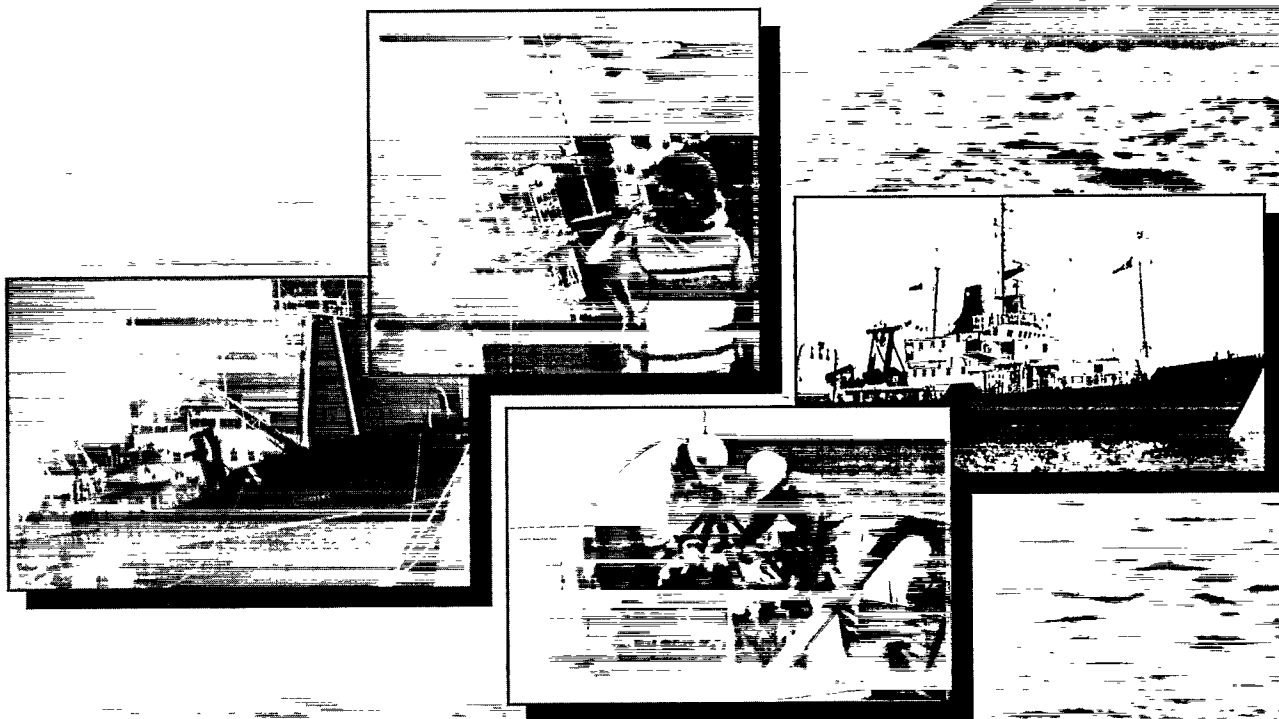
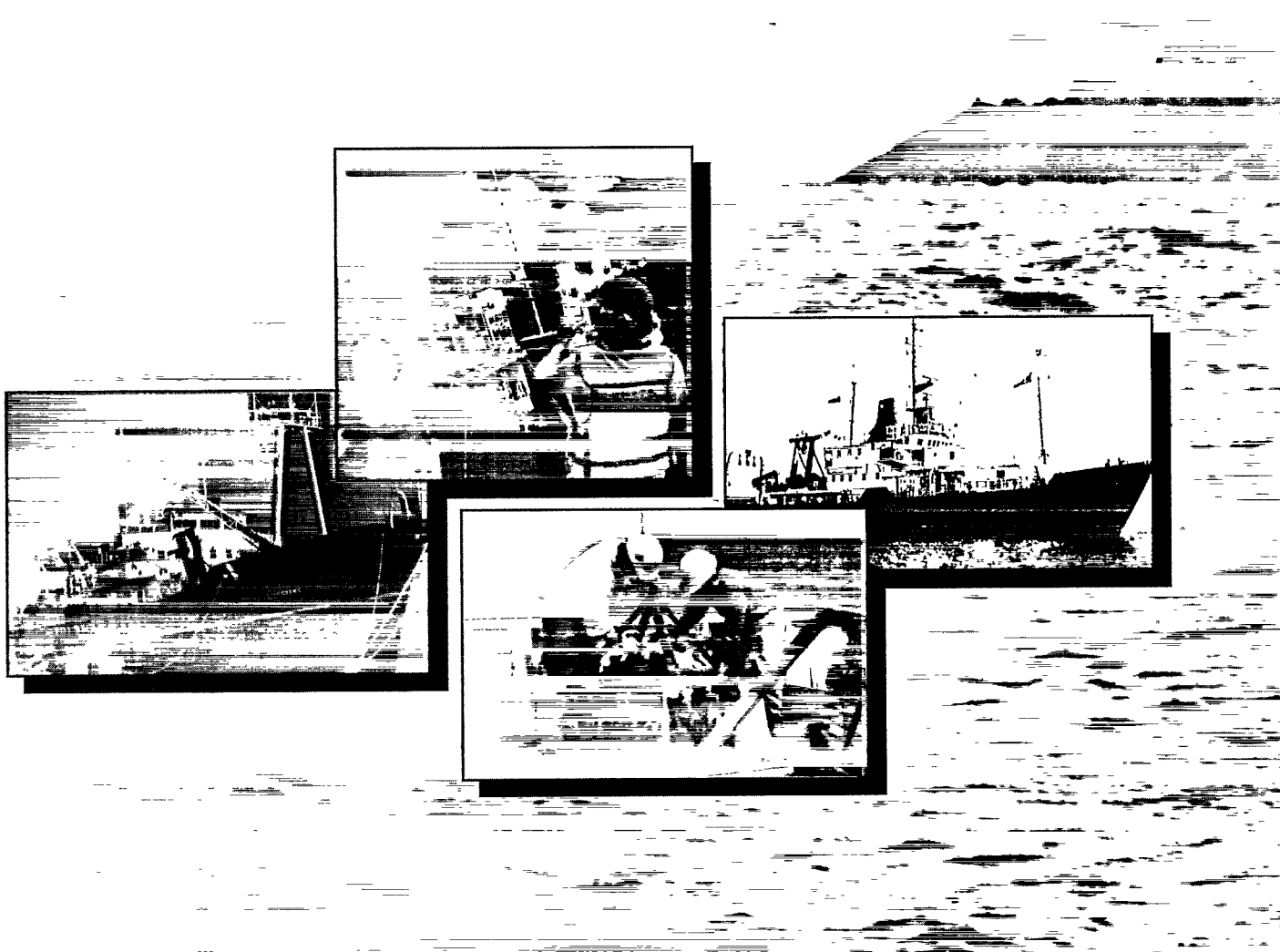




Southampton  
Oceanography  
Centre

# Cruise Report



**SOUTHAMPTON OCEANOGRAPHY CENTRE**  
**CRUISE REPORT**

**No. 2**

**RRS CHARLES DARWIN CRUISE CD95**  
**08 AUG-14 SEP 1995**

**The FLUXES 1 Programme**  
**(hydrothermal energy, chemical and biological**  
**fluxes at a ridge segment meso-scale)**

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**1996**

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## DOCUMENT DATA SHEET

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D. Edge	SHRIMP op.	SOC
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A. Taylor	computer- tech	RVS
D. Rees	mechanical- tech	RVS
D. G. Booth	acoustics tech.	RVS
S. Holland	BRIDGET/SHRIMP	JWA
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F. Vandermirsch	student	IFREMER

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S. Shields	Stwrd.	RVS
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D. J. Hanlon	POM	RVS

## INTRODUCTION

Cruise CD95 sailed on the RRS *Charles Darwin* from Barry south Wales to Ponta Delgada, Azores from the 8<sup>th</sup> of August to the 14<sup>th</sup> September 1995. The objectives of the expedition, FLUXES 1, were to investigate the energy, chemical and biological fluxes from the Broken Spur vent field at 29°10'N in segment 17 of the Mid Atlantic Ridge (fig. 1). The methodology of the experiment depended on using the bathymetry and bottom-water structure of segment 17 as a natural laboratory in which the fluxes are integrated over time. The water column density structure is such that the rise height of the hydrothermal plume is effectively limited to a depth greater than that of the surrounding axial valley walls. The only opening is to the south where waters external to the ridge system have access to segment 17. Philosophically, the experiment must measure the chemical, energetic and biological inventory for segment 17. Then by measuring the exchange of vent effected water from the segment with water external to the system, the integration of the components can be deconvolved and fluxes derived.

