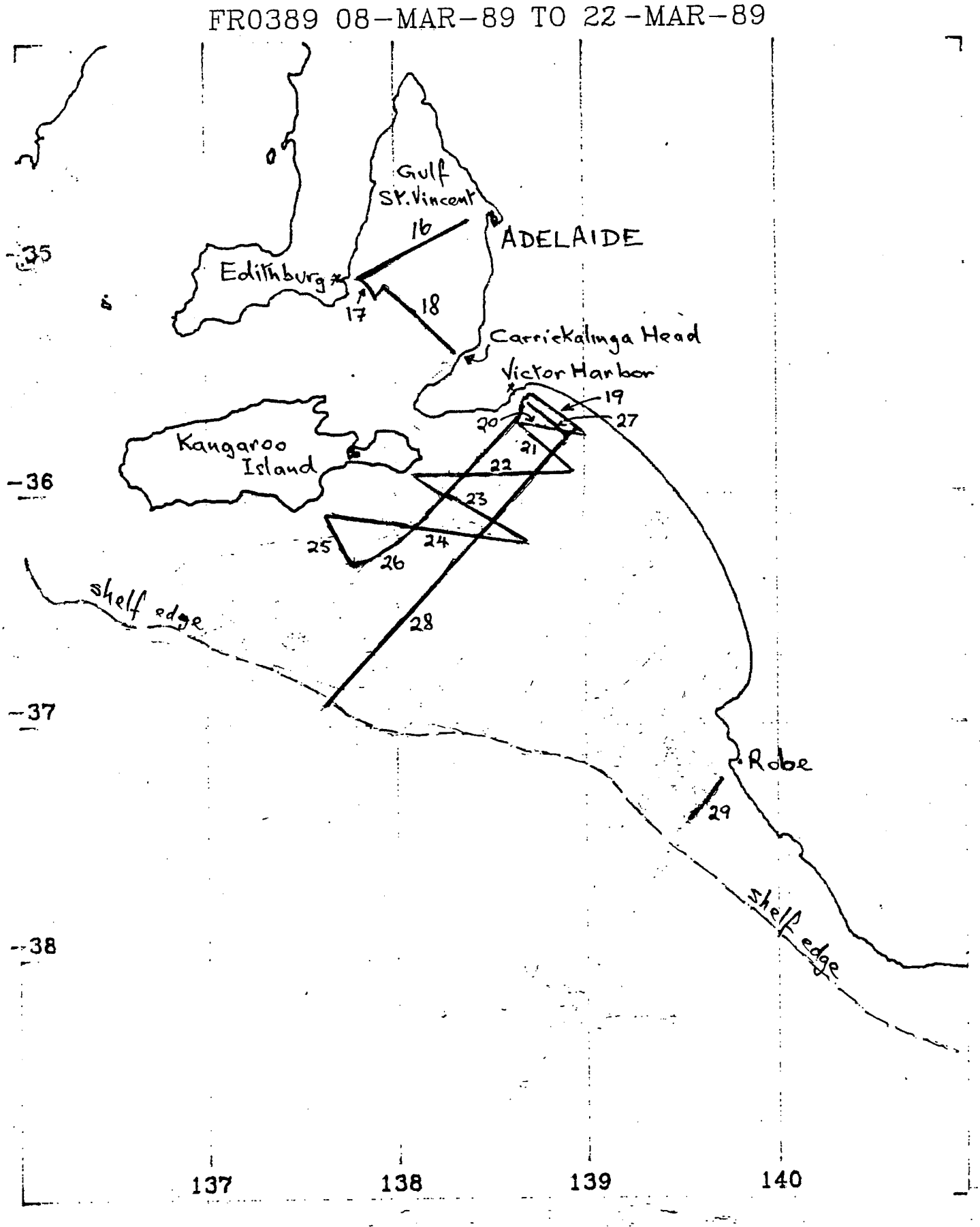


APPENDIX 1: PRELIMINARY SUMMARY OF MARINE SEISMIC TRACKLINES for GULF ST VINCENT & SOUTHERN OCEAN (i.e. Continental Shelf off River Murray, South of Kangaroo Island, & Southwest of Robe, SA. CSIRO R/V FRANKLIN Cruise 03/89, 8 - 22 March 1989.

| TRANSECT NO. | LENGTH of TRANSECT (nm/km) | FIX NOS. | DATES (CSumT) (GMT) | TIME START (CSumT) (GMT) | TIME END (CSumT) (GMT) | ROLL NO. | TIME BASE (.SEC) | SPACING (m/gridline) (1500 m/s) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| GULF ST VINCENT MARINE SEISMIC TRANSECTS<br>GEOPULSE BOOMER: Ignitron @ 175 Joules, 2 pps | | | | | | | | | |
| 16 | 34.5<br>64 | 1 - 43 | 8/03/89<br>8/03/89 | 13:44<br>03:14 | 20:05:23<br>09:35:23 | 1A (1-6, 15-43)<br>1B (7-14) | 0.15 | 11.25 | NE to SW, Outer Harbour Entrance Beacon to MacDonnell Sound (Edithburgh). |
| 17 | 14<br>26 | 44 - 71 | 8/03/89<br>8/03/89 | 20:14<br>09:44 | 22:26:20<br>11:56:20 | 1A | 0.15 | 11.25 | NW to SE, MacDonnell Sound (Edithburgh to Tapley Shoal). |
| 18 | 25<br>46 | 72 - 102 | 8-9/03/89<br>8/03/89 | 22:32:23<br>12:02:23 | 03:03<br>16:33 | 2 | 0.15 | 11.25 | NW to SE, Tapley Shoal to Carrickalinga Head.<br>End Gulf St Vincent seismic work |
| SOUTHERN OCEAN - RIVER MURRAY CONTINENTAL SHELF (ENCOUNTER BAY, SOUTH OF KANGAROO ISLAND, ETC)<br>GEOPULSE BOOMER: Ignitron @ 175 & 350 Joules, 2 pps | | | | | | | | | |
| 19 | 16.5<br>30.5 | 1 - 24 | 9/03/89<br>8-9/03/89 | 08:46<br>22:18 | 11:38<br>01:08 | 3 | 0.15 | 11.25 | NE to SW, Victor Harbor (Encount Bay) to S of Kangaroo Island.<br>175 Joules. |
| 20 | 18<br>34 | 25 - 47 | 9/03/89<br>9/03/89 | 12:06:30<br>01:36:30 | 15:22<br>04:52 | 4 | 0.15 | 11.25 | SE to NW.<br>175 Joules |
| 21 | 21.5<br>40 | 48 - 72 | 9/03/89<br>9/03/89 | 15:28<br>04:58 | 19:20<br>08:50 | 4 | 0.15 | 11.25 | NW to SE.<br>175 Joules. |
| 22 | 44<br>81.5 | 73 - 125 | 9-10/03/89 | 19:30<br>09:00 | 03:32:30<br>17:02:30 | 5A (73-99)<br>5B (100-125) | 0.15 | 11.25 | E to W over Threshhold Bank.<br>175 Joules (73 - 77).<br>350 Joules (78 - 125). |