## METHODOLOGY AND TECHNOLOGY

We began the experiment by surveying the bottom 500m of the water column in segment 17 for plume components. Particulates, dissolved Mn, temperature and salinity were measured by insitu sensors on the BRIDGET vehicle. Water samples taken at the start and end of each line were sub-sampled for analyses, at a later date, of particles, methane, inorganic chemistry and He<sup>3/4</sup>. A total of 14 tow-yo deployments were completed within the segment (fig.2) hauling and veering at a rate of 30m/min, towing BRIDGET across the seafloor at altitudes of 100 - 500m at speeds of approximately 1.5-1.7 knots. These included four along axis tows, followed by seven cross-axis tows, and two tows in the water external to segment 17 to its northwest and southeast. In this way we were able to collect the equivalent of more than 300 vertical profiles through the deep portion of the water column.

The water column survey showed the depth and length scale of the particulate plume. On this information, deep-towed nets were deployed along the axis of segment 17, over the neovolcanic ridge (fig. 3). The fishing rig comprised of three pairs of nets. Each pair consisting of one 8m<sup>2</sup> net of mesh size 4.5mm and one 1m<sup>2</sup> net of mesh size 0.33mm. A near bottom echosounder and depth gauge monitored the position of the rig in the water column, and a flow meter measured the volume of water filtered. The nets were deployed at a set depth for each tow, either within or at various heights above the plume depth of 2900m. Each pair of nets were fished for 2 hours (covering a distance of about 8km) thereby sampling each end of the segment and the centre directly over the Broken Spur vent field.



In order to distinguish between those fluxes from high temperature activity and those of a low temperature origin, it was important to investigate the extent of the area over which the venting is taking place. Although this was done to some degree by the water column survey, seafloor exploration by cameras was needed to map the field in detail. For this we deployed the SHRIMP R.O.V. video camera system. Although very much still under development at the time, the vehicle completed five dives accumulating a total of 14 hours bottom time. Navigation was by a combination of GPS and acoustic transponders, and a total of 7km of seafloor were surveyed in this way.

Rock samples were recovered from the northern end of segment 17 and the southern end of segment 18 (fig. 4). These samples completed coverage of the whole of segment 17, collected during BRIDGE CRP cruises in the area in the last 2 years.

The final activity of the experiment was the deployment of eight moorings, in place until late summer 1996 (fig. 5). Five of the moorings carried an array of current meters, conductivity cells and high-resolution miniature temperature recorders (MTRs) (fig. 6). Two moorings also carried 100m long thermistor chains. The remaining three moorings of the eight deployed had sediment traps and current meters. Four of the largest moorings formed an array across the southern gateway of segment 17, with some 16 current meters, 12 MTRs, and two thermistor chains spanning the top of the plume. One mooring is in place on the deepest sill in the north of the segment. These five moorings gather information about the water exchange into and out of the segment. The sediment traps, which were placed near, mid, and distal to the vent field, gathered information about chemical exchange between the particles and the water column.

## **TENTATIVE RESULTS**

### **Water column surveys**

The initial three along-axis BRIDGET runs (b07, b11, b12), each of approximately 24-hours duration, occupied the west, central and east portions of the axial rift-valley. Along the western track (b07), an optical plume signal was detected from just south of 29°10'N, the site of previously-studied hydrothermal venting (Murton et al., 1995) but this signal did not persist more than 1-2 nautical miles south and was not observed south of 29°08'N. During the next run, along the centre of the axis (b11) only the very faintest plume signal was observed, again close to 29°10'N, but this time to the east of the Broken Spur ridge. No real-time plume signals were observed during the eastern run along-axis (b12).

Following the three along-axis runs, BRIDGET deployments became interspersed with other activities and a series of 7 across-axis runs were initiated, first at 5 nautical miles intervals along-axis at 29°00'N, 29°05'N, 29°10'N, 29°15'N and 29°20'N. Of these, real-time optical plume signals were only seen at 29°10'N (across axis run b14) where maximum anomalies were seen directly above and slightly to the east of the Broken Spur ridge (depth 3050m). Following these surveys two further survey lines were added to the programme (b19 and b21) at 29°07.5'N and 29°12.5'N respectively, 2.5 nautical miles north and south of the Broken Spur target area. No optical plume anomalies were observed along the more southerly section but weak plume signals were observed at 29°12.5'N, north along the strike of the Broken Spur ridge from 29°10'N.

Interspersed between the last two across-axis runs, an along-axis run was also completed, directly above the Broken Spur ridge between 29°12.5'N and 29°07.5'N (b20). Optical plume signals were detected as soon as BRIDGET reached the appropriate depths (2800-3000m) at approximately 29°12'N and increased in strength as the instrument progressed south, closer to latitude 29°10'N. The plume was multi-layered with separate peaks observed at approximately 2850m, 2920m and 2980m. One profile of the raw BRIDGET nephelometer data, taken just north of 29°10'N, is shown in Fig.2. Immediately south of 29°10'N (i.e. at approx. 29° 09.7'N) this plume signal vanished and no further optical plume signals were detected throughout the remainder of the run.

A simple explanation of the entire BRIDGET data set collected would be that there is a single "point-source" of hydrothermal activity close to 29°10'N which is subject to much temporal variability in its direction of dispersion. This will be tested with data to be recovered from three sediment-trap and current meter moorings deployed at plume height at distances of 0.5, 1.0 and 2.5 nautical miles north and south from Broken Spur along the strike of the ridge-axis in approx. 12 months time. Even during the cruise, however, some evidence to support this "plume-variability" hypothesis was obtained from our last on-axis survey line, b22, which re-occupied the critical portion of the first along axis survey (b07). This final run, which extended from approx. 29°14'N to 29°04'N, detected a reasonable-strength plume signal, west of Broken Spur ridge but just North of 29°10'N (lat 29°11.5-10.5'N, cf. b20) rather than just south of 29°10'N, as observed during b07 (29°10-08'N). This data, again, is consistent with plume material dispersing from a single point-source on the Broken Spur ridge, at or close to 29°10'N, which is dispersed in different directions according to prevailing tidal motions and other deep-ocean currents active within the segment.

Certainly, there is no evidence for additional hydrothermal activity outside of a box bounded by line b07 and b11 to east and west and lines b19 and b21 to the south and north respectively. Our survey restricts high-temperature hydrothermal activity to a "point-source" area of perhaps just 2.0x2.5 nautical miles within the centre of the segment, eliminating the remaining 98%+ of the study area. Importantly, this confirms that the Broken Spur segment does possess the required characteristics to provide a useful and viable setting for continuing integrated fluxes studies, as proposed by the recent InterRidge workshop held in Cambridge, UK, in June 1995. From the BRIDGET survey work, additional important CTD data has also been collected from each of the two potential "gateways" to the open NW Atlantic (b10) and NE Atlantic (b24). Two vertical profiles of 6 water-column samples have also been collected routinely from each across-axis and along-axis run, at typical depths of 3000, 2900, 2850, 2800, 2700 and 2600m. These bottles were each subsampled immediately upon recovery from each BRIDGET deployment and have yielded archived sets of approx. 150 samples each for shore-based measurements of the classical dissolved hydrothermal tracers: He-3, methane, manganese and silica. Thus, although the real-time optical sensors on BRIDGET may have provided evidence that suspended particle enrichments do not persist more than 1-2 nautical miles away from the site of active venting, our systematic gridded set of water column samples will hopefully be able to detect these more persistent dissolved species over greater distances along-axis and help further our understanding of the integrated high-temperature hydrothermal flux along the length of the Broken Spur segment.

### **Pelagic Fishing**

A total of nine tows with the RMT nets (both 8m<sup>2</sup> and 1m<sup>2</sup>) were made in segment 17. Each trio of net pairs sampled the southern, central and northern sections of the segment. Two further tows were made on parallel courses but offset by one nautical mile to the east of the neovolcanic ridge crest.