| TRANSECT NO. | LENGTH of TRANSECT (nm/km) | FIX NOS. | DATES (CSumT) (GMT) | TIME START (CSumT) (GMT) | TIME END (CSumT) (GMT) | ROLL NO. | TIME BASE (.SEC) | SPACING (m/gridline) (1500 m/s) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| SOUTHERN OCEAN - RIVER MURRAY CONTINENTAL SHELF (ENCOUNTER BAY, SOUTH OF KANGAROO ISLAND, ETC) | | | | | | | | | |
| GEOPULSE BOOMER: Ignitron @ 175 & 350 Joules, 2 pps | | | | | | | | | |
| 23 | 36 | 126 - 167 | 10/03/89 | 03:40 | 10:21:10 | 6 | 0.15 | 11.25 | NW to SE over Sanders Bank. |
| | 67 | | 9/03/89 | 17:10 | 23:51:10 | | | | 350 Joules. |
| 24 | 54 | 168 - 225 | 10/03/89 | 10:27:40 | 19:50 | 7 | 0.15 | 11.25 | SE to NW. Time base changed fr |
| | 100 | | 9-10/03/89 | 23:57:40 | 09:20 | | 0.3 | 22.5 | 0.15 to 0.30 sec after fix 169 |
| | | | | | | | 0.25 | 18.75 | 0.25 sec after fix 187. 350 Jo |
| 25 | 19 | 226 - 248 | 10/03/89 | 19:58:15 | 23:25 | 8 | 0.25 | 18.75 | NW to SE. |
| | 35 | | 10/03/89 | 09:28:15 | 12:55 | | | | 350 Joules. |
| 26 | 64 | 249 - 330 | 10-11/03/89 | 23:39 | 11:55 | 9 (249-317) | 0.25 | 18.75 | SW to NE over Carter Knoll & |
| | 118.5 | | 10-11/03/89 | 13:09 | 01:25 | 10 (318-330) | 0.15 | 11.25 | towards Victor Harbor; minor CC |
| | | | | | | | | | after fix 322. 350 Joules. |
| | | | | | | | | | Time based changed from 0.25 to |
| | | | | | | | | | 0.15 sec at fix 301. |
| 27 | 17 | 331 - 355 | 11/03/89 | 12:00:15 | 15:28 | 11 | 0.15 | 11.25 | NW to SE. |
| | 31.5 | | 11/03/89 | 01:30:15 | 04:58 | | | | 350 Joules. |
| 28 | 95 | 356 - 466 | 11-12/03/89 | 15:34:21 | 09:15 | 12 (356-426) | 0.15 | 11.25 | NE to SW, south of Sanders Bank |
| | 175 | | 11/03/89 | 05:04:21 | 22:45 | 13 (427-466) | 0.25 | 18.75 | to outer shelf. 350 Joules. |
| | | | | | | | | | Time base changed from 0.15 to |
| | | | | | | | | | 0.25 sec at 405. Record improv |
| | | | | | | | | | End of marine seismic work for |
| | | | | | | | | | while. Pulled out & secured Bo |
| | | | | | | | | | equipment. Prepared for dredgi |
| | | | | | | | | | vibrocoring, & camera operation |
| SOUTHERN OCEAN - SOUTHWEST OFF ROBE, SA | | | | | | | | | |
| GEOPULSE BOOMER: Ignitron & Trigatron (Sparker) @ 350 Joules, 2 pps | | | | | | | | | |
| 29 | 14 | 467 - 482 | 18/09/89 | 15:22 | 17:57 | 14 | 0.25 | 18.75 | NE to SW off Robe. |
| | 26 | | 18/03/89 | 04:52 | 07:27 | | | | 350 Joules. Ignitron failed |
| | | | | | | | | | after #471; switched to Trigatr |
| | | | | | | | | | Boomer failed at fix 482 - |
| | | | | | | | | | corroded electrodes. Seismics |
| | | | | | | | | | terminated for remainder of cru |

Fig. Marine seismic tracklines



APPENDIX 2: PRELIMARY SUMMARY OF MARINE SEISMIC TRACTLINE EVENTS AS REALTED TO BRIDGE & SEISMIC LOGBOOKS.
NOTE: Time & Associated Latitude/Longitude correspond to second fix number.
CSIRO R/V FRANKLIN 03/89, 8 - 22 March 1989

TRANSECT NO. 16 DATE: 8 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 34.5 nm (64 km)
LOCATION: Gulf of St Vincent: Outer Harbour to Edithborough
TIME [CSumT (GMT)]: 13:40 to 20:05 (03:10 to 09:35)
POSITIONING SYSTEM: DBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 Joules & 2pps, BOOMER, Rental & Old EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 9 42 | 23 12 | | | 34 48.30 | 138 23.40 | Gulf St Vincent, near Outer Harbour. Prepare Boomer equipment for starboard side depoyment. |
| 12 0 | 1 30 | | | 34 48.00 | 138 23.60 | Deployed & tested Boomer equipment. Configuration: Boomer & hydrophone streamer on inside & outside end (1-2m seseparation) of aft starboard boom (4m extension); ~35m cables out. |
| 13 0 | 2 30 | | | 34 48.12 | 138 22.79 | Commence seismic run; still making final recorder adjustments. 13:14 SOL 16, Heading 239 TN. |
| 14 0 | 3 30 | 1 | 4 | 34 50.36 | 138 17.87 | |
| 15 0 | 4 30 | 5 | 14 | 34 52.41 | 138 12.74 | 15:00 - 15:50 Slowed down temporarily, troubleshooting EPC Recorders (both in use). Problem resolved - earth loop. |
| 16 0 | 5 30 | 15 | 18 | 34 54.00 | 138 9.60 | Slight seas, low swell, fine & clear. |
| 17 0 | 6 30 | 19 | 24 | 34 55.70 | 138 4.70 | |
| 18 0 | 7 30 | 25 | 30 | 34 58.60 | 137 59.30 | |
| 19 0 | 8 30 | 31 | 36 | 35 1.78 | 137 53.91 | Minor CC to 250 TN. |
| 19 24 | 8 54 | 37 | 38 | 35 2.72 | 137 51.45 | |
| 19 40 | 9 10 | 39 | 40 | 35 3.10 | 137 49.70 | |
| 20 0 | 9 30 | 41 | 42 | 35 3.90 | 137 47.80 | |
| 20 6 | 9 36 | 43 | | 35 4.03 | 137 47.20 | 20:03:23 EOL 16. |

TRANSECT NO. :7 DATE: 8 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 14 nm (26 km)
LOCATION: Gulf of St Vincent: Outer Harbour to Edithborough
TIME [CSumT (GMT)]: 20:14 to 22:27 (09:44 to 11:56)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 Joules & 2pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | to fix | LATITUDE (S) (deg min.min) | | LONGITUDE (E) (deg min.min) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 20 14 | 9 44 | | 44 | | | | | SOL 17, Heading 115 TN. |
| 20 40 | 10 10 | | | | | | | Slight CC to Heading 108 TN. |
| 20 50 | 10 20 | 45 | 49 | 35 5.60 | | 137 51.25 | | Slight CC to Heading 150 TN. |
| 21 0 | 10 30 | 50 | 52 | 35 6.50 | | 137 51.80 | | |
| 21 20 | 10 50 | 53 | 55 | 35 8.26 | | 137 53.00 | | CC to 090 TN. |
| 21 30 | 11 0 | 56 | 59 | 35 8.90 | | 137 53.70 | | CC to 035 TN. 21:37 OC. |
| 22 0 | 11 30 | 60 | 67 | 35 7.50 | | 137 55.20 | | |
| 22 25 | 11 55 | 68 | 70 | 35 6.15 | | 137 56.30 | | CC to 125 TN. |
| 22 26 | 11 56 | 71 | | | | | | EOL 17. Almost SOL for #18. |

TRANSECT NO. 18 DATE: 8 - 9 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 25 nm (46 km)
LOCATION: Gulf St Vincent: Edithburgh to Carrickalinga Head
TIME [CSumT (GMT)]: 22:32 to 03:03 (8-9 March) (12:02 to 16:33; 8 March)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 Joules & 2pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | to fix | LATITUDE (S) (deg min.min) | | LONGITUDE (E) (deg min.min) | | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 22 32 | 12 2 | 72 | | | | | | SOL 18, Heading 125 TN. |
| 23 0 | 12 30 | 73 | 76 | 35 8.50 | | 137 59.40 | | |
| 24 0 | 13 30 | 77 | 84 | 35 12.40 | | 138 3.80 | | Rippled sea, low swell, cloudy to clear. |
| (9/03) | (8/03) | | | | | | | |
| 0 50 | 14 20 | | | | | | | CC to 131 TN die to tides. |
| 1 0 | 14 30 | 85 | 89 | 35 15.50 | | 138 9.50 | | OC, Heading 131 TN. |
| 2 0 | 15 30 | 90 | 95 | 35 19.30 | | 138 14.40 | | |
| 3 0 | 16 30 | 96 | 101 | 35 22.80 | | 138 19.20 | | |
| 3 3 | 16 33 | 102 | | | | | | EOL 18. Pulled in & secured gear. 16:50 Proceed to Victor Harbor for start of Southern Ocean Transects (i.e. Victor Harbor, Kangaroo Island & River Murray continental shelf). |

TRANSECT NO. 19 DATE: 9 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 16.5 nm (30.5 km)
LOCATION: SOUTHERN OCEAN: NE to SW, Victor Harbor to S of Kangaroo Island
TIME [CSumT (GMT)]: 08:48 to 11:38 (09/03/89) (22:18 to 01:08; 08-09/03/89)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 Joules & 2pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 8 30 | 22 0 (08/03) | | | 35 34.00 | 138 44.00 | Deploy seimic gear near Victor Harbor. Rippled seas, low swell, light airs. |
| 8 45 | 22 15 | | | 35 34.20 | 138 44.30 | |
| 8 48 | 22 18 | 1 | | | | SOL 19, Heading 130 MN. |
| 9 0 | 22 30 | 2 | 4 | 35 35.60 | 138 46.20 | |
| 10 0 | 23 30 | 5 | 14 | 35 39.00 | 138 51.30 | |
| 11 0 | 0 30 (09/03) | 15 | 20 | 35 42.20 | 138 56.60 | |
| 11 37 | 1 7 | 21 | 23 | 35 44.40 | 139 0.10 | Slowing down. |
| 11 38 | 1 8 | 24 | | | | EOL 19. Adjusted starboard boom to increase separation between boomer & streamer. Extended adjustable boom further out (2m). |

TRANSECT NO. 20 DATE: 9 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 18 nm (33 km)
LOCATION: SOUTHERN OCEAN: SE to NW, Inner Shelf
TIME [CSumT (GMT)]: 12:00 to 15:22 (01:30 to 04:52)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 Joules & 2pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 12 0 | 1 30 | | | 35 44.78 | 139 0.40 | Adjustments made; come OC for SOL 20. |
| 12 6 | 1 36 | 25 | | | | SOL 20, Heading 280 TN. |
| 13 0 | 2 30 | 26 | 31 | 35 44.00 | 138 54.80 | |
| 14 0 | 3 30 | 32 | 38 | 35 42.27 | 138 47.24 | |
| 15 0 | 4 30 | 39 | 44 | 35 41.30 | 138 39.70 | |
| 15 20 | 4 50 | 45 | 46 | 35 41.20 | 138 37.60 | CC to 131 TN for SOL 21. |
| 15 22 | 4 52 | 47 | | | | EOL 20. |

TRANSECT NO. 21 DATE: 9 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 21.5 nm (40 km)
LOCATION: SOUTHERN OCEAN: NW to SE, Inner Shelf
TIME [CSumT (GMT)]: 15:20 to 19:20 (04:58 to 08:58)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 Joules & 2pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 15 20 | 4 58 | 48 | | | | SOL 21, Heading 131 TN. |
| 16 0 | 5 30 | 49 | 52 | 35 42.50 | 138 39.00 | Slight seas, low swell, fine & clear. |
| 16 30 | 6 0 | 53 | 55 | 35 44.70 | 138 41.30 | OC, Heading 128 TN. |
| 17 0 | 6 30 | 56 | 58 | 35 46.30 | 138 43.90 | OC, Heading 125 TN. |
| 18 0 | 7 30 | 59 | 64 | 35 49.70 | 138 48.80 | |
| 19 0 | 8 30 | 65 | 70 | 35 53.50 | 138 54.10 | OC, Heading 120 TN. |
| 19 22 | 8 52 | 71 | 72 | 35 54.60 | 138 56.00 | CC to 271 TN for SOL 22. |
| | | | | | | EOL 21. |

TRANSECT NO. 22 DATE: 9-10 MARCH 1989 (CSumT)
LENGTH OF TRANSECT: 44 nm (81.5 km)
LOCATION: SOUTERN OCEAN: E to W over Threshhold Bank
TIME [CSumT (GMT)]: 19:30 to 03:33 (10/03/89) (09:30 to 17:03; 09/03/89)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 175 & 350 Joules & 2pps, BOOMER, Rental & Old EPC 1600 RECORDERS

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 19 22 | 8 52 | | | 35 54.60 | 138 56.00 | CC to 271 TN for SOL 22. |
| 19 30 | 9 0 | 73 | | | | SOL 22, Heading 271 TN. |
| 19 35 | 9 5 | 74 | | 35 55.50 | 138 55.10 | |
| 20 0 | 9 30 | 75 | 77 | 35 54.80 | 138 52.80 | Slight seas, low swells, overcast. |
| 20 3 | 9 33 | | | | | Switched Boomer from 175 to 350 Joules. |
| 21 0 | 10 30 | 78 | 83 | 35 54.90 | 138 46.30 | |
| 22 0 | 11 30 | 84 | 89 | 35 55.25 | 138 39.10 | |
| 23 0 | 12 30 | 90 | 95 | 35 55.40 | 138 31.60 | |
| 24 0 | 13 30 | 96 | 102 | 35 55.30 | 138 26.70 | Overcast, rain showers. |
| (10/03) | (09/03) | | | | | |
| 1 0 | 14 30 | 103 | 108 | 35 54.90 | 138 19.80 | |
| 2 0 | 15 30 | 108 | 115 | 35 54.40 | 138 14.00 | |
| 3 0 | 16 30 | 116 | 121 | 35 54.40 | 138 7.80 | |
| 3 30 | 17 0 | 122 | 124 | 35 54.30 | 138 4.80 | CC to Heading 121 TN for SOL 23. |
| 3 32 | 17 2 | 125 | | | | EOL 22. |