The catches routinely contained three kinds of juvenile shrimp, namely species of *Corocaris*, *Alvinocaris* and a hitherto unidentified species (designated here, "sp. A"). Notably, no juveniles of *Rimicaris* were caught. Specimens were caught in all nets fished over or parallel to the ridge, with a total of 40-50 each of *Corocaris* and *Alvinocaris* and over 100 of sp. A being obtained. The highest numbers per haul of each species were recorded from the central segment tows over the Broken Spur vent field. The values for the southern and northern sections were much lower and differed little from each other. Samples were taken at all depths between 2000 and 3000m. Higher numbers per haul were obtained in the deepest hauls (2700-3000m): the highest numbers of all occurred in a tow which hit the bottom, despite the nets being damaged,

and hence yielding only minimum numbers. The lowest numbers were found in the shallowest hauls (2000-2300m) where no *Corocaris* and *Alvinocaris* were found, only sp. A.

An additional tow of three net hauls was made in the adjacent segment of the Mid Atlantic Ridge to the north (segment 18) at a depth of 2900-3000m. All three species were caught, in numbers similar to those over the Broken Spur vent ridge. A further tow at similar depth and height above bottom in the western Atlantis fracture zone 10 mile to the north of segment 18 yielded one specimen each of *Alvinocaris* and sp. A. A notable feature about all three species caught was the remarkably large amounts of lipid in the thorax and first three abdominal segments coupled with the absence of any discernible intestinal contents. The amount of lipid in the species would allow them to travel for significant time without the need to feed.

From the rapid diminution in numbers with distance both above and laterally from the Broken Spur vent field it would seem that the segment basin does indeed limit the opportunity for dispersion. However, the presence of the animals in segment 18 and the Atlantis fracture zone suggests that there are other standing populations of adults from which the juveniles are recruited. Nevertheless, a single water column survey in segment 18 along the length of the neovolcanic ridge with the BRIDGET vehicle failed to show even the slightest particulate plume. The complete absence of any identifiable *Rimicaris* in the net hauls is intriguing since reports from the vent sites reveal that this species is dominant (Murton and Van Dover, 1993; Murton et al., 1995). The overall biomass in the deep water column of the segment was low, comprising, in addition to the species above, pelagic oplophorid decapods, nematines, amphipods, large copepods, a few small medusae, siphonophors and fish. The vent-associated shrimp constituted a significant component of the overall biomass and energetics of this deep pelagic system.

#### SHRIMP R.O.V video surveys

The SHRIMP (seafloor high-resolution imaging platform) vehicle was deployed for the first time over the Broken Spur vent field. Although still very much under development at the time, the system worked well, recording up to three hours of continuous colour video on an internal analogue Hi8 video tape deck. The five surveys covered the central neovolcanic ridge axial graben from 29°08'N to 29°11'N, with several passes from 29°10'N to 29°11'N. From the altitude, depth and positional information during these dives we were able to map the geological setting and extent of the active vent area of Broken Spur. There was no evidence of hydrothermal activity south of Saracen's head in the known field. In fact, the axial graben south of Broken Spur was dominated by older lavas covered in a moderate blanket of pale grey pelagic sediment. The Broken Spur vent field from 29°10'N, however, is characterised by

abundant fresh pillow lavas that have cascaded down the graben walls, clearly post-dating the tectonic rifting.

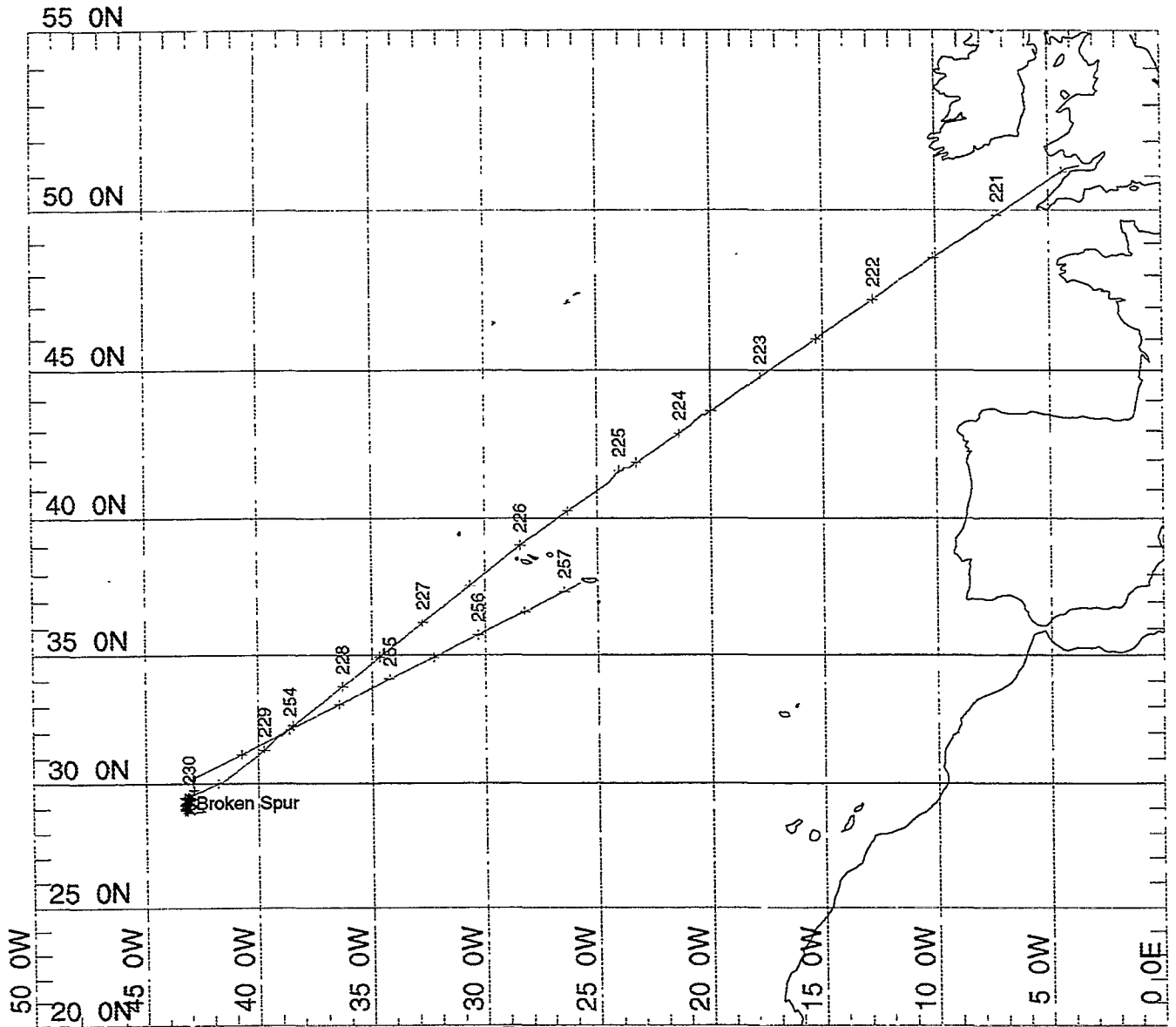
The most active areas in the vent field were found to be located 200m north of the known sulphide mounds and continued for at least another 200m, but for less than 1km, north along the centre of the axial graben. Thick black particulate-rich clouds dominate the entire length of this region, making photographic work difficult by obscuring the field of view. We can confirm the geological setting of this vent field, elucidated from the last three expeditions including the DSV *Alvin* and *MIR* dives (Murton et al, 1993, 1995; Murton and Van Dover 1993; Nesbit and Murton 1995), and can further say that this axial-graben and inner graben setting continues along the entire length of the active venting area.

#### ACKNOWLEDGEMENTS

We indebted to the captain, officers and crew of the RRS *Charles Darwin* without whose skilled seamanship none of the work reported here would have been possible. The study was funded by NERC as part of the BRIDGE programme.