TRANSECT NO. 23 DATE: 9-10 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 36 nm (67 km)
LOCATION: SOUTHERN OCEAN: NW to SE over Sanders Bank
TIME [CSumT (GMT)]: 03:40 to 10:22 (10/03/89) (17:10 to 23:52; 09/03/89)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 3 30 | 17 0 | | | 35 54.30 | 138 4.80 | Prepare for SOL 23. |
| 3 40 | 17 10 | 126 | | | | SOL 23, Heading 121 TN. |
| 4 0 | 17 30 | 127 | 128 | 35 55.30 | 138 6.80 | Slight seas, low swell, fine & clear. |
| 5 0 | 18 30 | 129 | 134 | 35 58.70 | 138 11.90 | |
| 5 30 | 19 0 | 135 | 137 | 36 0.30 | 138 14.50 | |
| 6 0 | 19 30 | 138 | 140 | 36 1.50 | 138 17.10 | |
| 6 33 | 20 3 | 141 | 143 | 36 2.90 | 138 20.40 | |
| 7 0 | 20 30 | 144 | 146 | 36 4.20 | 138 22.70 | |
| 8 0 | 21 30 | 147 | 152 | 36 6.50 | 138 28.95 | Moderate seas with low swells. |
| 9 0 | 22 30 | 153 | 158 | 36 9.47 | 138 34.43 | |
| 10 0 | 23 30 | 158 | 164 | 36 12.38 | 138 39.87 | |
| 10 21 | 23 51 | 165 | 167 | | | EOL 23. |
| 10 22 | 23 52 | | | 36 13.29 | 138 41.70 | |

TRANSECT NO. 24 DATE: 9-10 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 54 nm (100 km)
LOCATION: SOUTHERN OCEAN: SE to NW, Mid shelf
TIME [CSumT (GMT)]: 10:27 to 19:50 (10/03/89) (23:57 to 09:20; 9-10/03/89)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 10 22 | 23 52 | | | 36 13.29 | 138 41.70 | Prepare for SOL 24. |
| 10 27 | 23 57 | 168 | | | | SOL 24, Heading 280 TN. |
| 11 0 | 0 30 | 169 | 172 | 36 12.93 | 138 37.54 | |
| 12 0 | 1 30 | 173 | 178 | 36 11.90 | 138 32.02 | Slight to moderate seas & swell, overcast to clear. |
| 13 0 | 2 30 | 179 | 184 | 36 10.76 | 138 24.32 | |
| 14 0 | 3 30 | 185 | 190 | 36 10.03 | 138 17.27 | |
| 15 0 | 4 30 | 191 | 196 | 36 9.00 | 138 9.60 | |
| 16 0 | 5 30 | 197 | 202 | 36 7.80 | 138 1.80 | Moderate seas, low swell, fine & clear. |
| 17 0 | 6 30 | 203 | 208 | 36 7.00 | 137 56.30 | |
| 18 0 | 7 30 | 209 | 214 | 36 6.10 | 137 49.90 | |
| 19 0 | 8 30 | 215 | 220 | 36 5.70 | 137 42.80 | CC to Heading 285 MN. |
| 19 50 | 9 20 | 221 | 225 | 36 5.20 | 137 36.80 | EOL 24. CC for SOL 25. |

TRANSECT NO. 25 DATE: 10 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 19 nm (35 km)
LOCATION: SOUTHERN OCEAN: NW to SE, S of Kangaroo Island
TIME [CSumT (GMT)]: 19:58 to 23:25 (09:28 to 12:55)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 19 58 | 9 28 | | 225 | 36 5.20 | 137 36.80 | Prepare for SOL 25. |
| 19 58 | 9 28 | 226 | | | | SOL 25; Heading 153 TN. |
| 20 0 | 9 30 | 227 | | 36 4.90 | 137 37.10 | Rough seas with moderate swell. |
| 20 30 | 10 0 | 228 | 230 | 36 7.80 | 137 39.00 | CC to 145 TN. |
| 21 0 | 10 30 | 231 | 233 | 36 10.70 | 137 40.60 | |
| 22 0 | 11 30 | 234 | 239 | 36 15.00 | 137 43.20 | CC to 140 TN. |
| 23 0 | 12 30 | 240 | 245 | 36 18.80 | 137 46.60 | |
| 23 24 | 12 54 | 246 | 247 | 36 20.50 | 137 47.80 | CC to 047 TN. Prepare for SOL 26. |
| 23 25 | 12 55 | 248 | | | | EOL 26. |

TRANSECT NO. 26 DATE: 10-11 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 64 nm (118.5 km)
LOCATION: SOUTHERN OCEAN: SW to NE, Outer Shelf to Inner Shelf (Victor Harbor)
TIME [CSumT (GMT)]: 23:39 to 11:55 (10-11/03/89) (13:09 to 01:21; 10-11/03/89)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 23 24 | 12 54 | | | 36 20.50 | 137 47.80 | CC to 047 TN. Prepare for SOL 26. |
| 23 39 | 13 9 | 249 | | | | SOL 26; Heading 047 TN. |
| 24 0 (11/03/89) | 13 30 | 250 | 252 | 36 18.50 | 137 50.00 | Moderate to high seas, heavy swells, cloudy to clear. |
| 1 0 | 14 30 | 253 | 259 | 36 14.80 | 137 54.30 | |
| 2 0 | 15 30 | 260 | 265 | 36 11.80 | 137 58.80 | |
| 3 0 | 16 30 | 266 | 271 | 36 8.20 | 138 3.20 | |
| 4 0 | 17 30 | 272 | 277 | 36 5.00 | 138 8.20 | Moderate seas & swell, fine & clear. |
| 5 0 | 18 30 | 278 | 282 | 36 1.50 | 138 12.70 | |
| 6 0 | 19 30 | 283 | 288 | 35 58.00 | 138 17.00 | |
| 6 30 | 20 0 | 289 | 291 | 35 56.40 | 138 19.20 | Minor CC to 045 TN. |
| 7 0 | 20 30 | 292 | 294 | 35 54.70 | 138 21.40 | |
| 8 0 | 21 30 | 295 | 300 | 35 51.00 | 138 26.10 | Slight seas with moderate SSE swell |
| 9 0 | 22 30 | 301 | 307 | 35 47.40 | 138 31.20 | |
| 10 0 | 23 30 | 308 | 314 | 35 43.50 | 138 36.20 | Slight CC to 040 TN. |
| 11 0 | 0 30 (11/03/89) | 315 | 322 | 35 39.80 | 138 40.80 | Slight CC to 035 TN. |
| 11 55 | 1 25 | 323 | 330 | | | EOL 26. |
| 12 0 | 1 30 | | | 35 34.50 | 138 40.00 | Prepare for SOL 27. Moderate seas & swell, cloudy to clear. |

TRANSECT NO. 27 DATE: 11 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 17 nm (31.5 km)
LOCATION: SOUTHERN OCEAN: NW to SE, Inner Shelf
TIME (CSumT (GMT)): 12:00 to 15:28 (1:30 to 5:58)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 12 0 | 1 30 | 331 | | 35 34.50 | 138 40.00 | SOL 27. Moderate seas & swell, cloudy to clear. |
| 13 0 | 2 30 | 332 | 339 | 35 38.10 | 138 44.90 | Heading 131 TN. |
| 14 0 | 3 30 | 340 | 345 | 35 41.83 | 138 49.76 | |
| 15 0 | 4 30 | 346 | 352 | 35 44.50 | 138 53.60 | |
| 15 29 | 4 58 | 353 | 359 | | | EOL 27. Prepare for SOL 28. |
| 15 30 | 5 0 | | | 35 45.70 | 138 55.70 | CC to Heading 222 TN. |

TRANSECT NO. 29 DATE: 18 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 14 nm (25.9 km)
LOCATION: NE to SW off Robe
TIME (CST/GMT) 15:22 to 17:57 (04:52 to 07:27)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, DR (Dead Reckoning)
IGNITRON & TRIGATRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER
Ignitron died,shortly followed by the Trigatron - corroded/dissolved electrodes.

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 15 15 | 4 45 | | | 37 14.5 | 139 42.7 | Set up Boomer/streamer over starboard side. Prepare for SOL 29, NE to SW of Robe (Inner to outer shelf). |
| 15 2 | 4 52 | 467 | | | | SOL 29, OC 220 TN. |
| 16 0 | 5 30 | 467 | 471 | 37 17.5 | 139 39.4 | Slight seas, low swell, fine & clear. |
| 16 13 | 5 43 | 472 | | 37 18.56 | 139 38.69 | #472 at 16:10hr. |
| 17 0 | 6 30 | 473 | 477 | 37 21.2 | 139 34.5 | Slight CC to 210 TN. |
| 17 38 | 7 8 | 478 | 480 | 37 24.52 | 139 31.84 | #480 at 17:30hrs. |
| 17 55 | 7 25 | 481 | 482 | 37 26.06 | 139 31 | #482 at around 17:57hrs. |
| | | | | | | EOL 29 pre-maturely due to failure of Geopulse Boomer system. Pulled in & secured gear. Prepared for dredging, vibrocoring & camera work. |

TRANSECT NO. 28 DATE: 11-12 MARCH 1989 (CSumT/GMT)
LENGTH OF TRANSECT: 94.5 nm (175 km)
LOCATION: SOUTHERN OCEAN: NE to SW, S of Sangers Bank, Inner to Outer Shelf
TIME [CSumT (GMT)]: 15:34 to 09:15 (11-12/03/89) (05:04 to 22:45; 11/03/89)
POSITIONING SYSTEM: OBS (Radar), GPS, SATNAV, OR (Dead Reckoning)
IGNITRON @ 350 Joules & 2 pps, BOOMER, Rental EPC 1600 RECORDER

| TIME (CSumT) | TIME (GMT) | FIX NOS. fix | FIX NOS. to fix | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | COMMENTS |
|---|---|---|---|---|---|---|
| 15 36 | 5 0 | | | 35 45.70 | 138 55.70 | CC to Heading 222 TN. |
| 15 34 | 5 4 | 356 | | | | SOL 28, Heading 222 TN. |
| 16 0 | 5 30 | 357 | 359 | 35 47.90 | 138 52.80 | Slight seas, mod. swell, clear & fine. |
| 17 0 | 6 30 | 360 | 366 | 35 51.30 | 138 49.20 | |
| 17 30 | 7 0 | 367 | 369 | 35 52.80 | 138 46.90 | Slight CC to 220 TN. |
| 18 0 | 7 30 | 370 | 372 | 35 54.75 | 138 44.40 | |
| 18 30 | 8 0 | 373 | 375 | 35 56.50 | 138 41.60 | Slight CC to 217 TN. |
| 19 0 | 8 30 | 376 | 378 | 35 58.25 | 138 39.70 | |
| 19 13 | 8 43 | 379 | | 35 58.88 | 138 39.39 | |
| | | @ 19:10 | | | | |
| 19 51 | 9 21 | 380 | 383 | 36 1.78 | 138 36.59 | |
| 20 0 | 9 30 | 384 | | 36 2.31 | 138 36.09 | Moderate seas & swell. |
| 20 19 | 9 49 | 385 | | 36 3.24 | 138 34.49 | |
| | | @ 20:10 | | | | |
| 21 0 | 10 30 | 386 | 390 | 36 6.00 | 138 34.70 | Slight CC to 222 TN. |
| 22 0 | 11 30 | 391 | 396 | 36 9.96 | 138 26.80 | Slight CC to 221 TN. |
| 23 0 | 12 30 | 397 | 402 | 36 14.26 | 138 22.00 | |
| 24 0 | 13 30 | 403 | 409 | 36 17.65 | 138 17.46 | Moderate seas & swell, cloudy & clear. |
| (12/03/89) | | | | | | Slight CC to 216 TN. |
| 0 46 | 14 16 | 410 | 413 | 36 20.78 | 138 14.73 | |
| 1 0 | 14 30 | 414 | 415 | 36 21.62 | 138 13.97 | |
| 1 32 | 15 2 | 416 | 418 | 36 23.98 | 138 11.56 | Slight CC to 222 TN. |
| 2 0 | 15 30 | 419 | 421 | 36 25.70 | 138 9.71 | |
| 3 0 | 16 30 | 422 | 428 | 36 29.42 | 138 5.54 | |
| 3 19 | 16 49 | 429 | 430 | 36 31.11 | 138 3.51 | |
| 3 32 | 17 2 | 431 | | 36 32.50 | 138 1.50 | |
| | | @ 03:30 | | | | |
| 4 0 | 17 30 | 432 | 434 | 36 34.20 | 137 59.61 | SLight seas, low swell, fine & clear. |
| 4 22 | 17 52 | 435 | 436 | 36 37.65 | 137 55.95 | |
| | | | @ 04:20 | | | |
| 5 0 | 18 30 | 437 | 440 | 36 38.15 | 137 55.38 | |
| 5 20 | 18 50 | 441 | 442 | 36 39.53 | 137 54.22 | |
| 6 0 | 19 30 | 443 | 446 | 36 42.32 | 137 51.53 | |
| 7 0 | 20 30 | 447 | 452 | 36 45.88 | 137 47.39 | |
| 7 38 | 21 8 | 453 | 455 | 36 49.63 | 137 43.56 | Slight CC to 225 TN. |
| 8 0 | 21 30 | 456 | 458 | 36 51.19 | 137 41.83 | Moderate seas, low swells. |
| 9 0 | 22 30 | 459 | 464 | 36 54.90 | 137 37.68 | |
| 9 15 | 22 45 | 465 | 466 | | | EOL 28. |
| 9 25 | 22 55 | | | 36 55.99 | 137 36.29 | Complete seismic work. Pulled in & secured equipment. Prepare for dredging, vibrocoring, & camera tows. |

APPENDIX 3: PRELIMINARY DREDGE SITE SUMMARY: CSIRO FRANKLIN 03/89.
Victor Harbor - Continental Shelf off River Murray & South of Kangaroo Island, &
Offshore Robe, SA. 8 - 22 March 1989.