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MERCATOR PROJECTION

GRID NO. 1

SCALE 1 TO 32500000 (NATURAL SCALE AT LAT. 0)

INTERNATIONAL SPHEROID PROJECTED AT LATITUDE 40

RRS Charles Darwin - Cruise 95

Fig. 1 Track chart, RRS Charles Darwin Cruise CD95, 8<sup>th</sup> August - 14<sup>th</sup> September 1995

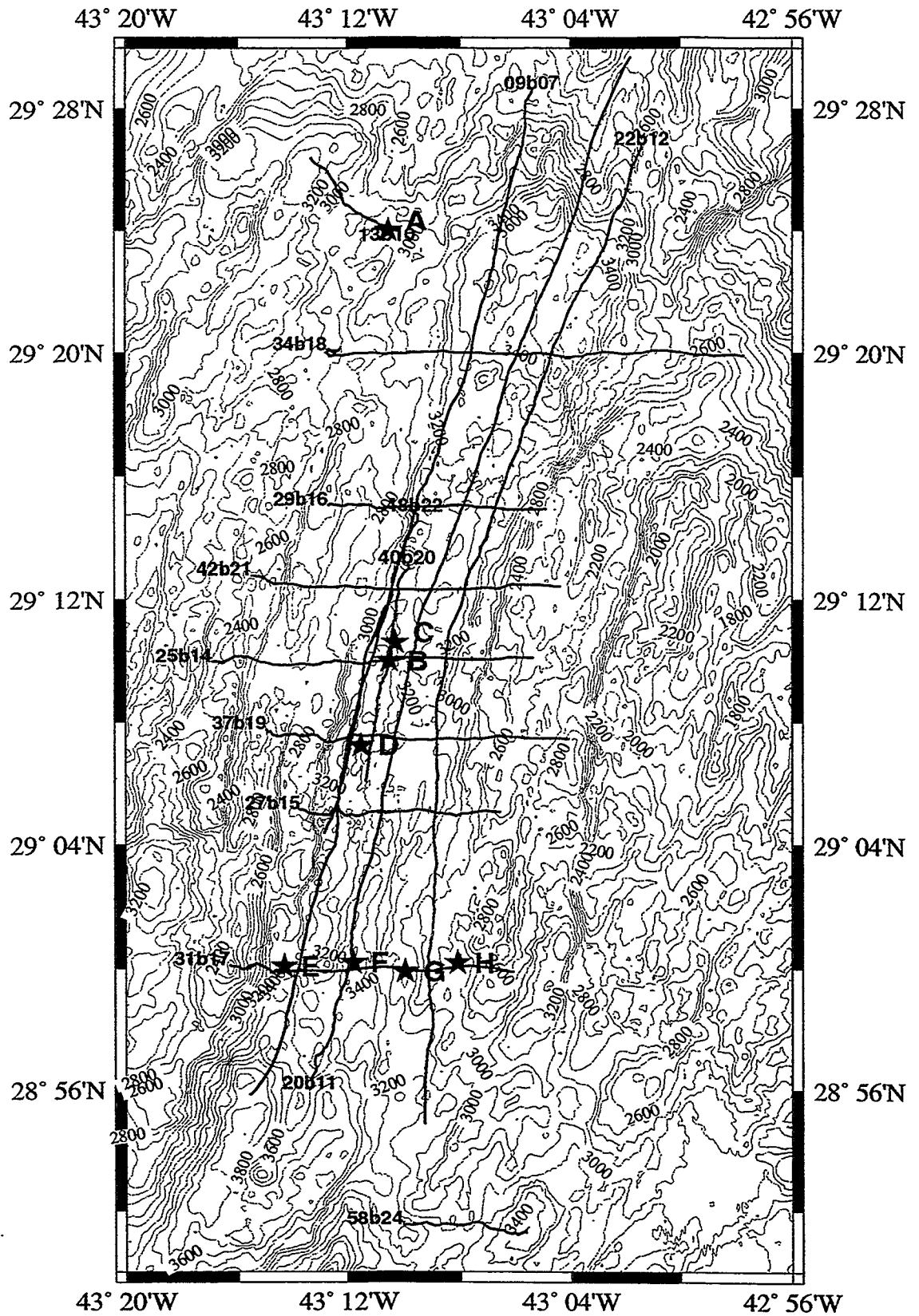


Fig. 2 Track chart, BRIDGET vehicle during cruise CD95

-17-  
RMT8+1 pelagic net tows

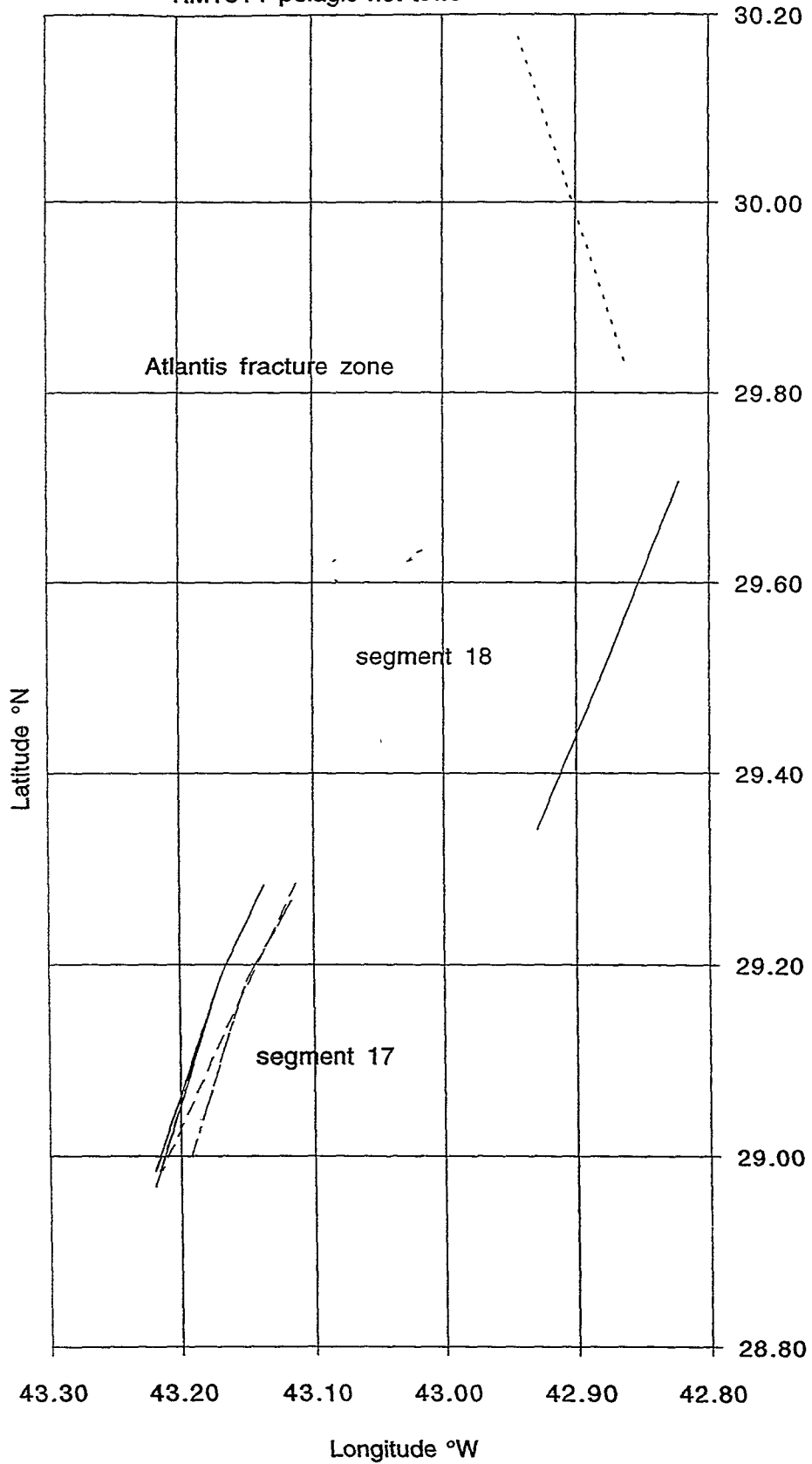


Fig. 3 Track chart, RMT-nets during cruise CD95 in segments 17, 18 & 19, MAR



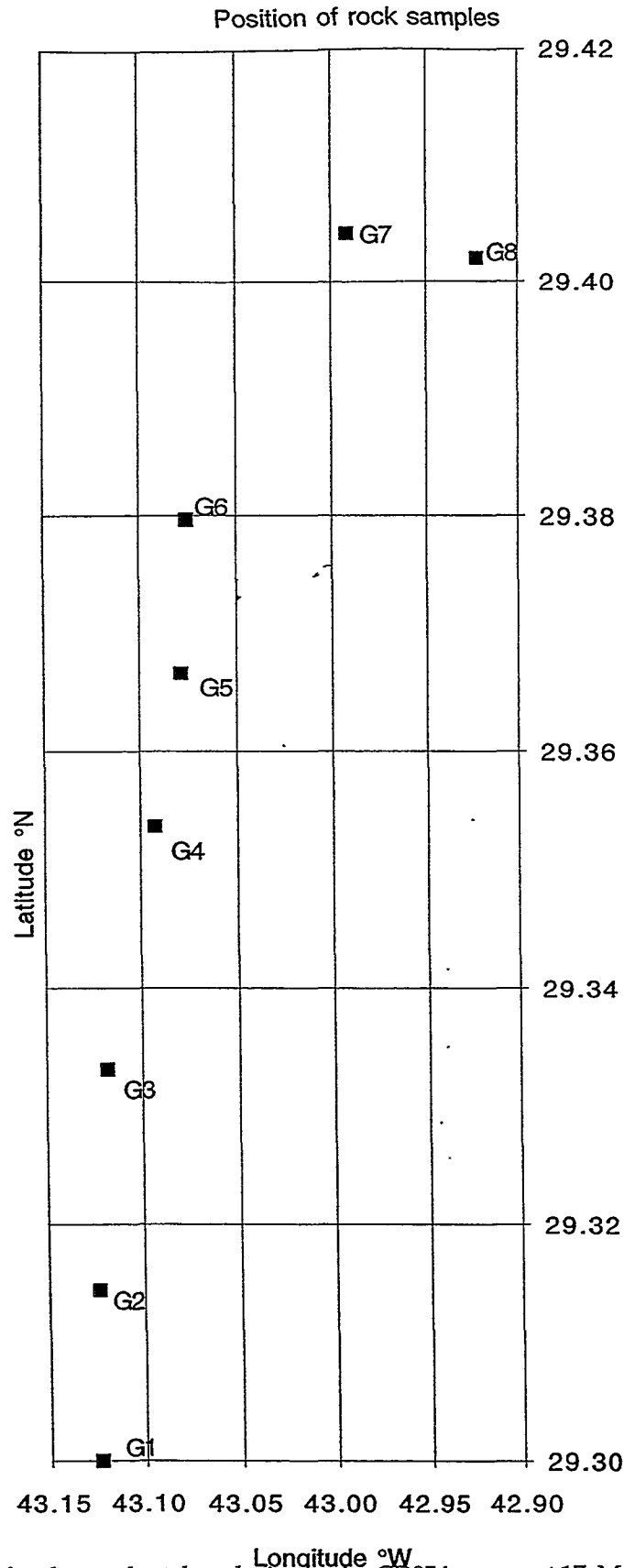


Fig. 4 Positions of rock samples taken during cruise CD95 in segment 17, MAR

BRIDGE mooring locations

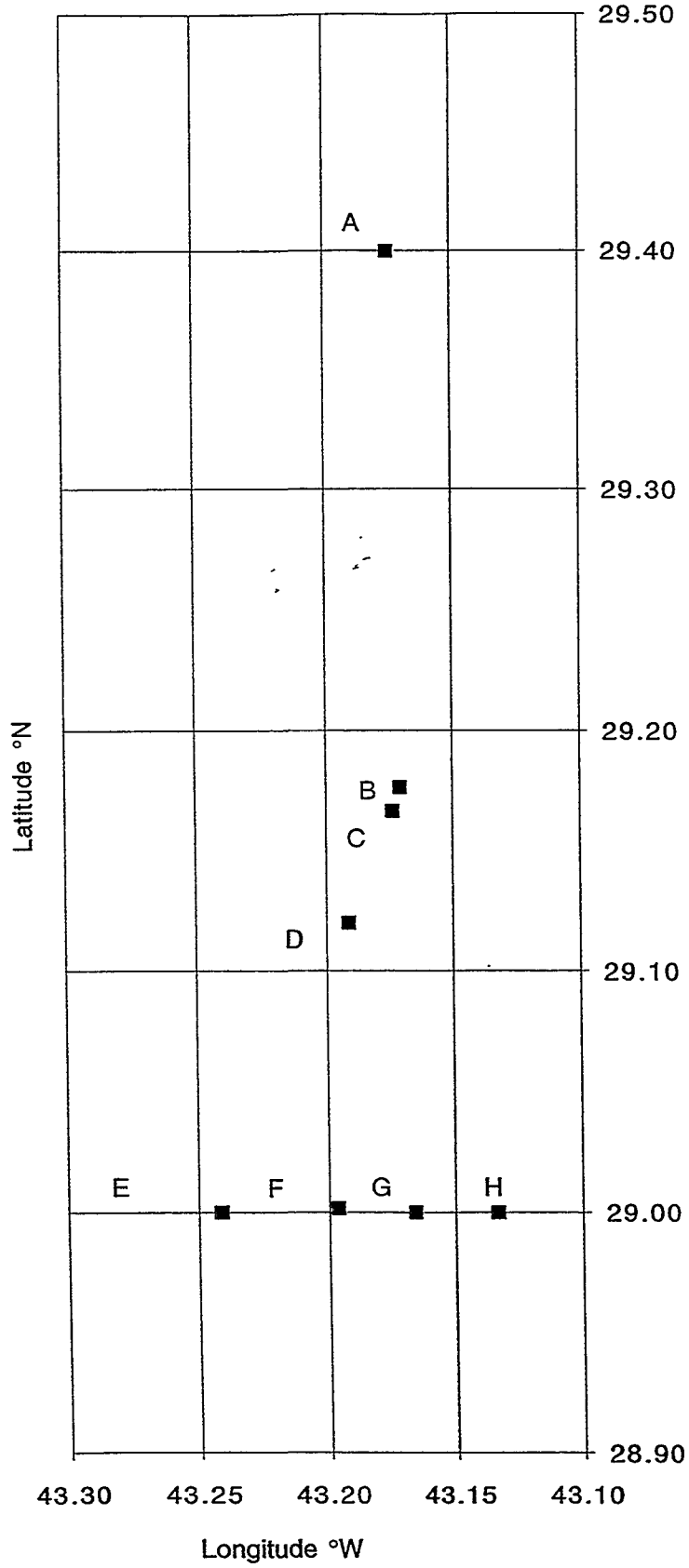


Fig. 5 Location of moorings deployed during cruise CD95 in segment 17, MAR

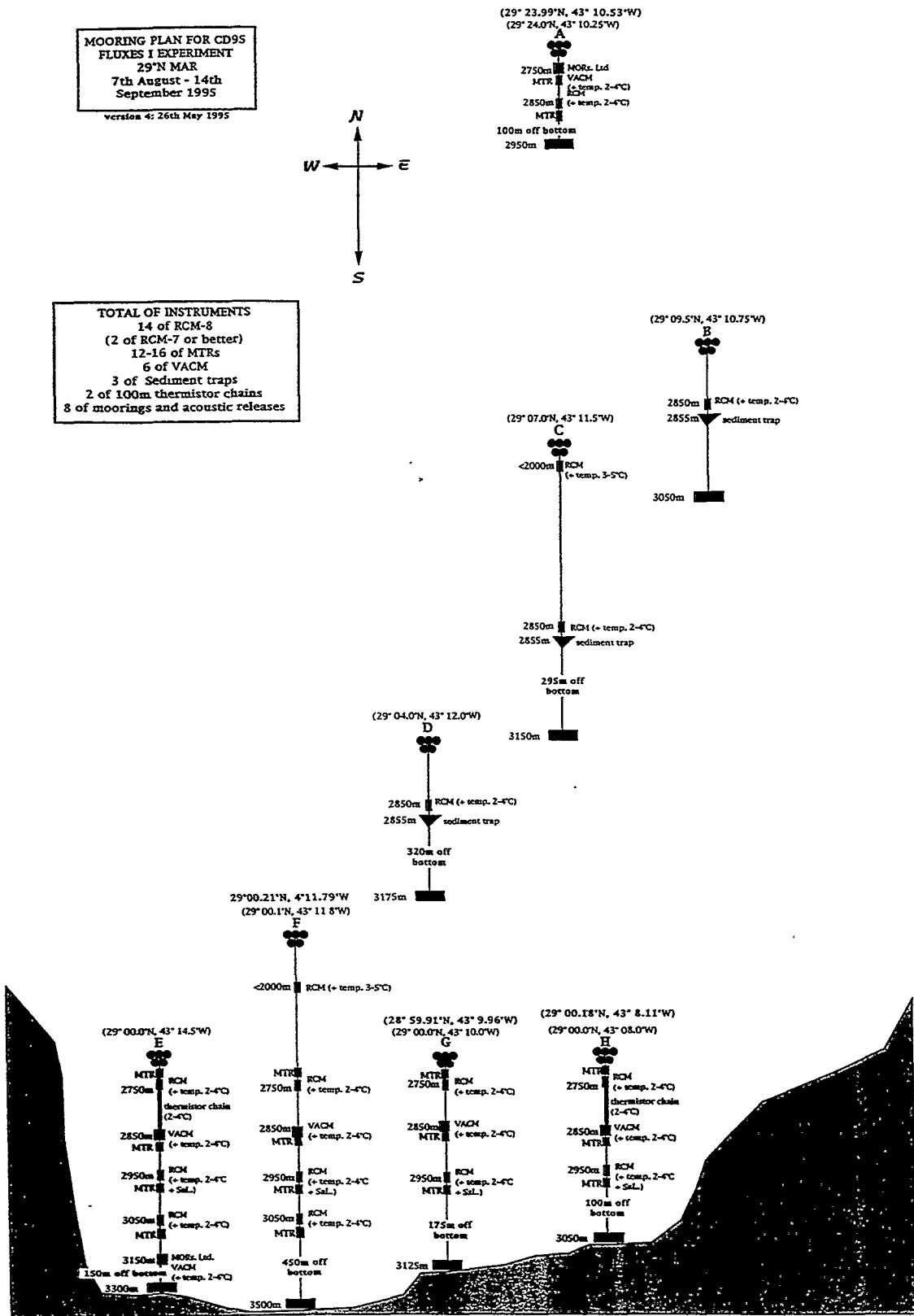


Fig. 6 Diagram of moored instrumentation arrangements deployed during cruise CD95

## INSTRUMENTATION REPORTS

### ZAPS

#### Introduction

ZAPS (zero angle photo-spectrometer) to measure total oxidisable manganese, was installed on Bridget without any major problems and oriented with the flow cell outlet vertically above the inlet connector. Both the ZAPS unit and battery pack were mounted with the electrical connections facing forward, giving the flow cell and associated pipes as much protection as possible. The pump unit was fitted in the same orientation, although a protective layer was added between the pump and Bridget, due to the pump rubbing the framework when mounted. Communication with Bridget was accomplished without any problems, and throughout the cruise ZAPS transmitted data back to Bridget. Large diameter piping (6.35 mm ID) was installed from the outlet of the chemical cartridge to the lower connector of the flow cell mounted on ZAPS (1m long). A further connection was made from the flow cell, upper connector to the pump (1.25m long). An exhaust pipe was also fitted to dispense the outflow beyond the rosette water sampler. Flow rate was set at 45 ml/min throughout the cruise. Some difficulties were experienced, a list these and other events are given in Appendix A

#### Analysis of Results

The ZAPS unit sent data back from all the stations. During all the deployments no plume signatures were picked up, however due to some problems, described below, the only deployment which ZAPS was likely to have seen anything is CD9548b22. During this station the other instruments only picked up small events, indicating a small plume. After fresh chemistry, a DEA stick and Peridate crystals were installed, surface water oxidisable manganese seemed to be detected.

Throughout the cruise it was noticed that the background signal from ZAPS slowly increased, reducing the dynamic range of the instrument. It was suspected that the chemical reagents were leaching into the surface of the flow cell, as was visibly happening to the fluid pipes leading into and away from the cell. No means were aboard the ship to remove this contamination. It did not however affect the sensitivity of the instrument.

Due to lack of manganese to generate calibration samples we were unable to carryout an investigation into the sensitivity of ZAPS to oxidisable manganese on board the cruise. It is impossible say whether the variations seen, other than the noise of the system, were due to

manganese or not. Additionally, due to the problem of the ship losing communication's with Bridget on its return to the surface, we were unable to obtain a complete surface water profile. During the downcast, the surface water profile suffers with problems of trapped air (causing scattering) and rapidly changing concentrations of the chemistry reagents. These variables do not settle down until ZAPS is at a depth of 50m or greater, unless the ZAPS system is pre-primed just before deployment.

The following is a brief synopsis of the events and problems associated with the various BRIDGET stations:

- CD9509b07

Western longitudinal axis of trench, no plume seen by ZAPS, although plume signature picked up by transmissiometer. On recovery a broken pipe connector had allowed sea water to bypass the chemical reagent cartridges.

- CD9513b10

North Western outflow, no plumes seen by any instrument.

- CD9520b11

Middle longitudinal axis of trench, no plume seen by ZAPS, very small plume seen by nephelometer, transmissiometer and CTD. Varying fluorescent signal detected when changing from a down cast to up-cast, suspected chemistry concentration changing so both DEA and Peridate replaced on recovery.

- CD9522b12

Eastern longitudinal axis of trench, no plume seen by any instrument.

- CD9525b14

Cross axis across centre of Broken Spur ridge, no plume seen by ZAPS, although transmissiometer, nephelometer and CTD picked up a plume signal. Particular matter found in flow cell, pump found not to be working on recovery.

- CD9527b15

Southern cross axis of Broken Spur ridge. ZAPS power cable short, power returned half way through deployment. No plumes seen by any instrument.

- CD9529b16

Northern cross axis of Broken Spur ridge, no plumes seen by any instrument.

- CD9531b17

Lower Southern cross axis across trench, no plumes seen by any instrument.

- CD9534b18

Upper Northern cross axis across trench, no plumes seen by any instrument.