| SITE NO. | LOCATION | SEISMIC TRANSECT NO. | LCN. FIX NO. | LOCAL DATE (CSumT; CST) | TIME (CSumT; CST) | TIME (GMT) | LATITUDE (S) (deg min.min) | LONGITUDE (E) (deg min.min) | DEPTH (m) | BEARING (TN) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Outer shelf | T28 | 465 | 12/03/89 | 12:45 | 02:15 | 36 56.5 | 137 39.7 | 162-171 | 234 | Sand & bryozoan grit. |
| 2 | Outer shelf | T28 | 463 - 464 | | | | 36 55.6 | 137 39.5 | 122-127 | 268 | Cobbles, living algae, abundant bryozoan |
| 3 | Bank | T28 | 463 | | 15:20:19 | 04:30:19 | 36 55.3 | 137 38.3 | 119-123 | 252 | Similar to #2; more uniform. |
| 4 | Scarp on outer shelf | T28 | 452 - 453 | | 16:50 | 06:20 | 36 45.3 | 137 39.0 | 64-67 | 214 | Nodules of calcareous algae/bryozoan encrusted; med.-coarse sands with shell fragments & bryozoans (less bryozoans than #3). |
| 5 | Outer to mid shelf | T28 | 437 - 439 | | 18:33 | 08:03 | 36 37.0 | 137 57.5 | 66-68 | 209-213 | Well sorted yellow fine to med. quartz & some carbonate sand; rare bivalves w/ virtually no bryozoans. |
| 6 | Mid shelf | T28 | 425 - 426 | | 20:21 | 09:51 | 36 28.4 | 138 7.7 | 66-67 | 188 | Poorly sorted gravel & fine to coarse sand; mixed quartz & carbonate. |
| 7 | Mid shelf | T28 | 409 - 412 | | 21:53 | 11:23 | 36 19.4 | 138 18.7 | 60-62 | 189 | Well sorted fine to v fine quartz sand; few bivalve fragments, 1 bryozoa. |
| 8 | Mid shelf | T28 | 395 - 398 | | 23:51 | 13:21 | 36 10.8 | 133 27.3 | 57-58 | 192 | Fine to v fine quartz sand; ~ 40% fine carbonate fragments & some forams. |
| 9 | Inner to mid shelf | T28 | 383 | 13/03/89 | 01:29 | 14:59 | 36 1.9 | 138 36.9 | 52-54 | 200 | Coarse fragments of shells & bryozoa with spines, forams & rock fragments. |
| 10 | Inner shelf | T28 | 370 | | 03:30 | 17:00 | 35 53.0 | 138 47.0 | 47 | | Fine grained mixed quartz & carbonate Sd |
| 11 | Inner shelf | T29 | 38 - 22 | | 05:39 | 19:09 | 35 44.0 | 138 57.3 | 42 | | Fine-med quartz sand with minor carbonat |
| 12 | Innermost shelf | T19 | 19 - 15 | | 06:30 | 20:00 | 35 39.0 | 138 51.2 | 36 | | Poorly sorted med - coarse sand & gravel, minor mud component. |
| 13 | Inner shelf | T29 | 38 | | 09:39 | 22:09 | 35 42.5 | 138 47.3 | 42-45 | 164 | V fine quartz sand. |
| 14 | Inner shelf | T21 | 52 | | 08:44 | 22:14 (12/03/89) | 35 43.0 | 138 48.2 | 42-43 | 157 | Fine quartz & carbonate sands; rare thin shelled molluscs. |
| 15A | Sanders Bank | T23 | 144 | | 11:52 | 01:20 (13/03/89) | 36 2.4 | 138 22.7 | 37 | 162 | Sand with coarse fraction of shells, sponges, bryozoans, algae & coral. |
| 15B | Slope, Sanders Bank | T23 | 144 | | 12:16 | 01:40 | 36 2.7 | 138 22.0 | 41-52 | 131 | Lithified sand fragments (15B also). |

| SITE NO. | LOCATION | SEISMIC TRANSECT NO. | LCN. FIX NO. | LOCAL DATE (CSuST; CST) | TIME (CSuST; CST) | TIME (GMT) | LATITUDE (S) (deg min.mm) | LONGITUDE (E) (deg min.min) | DEPTH (m) | BEARING (TN) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16A | Crest, Sanders Bank | T22 | 143 | | 12:46 | 02:16 | 36 2.6 | 138 20.1 | 38-39 | 176 | Little recovered: sand, algae, shells. |
| 16B | Crest, Sanders Bank | T22 | 143 | | 13:01 | 02:31 | 36 2.7 | 138 20.1 | 37-38 | 175 | Glacial boulders, bryozoal limestone, red algae, sponges, ascidians. |
| 17A | E of Threshhold Bank | T22 | 112 | | 14:17 | 03:47 | 35 54.7 | 138 16.8 | 38 | 135 | Med - coarse sands, sponges, calcareous algae & a brittle star. |
| 17B | E of Threshhold Bank | T22 | 112 | | 14:34 | 04:04 | 35 54.7 | 138 16.7 | 34-37 | 136-132 | As above with bryozoan fragments, spines |
| 18 | Threshhold Bank | T22 | 113 | | 15:13 | 04:43 | 35 55.2 | 138 15.5 | 32 | | No sample retrieved (hard substrate?). |
| 19 | Towards Cape Hart | T22 | 118 | | 16:33 | 06:03 | 35 54.5 | 138 12.0 | 37-38 | 135 | Bioclastic sands of shells & forams. |
| 20 | Towards Cape Hart | T22 | 119 | | 17:10 | 06:40 | 35 54.8 | 138 11.7 | 42 | 125 | Similar to #19 with fine bivalves, med - coarse sands |
| 21 | S of Sanders Bank | T24 | 191 | | 19:29 | 08:59 | 36 10.0 | 139 16.4 | 61 | | Fine well sorted brownish quartz & |
| 22 | near Carter Knoll | T24 | 196 | | 20:26 | 09:56 | 36 9.5 | 138 11.0 | 45-46 | | Red algae. |
| 23 | Midshelf off MacDonnell Pen. | T24 | 203 | | 21:56 | 11:26 | 36 7.7 | 138 0.3 | 58-59 | | Med - coarse yellow brown bioclastic sands with sponges. |
| 24 | Past Carter Knoll | T26 | 259 | | 23:00 | 12:30 | 36 14.8 | 137 53.5 | 64-65 | | Reddish brown coarse bioclastic sands with coralline algae & sponges. |
| 25 | Midshelf off MacDonnell Pen. | N/A | | 14/03/89 | 00:35 | 14:05 | 36 22.5 | 137 46.1 | 74 | | Yellow brown med - coarse bioclastic sand with a detrital component. |
| 26 | Mid to outer shelf | | | | 02:05 | 15:35 | 36 30.5 | 137 34.7 | | | Brown bioclastic/terrigenous sands with mollusc component. |
| 27 | Shelf margin | | | | 03:40 | 17:30 | 36 38.2 | 137 25.6 | 88-90 | 158 | Med - coarse bioclastic sands, mollusc fragments, spines, forams, bryozoans. |
| 28 | b/n VH89/4 & VH89/5 | | | | 06:30 | 20:00 | 36 41.5 | 137 52.7 | 62-65 | 145 | Coarse sands of quartz, bryozoans, shell fragments & encrusted pebbles. |
| 29 | Outer shelf | | | | 09:35 | 23:05 | 37 2.6 | 137 58.1 | 141-143 | | Med - coarse bioclastic sands. |
| 30 | Outer shelf - ridge | | | | 10:22 | 23:52 | 37 2.1 | 138 1.5 | 108-111 | | V coarse bioclastic sands of mainly multi-sized bryozoans. |
| 31 | Knoll on outer shelf | | | | 11:14 | 00:44 (14/03/89) | 37 0.5 | 138 2.8 | 85 | | Bryozoal sands & coarse bioclastic debris; sponges, brittle star, solitary corals. |
| 32 | Outer shelf | | | | 12:32 | 02:02 | 36 54.4 | 138 7.9 | 73-74 | 152 | Coarse bioclastic sands, mollusc fragments, forams, quartz, & brown specks. |

| SITE NO. | LOCATION | SEISMIC TRANSECT NO. | LCN. FIX NO. | DATE (DD/MM/89 CST) | TIME (HR:MN CST) | TIME (HR:MN GMT) | LATITUDE (S) (deg min.mn) | LONGITUDE (E) (deg min.min) | DEPTH (m) | BEARING (TN) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | Outer-mid shelf. | | | | 13:33 | 03:33 | 36 50.3 | 138 12.7 | 62 | 163 | Mixed quartz-bioclastic (bellusc fragments) sands, little bryozoa & one bored rock. |
| 34 | Outer mid shelf | | | | 14:57 | 04:27 | 36 41.7 | 138 22.5 | 60-62 | 167 | Similar to #33: mixed quartz-bioclastic sands (brown grit, mollusc fragmts etc). |
| 35 | Mid shelf | | | | 16:30 | 06:00 | 36 32.8 | 138 32.2 | 61-63 | 157 | Fine to med sands,mostly quartz with shell fragments. |
| 36 | Mid shelf | | | | 18:50 | 08:20 | 36 24.0 | 138 42.2 | 59 | 153 | Quartz sand with minor thin-shelled shell fragments. |
| 37 | Inner to midshelf | | | | 20:15 | 09:45 | 36 15.3 | 138 51.5 | 53 | 152 | Fine sands with minor mud component. |
| 38 | Inner shelf | | | | 21:45 | 11:15 | 36 6.1 | 139 1.5 | 48 | 162 | Fine siliceous sand with minor mud component. |
| 39 | Innermost shelf | | | | 23:15 | 12:45 | 35 58.0 | 139 10.5 | 46 | 155 | Fine siliceous sand with minor dark shell fragments. |
| 40 | Innermost shelf | | | 15/03/89 | 01:08 | 15:38 | 36 9.9 | 139 25.9 | 41 | 159 | Heavily encrusted pebbles, brown med sand, & bryozoans. |
| 41 | Inner shelf | | | | 03:45 | 17:18 | 36 18.6 | 139 17.6 | 50 | 170 | Fine brown siliceous sand with minor thin shell fragments. |
| 42 | Inner shelf | | | | 05:58 | 19:28 | 36 27.3 | 139 7.5 | 53 | 170 | Fine brown siliceous sands. |
| 43 | Mid shelf | | | | 07:49 | 21:19 | 36 35.9 | 138 56.7 | 55-56 | 161 | Quartoze sand with abundant whole/broken bivalves. |
| 44 | Mid to outer shelf | | | | 09:39 | 23:09 | 36 46.3 | 138 46.6 | 52 | 168 | Calcareous/quartz sands with few bivalves & minor sponges & algae. |
| 45 | Outer shelf | | | | 10:32 | 00:02 (15/03/89) | 36 50.2 | 138 42.6 | 57 | 149 | Bryozoan, sponges & algal bioherm "reef" in coarse bioclastic debris including molluscs. |
| 46 | Outer shelf | | | | 11:36 | 01:06 | 36 54.5 | 138 36.9 | 67 | 155 | Coarse bivalve rich calcareous sand. |
| 47 | Outer shelf | | | | 12:33 | 02:03 | 36 58.5 | 138 32.6 | 77 | 193 | V coarse bioclastic sand with numerous sponges & bryozoans. |
| 48 | Outermost shelf | | | | 13:38 | 03:08 | 37 2.9 | 138 27.5 | 98 | 134 | V coarse bioclastic sands including bryozoans & some sponges. |