- CD9537b19

Lower Southern cross axis across Broken Spur ridge, no plumes seen by any instrument.

- CD9540b20

Central longitudinal axis of Broken Spur ridge, no plume seen by ZAPS, although transmissiometer, nephelometer and CTD picked a plume signal up. Pump not working when Bridget recovered, battery voltage too low for pump to operate, ZAPS electronics still working.

- CD9542b21

Upper Northern cross axis across Broken Spur ridge, no plumes seen by any instrument.

- CD9548b22

Repeat segment of western longitudinal axis of trench, no plume seen by ZAPS. Very small plume signal picked up by other instruments.

- CD9558b24

Southern Eastern outflow, no plumes seen by any instrument.

- CD9568b25

North of Broken Spur, no plume seen by any instrument.

### **Recommendations**

The following is a list of recommended actions to be carried out to determine the nature and sensitivity of the ZAPS instrument, and for the analysis of the results obtained from the CD95 cruise and any future cruises. Additionally some of the recommendations will improve and add reliability to the results by continuously monitoring operational parameters during deployments:

- Analysis of the solid state chemistry set-up received from Gary Klinkhammer (Oregon State University) a day before the CD95 cruise.
- The flow cell should be made of chemical resisting black plastic, with a low coefficient of scattering.
- A flow meter or similar device should be installed to ensure the pump is operating correctly, and that there is an adequate flow rate.
- Measurement of battery voltage.
- Modification of the S.O.C. ZAPS to include memory storage facility.
- Investigation into the possibility of injecting calibrated sample/s at points throughout a deployment.
- Investigation into new methods of releasing the chemical reagents into the system and the use of a peristaltic pump.

## **SHRIMP**

### **Introduction**

The SHRIMP (Seabed high resolution imaging platform) was deployed for the first time on CD95. This vehicle was designed to make video and still photographic surveys of the sea floor. Although the vehicle was not completed for this cruise, Dave Edge, the engineer responsible for its development, made every effort to get the system ready for trials. The SHRIMP was fitted with a Deep-sea Power and Light Hi8 video camera and recorder, 200W white lights, a 35mm stills camera, 1000J flash units, and two 12 volt, 72 Amp hours lead acid battery packs. Development of the vehicle at sea was directed to the command and control system, which was designed to operate on the ship's co-axial conducting towed cable.

Problems were encountered during the first run of the SHRIMP. The conducting cable command system worked well enough after problems with low signal to noise were resolved. The Mesotech altimeter gave reasonable indications of the height of the SHRIMP above the sea floor. Unfortunately, two problems emerged: the 35mm camera flash unit failed to operate and the SHRIMP became snagged on the bottom for 50 minutes. Although at no time was the deep-tow conducting cable compromised with excessive strain loads, the RVS engineers on the

ship refused permission to use the cable again without emergency release systems being in place. RVS operations on shore gave permission only if we could guarantee that SHRIMP would not snag again, which of course we could not.

The problem with the 35mm camera flash could not be resolved. The SHRIMP was fitted with a series of weak links and deployed from the starboard side on the dredging warp. Altitudes were determined from a pinger attached to the vehicle. This proved difficult, since the pingers transmit pulse length was longer than the two way travel time between the SHRIMP and the sea floor at an altitude of 5m. An unexpected advantage of using the pinger came from side echos from its wide beam angle which revealed the presence of steep slopes adjacent to the vehicle before they were actually encountered. So we were able to avoid many crashes. The video was controlled by modifying the acoustic command unit on SHRIMP to enable a simple on off control. The acoustic unit changed its transmission pulse frequency when the video was activated indicating that it had received the command signal. The acoustic data from SHRIMP was displayed on a waterfall VDU, originally meant to be used for the RMT-net monitors. Extra video lights that we fitted to the SHRIMP, and which were not pressure tested, imploded.

A total of 5 SHRIMP dives were made, with almost 12 hours of video recorded. The limited lighting on the vehicle meant that we could only record from a range of 3 to 5 metres. With the vehicle operating from the starboard A-frame, the ship was found to remain manoeuvrable and heave was almost eliminated.

### **Recommendations**

The following is a list of recommended actions to be carried on the SHRIMP to ensure it operates to its bet capability in future.

- The SHRIMP vehicle must use the deep-towed conducting cable when fully operational. To safe guard this cable, the vehicle must be fitted with an emergency release of some kind.
- To minimise heave and to better allow manoeuvrability of the ship, the SHRIMP must be deployed from the side A-frame, and NOT towed behind the ship.
- Speeds must be limited to 1kt maximum over the ground.
- An avoidance sonar should be fitted to SHRIMP to give warning of adjacent steep topography before the vehicle happens upon it.



- Transponder navigation worked reasonably well, but at very low speeds, the SHRIMP was found to be directly beneath the ship. Thus the use of pico-GPS would greatly improve the first order navigation of the vehicle.

## **RMT-NETS**

### **Introduction**

The RMT-nets and monitor was built especially for use on CD95. The nets and net release mechanism was the same as that used before on biology cruises. However, the release mechanism, altimeter and electronic monitor was now nested in a square frame, providing protection and eliminating the need for a cradle on the ship's deck to stow the system when on board.

The system had initial problems that were never fully resolved: the Mesotech altimeter could not be made to interface with the computer on the new electronic net monitor. The altimeter also had a tendency to lock on to the weight bar hanging beneath the nets, and not to give true altitudes.

These problems were resolved by using an old acoustic net-monitor and altimeter, which had only a few 10s of metres range rather than the 200m range of the Mesotech. This worked well, but the acoustic monitor had to be tracked with the old waterfall VDU acoustic display system, which was subject to noise from the ship's propulsion and which did not log any of the information. This compromise resulted in a failing of the system, when the altimeter gave wrong information and the new nets were destroyed following a collision with the rugged volcanic sea floor. Old nets were then remobilised to complete the biological survey and the work was concluded satisfactorily.

### **Recommendations**

The following is a list of recommended actions to be carried out on the RMT-net system

- The new electronic monitor needs to be completed, tried and tested so that the Mesotech altimeter interfaces with the computers allowing digital command, control and data to be transferred through the deep-tow conducting cable and logged.

## **BRIDGET**

## **Introduction**

The BRIDGET system was tested on several occasions before being deployed to gather data. The vehicle worked well, including the top-end software developed specifically for the system. However, a number of problems were encountered: the wet mating pi-connectors in use had a tendency to loose contact due to pressure differentials. We noted that newer versions of these multiple connectors had a securing ring attached that prevented this from happening. The system had several electronic failures during which the onboard modem was destroyed. On investigation, the problem was determined to be a result of a short circuit in the swivel slip ring.

## **Recommendations**

The following is a list of recommended actions to be carried out on the BRIDGET system.

- Greater electrical protection needs to be installed for the onboard modem. This device, essential to the communication and control of the BRIDGET, lies at the heart of the system. Despite carrying spares, the essential nature of this complex component should be fused to ensure high voltages do not reach the modem and damage it.
- Existing wet mating pi-connectors should be replaced with the more secure modern versions.

## **MOORINGS**

### **Introduction**

The moorings were deployed without any serious problems. Weather condition prevented some moorings to be deployed anchor last, the preferred method, but this did not hamper the work significantly. Improvements could be made to the way the moorings are handled on deck. The current system of using both sea cranes is cumbersome. A system of cleats and anchoring spar on the after deck may prove a better method in future and would eliminate the problems associated with poorer weather deployment. Such a system was recommended by the AB Mr Paul Dean and warrants further investigation.

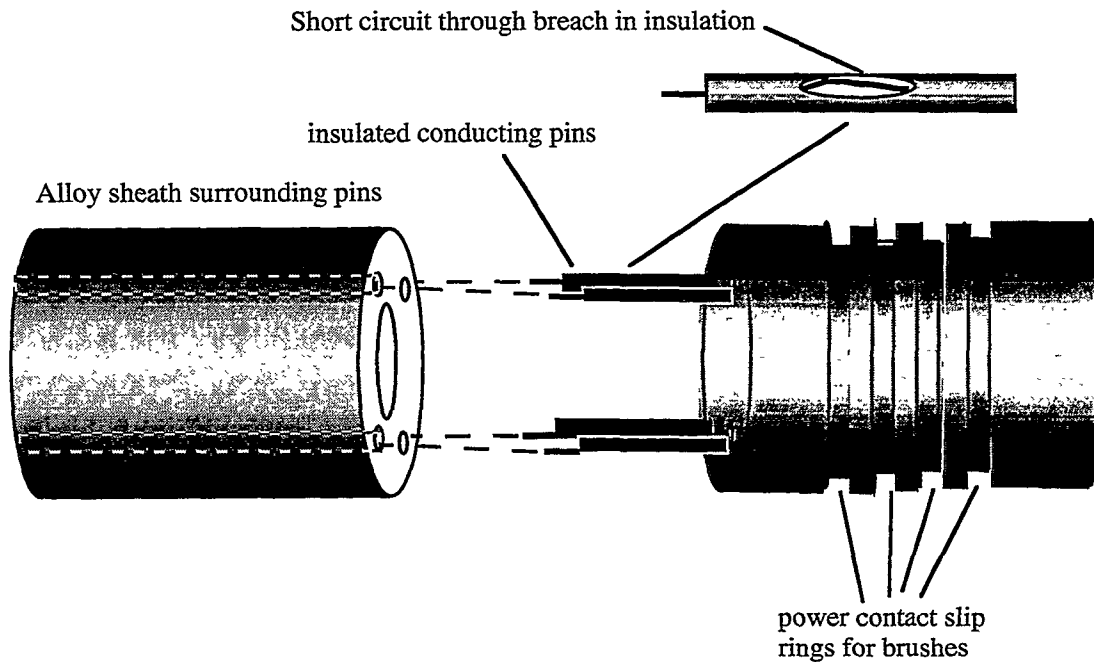
## **DEEP-TOW CABLE AND SWIVEL**

## Introduction

The deep-tow cable and swivel system had several problems associated with them. The deep-tow cable suffered damage to its outer load bearing strands, apparently following the attachment of a pinger using the wrong sized clamps. This damage resulted in 50m of the cable being cut off and the cable reterminated. On inspection, the cable's load bearing outer strands appeared to be quite rusty and it was noted that the cable did not have any seawater protection. It was remarked that the extent of rust damage may be causing the cable's outer strands to become brittle, compromising the cable's strength and durability.