| SITE NO. | LOCATION | SEISMIC TRANSECT NO. | LON. FIX NO. | LOCAL DATE (CSuaT; CST) | TIME (CSuaT; CST) | TIME (GMT) | LATITUDE (S) (deg min.mn) | LONGITUDE (E) (deg min.min) | DEPTH (m) | BEARING (TN) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | Outermost shelf | | | | 16:00 | 05:30 | 37 8.8 | 138 52.1 | 164 | 138 | Little recovered: med-fine bioclastic sands including bryozoans & molluscs. |
| 50 | Outer shelf | | | | 17:05 | 06:35 | 37 4.1 | 138 56.3 | 91 | 170 | Med-coarse bioclastic sands with bryozoan & mollusc fragments. |
| 51 | Outer to outer-mid shelf | | | | 18:05 | 07:35 | 37 0.2 | 139 1.1 | 76 | 176 | Fine-med bioclastic sands with larger bryozoan & mollusc fragments. |
| 52 | Extension of MB Reef | | | | 19:30 | 09:00 | 36 51.1 | 139 10.8 | 50 | 176 | Bryozoan & sponges bioherm with minor coarse carbonate sand. |
| 53 | Inner shelf | | | | 21:00 | 10:30 | 36 42.2 | 139 20.7 | 47 | 180 | Bryozoans & sponges, coarse bioclastic & quartz sands & eolinite SS, large Tertiary flint nodules. |
| 54 | Innermost shelf | | | | 22:26 | 11:56 | 36 35.5 | 139 30.2 | 39 | 178 | Coarse brown bioclastic sands with sponges, bryozoans & carbonate SS pebbles. |
| 55 | Innermost shelf alongside MB Reef | | | 17/03/89 | 01:08 | 14:48 | 36 57.8 | 139 31.2 | 29 | 162 | Mainly sponges & various algae, some coarse bioclastic sand. |
| 56 | Narrow mid shelf off Robe | | | 17/03/89 | 14:40 | 04:10 | 37 7.9 | 139 22.4 | 62 | 136 | Brown bioclastic sands with fragments of bivalves, bryozoans, sponges & corals |
| 57 | Outer-mid shelf off Robe | | | | 15:35 | 05:05 | 37 11.5 | 139 17.3 | 74 | 150 | Bioclastic sands with fragments of mollusc, bryozoans, & coral; minor terrigenous component. |
| 58 | Outer shelf off Robe | | | | 16:40 | 06:10 | 37 14.9 | 139 12.7 | 141 | 142 | Med bioclastic sand with bryozoans, corals & bivalves. |
| 59 | Outer shelf/slope, Robe | | | 18/03/89 | 19:35 | 09:05 | 37 30.7 | 139 25.7 | 167 | 131 | Med. bioclastic sand with abundant bivalves & bryozoan fragments. |
| 60 | Mid shelf, off Robe | T29 | 481 | | 22:05 | 11:35 | 37 23.3 | 139 30.8 | 92 | 127 | Poorly sorted bioclastic sand with bryozoan, mollusc & lithified rock fragments. |
| 61 | Mid to inner shelf off Robe | T29 | 477 | | 22:50 | 12:20 | 37 21.9 | 139 36.0 | 51 | 126 | Coarse bioclastic sands with fragments of mollusc, bryozoan & brown rock. Some live sponges. |
| 62 | Inner to mid shelf, off Robe | T29 | 475 | | 23:19 | 12:50 | 37 20.4 | 139 37.4 | 42 | 122 | Coarse bioclastic sands & brown rounded pebbles with mollusc & bryozoans. Minor mud. |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | Inner shelf, off Robe | T29 | 470 | 19/03/89 | 00:07 | 13:37 | 37 17.4 | 139 41.1 | 40 | 130 | Med bioclastic sand with bivalve & bryozoan fragments; living algae, sponges & worms. |
| 64 | Outermost shelf, off Robe | | | 18/03/89 | 20:30 | 10:00 | 37 31.1 | 139 25.5 | 338 | 124 | Poorly sorted bioclastic sands with minor mud; fragments of bivalves, bryozoans & corals. |
| 65 | Outermost shelf, W of #64 | | | 19/03/89 | 01:30 CST starts | 16:00 | 37 17.0 | 139 11.1 | 186 | 109 | Med bioclastic sands with abundant bivalve fragments & some coral & rare bryozoan fragments. |
| 66 | Outermost shelf, W of #65 | | | | 03:41 | 18:11 | 37 9.4 | 138 49.4 | 180 | 115 | Med grey-brown muddy bryozoan sand (different from #65). |
| 67A | Outermost shelf, W of #66 | | | | 06:15 | 20:45 | 37 5.2 | 138 24.7 | 164 | 111 | Olive grey bryozoan mud & sand. Many delicate branching bryozoa, some alive. |
| 67B | Outermost shelf, W of #66 | | | | 07:20 | 21:50 | 37 5.3 | 138 24.9 | 170 | 136 | Similar to #67A; dredg at near location 67A. |
| 68 | Outer shelf edge | | | | 20:06 | 10:36 | 36 43.6 | 137 18.3 | 113 | 116 | Coarse bryozoan sand with many live sponges & some live bryozoans. |
| 69 | Outer shelf edge | | | | 21:33 | 12:03 | 36 46.1 | 137 14.2 | 176 | 126 | Olive grey slightly muddy fine bryozoan sand; no living biota present. |
| 70 | Mid shelf | | | | 23:41 | 14:11 | 36 27.3 | 137 7.7 | 97 | 124 | Pale yellow well sorted med bioclastic sand of bivalve & bryozoan fragments. |
| 71 | Outer shelf | | | 20/03/89 | 01:42 | 16:12 | 36 35.6 | 136 57.7 | 130 | 111 | Yellow brown med-coarse bioclastic sands with few live sponges. |
| 72 | Outer shelf edge | | | | 02:31 | 17:01 | 36 37.4 | 136 55.8 | 129 | 110 | Yellow brown med-coarse bioclastic sand with bryozoan, bivalve fragments. |
| 73 | Mid shelf | | | | 09:20 | 23:50 | 36 14.6 | 136 55.4 | 85 | 91 | Med bioclastic sand with bryozoan & mollusc fragments. |
| 74 | Outer to mid shelf | | | | 07:25 | 21:55 | 36 24.7 | 136 43.4 | 116 | 102 | Moderately well sorted bioclastic sand with bryozoan & mollusc fragments. |
| 75 | Outer shelf | | | | 05:14 | 20:14 | 36 32.3 | 136 33.3 | 160 | 102 | Yellow brown to grey fine to med bioclastic/detrital sand |
| 76 | Outer shelf edge | | | | 04:59 | 19:29 | 36 34.3 | 136 31.4 | 197 | 132 | Greenish grey silty fine sand (bioclastic/detrital), moderately well sorted. |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 77 | Carter Knoll | | | | 17:06 | 07:36 | 36 8.4 | 138 21.6 | 42-46 | 47 | Brown med bioclastic sand & Pacenellid algae alive. |
| 84 | Mid shelf | | | 21/03/89 | 11:34 | 02:04 | 35 54.4 | 138 44.8 | 49 | 190 | Brown well sorted fine siliceous sand with bioclastic component |
| 85 | Mid shelf, E of Sanders Bank | | | | 13:50 | 04:20 | 36 6.8 | 138 28.6 | 55-57 | 219 | Mixed bioclastic/siliceous sand with small brown pebbles. Minor bryozoan & bivalve fragments. |
| 88 | Near K.I., W of Threshhold Bank | | | | 19:30 | 10:00 | 35 54.3 | 138 10.5 | 38 | 171 | Brown well sorted fine siliceous sand with minor bioclastic component. |
| 89 | E of Backstairs Passage | | | | 21:25 | 11:55 | 35 50.0 | 138 26.9 | 38 | 80 | Med to coarse bioclastic sand with large brown pebbles. |

END DREDGING PROGRAM, FRANKLIN 03/89.

APPENDIX 4: PRELIMINARY SUMMARY OF VIBROCORE OPERATIONS
CSIRO R/V FRANKLIN 03/89, 8 - 22 MARCH 1989

| VBC NO. | DATE (CST) | TIME (CSumT; CST) | LATITUDE (S) | LONGITUDE (E) | DEPTH (m) | COMMENTS |
|---|---|---|---|---|---|---|
| VHLB1 | 18/03/89 | 08:45 - 09:00 | 36 48.55 | 139 44.85 | 8 | Lacepede Bay, off Kingston. VBC tipped over due to rocky, uneven bottom. No core retrieved. Very hard calcrete (rock) & carbonate gravel recovered in core catcher. |
| VHLB2 | 18/03/89 | 10:55 - 11:30 | 36 45.94 | 139 38.42 | 28 | Lacepede Bay, off Kingston; slightly seaward of VHLB1. 0.83 m Recovered. Penetrated into light grey very hard lacustrine (?) mud. |
| VH80 | 20/03/89 | 20:45 - 20:20 | 35 54.6 | 138 16.4 | 39 | 0.1m Recovered of hard skeletal grainstone. Pale yellow medium grained well sortd skeletal grainstone with bryozoa, bivalves. Bored by organisms & later filled with pebbles (dark brown) & sand. Top surface of core covered by a weathering crust of brown laminated sediment which was fragme during vibrocoring. |
| VH81 | 21/03/89 | 01:05 - 02:25 | 35 39 | 138 51.5 | 36 | First attempt - bent barrel due to suspected tip over combined with hard substrate. Second attempt: 0.75m Recovered. Hard gravel with whole bivalve shells at base. |
| VH82 | 21/03/89 | 03:30 - 04:00 | 35 39.82 | 138 52.8 | 40 | Very hard substrate encountered. Several chunks of friable but indurated well sorted medium quartz sandstone; some mollusc fragments & fresh (?) bryozoa. Electrical cable damaged on recovery. Re-spliced. |
| VH83 | 21/03/89 | 08:00 - 09:30 | 35 47.75 | 138 52.7 | 44 | First attempt: lost barrel on pull-out or shortly - difficult to extract from seabed. Second attempt: 0.73m Recovered. Fine to medium grained brown to grey moderately to well sorted, compact. Electrical cable severely damaged (pinched between vb head & brace). Terminated VBC operations for remainder of cruise. |