The swivel fitted to the cable was a strengthened version of the TOBI deep-tow swivel, oil compensated, and rated to 500V. Two problems encountered with the swivel were: breaching of the oil-water interface, and short circuiting of the slip-ring body to the conducting pins that pass through the slip-ring body.

### Exploded view of the slip ring assembly



These problems were in fact related. The rubber bellows that act as a water - oil interface tended to expand due to small air pockets trapped within the oil filled swivel. The expanded bellows then abraded against the ends of the power pins where they protruded beyond the alloy sheath. This abrasion penetrated the rubber sheath causing a leak. The pressure of the rubber bellows on the pins also caused them to abrade against the inside of the

alloy sheath, which in turn cause the insulation surrounding the pins to fail leading to a short circuit.

### **Recommendations**

The following is a list of recommended actions to be carried out on the deep-tow cable and swivel systems.

- The deep-tow cable must be protected from corrosion and inspected regularly.
- The swivel must be modified to eliminate pressure from the bellows pressing on the conducting pins causing abrasion. This can be done in two ways: making it easier to bleed the swivel body of air during filling with oil, and placing a cap over the protruding ends of pins to protect them from the bellows.
- The conducting pins should be insulated from the body of the slip ring assembly. This can best be achieved by manufacturing the slip ring sheath assembly from a non-conductive material.

**APPENDIX 1, RRS CHARLES DARWIN, CRUISE CD 95/95, CAPTAIN'S LOG.**

**Tuesday 8th. August '95.**

0612 - BST - Vessel Clear of Berth, Barry.  
0622 - BST - Vessel Entering Lock.  
0643 - BST - Vessel Clear of Lock.  
0647 - BST - Vessel Clear of Breakwater.  
0649 - BST - Pilot Disembarked.  
0700 - BST - Full Away on Passage, off Merkur Buoy.  
Noon Position: Lat: 51 13.1 N. Long: 04 13.2 W.

**Wednesday 9th. August '95.**

Noon Position: Lat: 48 38.8 N. Long: 09 52.6 W.

**Thursday 10th. August '95.**

0200 - Clocks Retarded 1 Hour to GMT.  
Noon Position: Lat: 46 00.0 N. Long: 15 18.1 W.

**Friday 11th. August '95.**

1124 - Lat: 43 38.4 N. Long: 19 57.6 W. Commenced Deploying BRIDGET;  
On Trial, Station 95/01/#01B, to 672 metres.  
Noon Position: Lat: 43 38.1 N. Long: 19 58.2 W.  
1225 - Lat: 43 38.0 N. Long: 19 58.6 W. BRIDGET Vehicle Recovered.  
1405 - Lat: 43 30.2 N. Long: 20 14.3 W. BRIDGET Deployed;  
On Trial, Station 95/02/#02B, to 913 metres.  
1534 - Lat: 43 30.6 N. Long: 20 16.9 W. BRIDGET Recovered.  
1547 - Lat: 43 30.8 N. Long: 20 17.1 W. BRIDGET Deployed;  
On Trial, Station 95/03/#03B, to 1500 metres.  
1745 - Lat: 43 31.5 N. Long: 20 19.2 W. BRIDGET Recovered.

**Saturday 12th. August '95.**

0955 - Lat: 41 53.6 N. Long: 23 16.5 W. Commenced Deploying BRIDGET;  
On Trial, Station 95/04/#04B, to 1500 metres.  
1149 - Lat: 41 55.0 N. Long: 23 17.6 W. BRIDGET Recovered.  
Noon Position: Lat: 41 55.1 N. Long: 23 18.0 W.  
1354 - Lat: 41 44.7 N. Long: 23 34.2 W. BRIDGET Deployed;  
On Trial, Station 95/05/#05B, to 3596 metres.  
1838 - Veered to 3599 metres.

2027 - Lat: 41 44.0 N. Long: 23 47.6 W. BRIDGET Recovered.

2202 - Lat: 41 37.4 N. Long: 23 59.9 W. Commenced Veering Conducting cable to 3000 metres to Test Swivel.

2345 - Lat: 41 38.6 N. Long: 24 03.3 W. Conducting Cable Recovered.

2400 - Trials Completed, Resumed Passage.

**Sunday 13th. August '95.**

Noon Position: Lat: 40 15.8 N. Long: 26 19.1 W.

2300 - Ponta de Barca Lt.( Graciosa, Azores.), Brg.107 True at 11.8 miles.

**Monday 14th. August '95.**

Noon Position: Lat: 37 36.4 N. Long: 30 40.5 W.

**Tuesday 15th. August '95.**

1130 - Lat: 34 55.1 N. Long: 34 38.7 W. Commenced Deploying BRIDGET; On Trial, Station 95/06/#06B, to 1600 metres.

1139 - Acoustic Navigation Transponder Fish Deployed on Test.

Noon Position: Lat: 34 55.6 N. Long: 34 38.5 W.

1344 - BRIDGET Vehicle and Acoustic Fish Recovered.

1418 - All Secure; Resume Passage.

**Wednesday 16th. August '95.**

Noon Position: Lat: 32 16.0 N. Long: 38 27.2 W.

1527 - Lat: 31 52.1 N. Long: 39 01.7 W. Commenced Deploying RMT Nets; On Trial, Station 95/07/#01N.

1539 - 10 Khz PES Fish Deployed.

1722 - Lat: 31 54.7 N. Long: 39 01.2 W. Ceased Veering Cable at 2430 metres.

1903 - Lat: 31 56.9 N. Long: 39 00.8 W. RMT Nets Recovered.

1912 - All Secure; Resume Passage.

**Thursday 17th. August '95.**

Noon Position: Lat: 30 00.1 N. Long: 41 45.5 W.

1845 - Lat: 29 32.7 N. Long: 43 02.4 W. Vessel Hove To for Wire Test.

1920 - CTD Wire Deployed, for Sound Velocity Test, Station 95/08/#02N.

1933 - CTD Wire Inboard.

1940 - CTD Wire Overboard.

1945 - CTD Wire Inboard; Freeing Counter Sheave.

2012 - Resume Deployment.

2014 - 3.5 Khz PES Fish Deployed.  
2212 - Lat: 29 33.9 N. Long: 43 03.8 W. CTD Wire Inboard.  
2258 - Lat: 29 29.5 N. Long: 43 05.2 W. BRIDGET Deployed, Station 95/09/#07B.  
2307 - Pinger Attached at 50 metres.  
2320 - Transponder Attached at 200 metres.  
2325 - Acoustic Nav. Transponder Fish Deployed to 25 metres.

**Friday 18th. August '95.**

Noon Position: Lat: 29 12.5 N. Long: 43 10.4 W. Towing BRIDGET at 1.5 - 2.0 Knots.  
2010 - Lat: 29 02.5 N. Long: 43 13.1 W. Neuston Net Deployed.  
2025 - Neuston Net Recovered.

**Saturday 19th. August '95.**

0146 - Lat: 28 55.1 N. Long: 43 16.4 W. BRIDGET Vehicle Recovered.  
0203 - Lat: 28 55.0 N. Long: 43 16.5 W. Commenced Wire Test; Station 95/10/#03N.  
0535 - Lat: 28 55.9 N. Long: 43 17.8 W. Completed Wire Test to 3200 metres.  
0707 - Lat: 28 58.8 N. Long: 43 12.2 W. BRIDGET Deployed; Station 95/11/#08B.  
0735 - BRIDGET Recovered, Deployment Aborted; For Re-Termination of Main Conducting Cable, 4 Broken Strands found at 50 metres.  
0843 - Acoustic Nav. Transponder Fish Recovered, Set Northerly Course.  
1154 - Lat: 29 24.0 N. Long: 43 10.5 W. Vessel Hove To.  
Noon Position: Lat: 29 24.2 N. Long: 43 10.5 W.  
1305 - BRIDGET Deployed on CTD Wire; Station 95/12/#09B.  
1325 - Avon Semi-Rigid Inflatable Work-Boat Launched for Testing Purposes.  
1342 - BRIDGET Vehicle Recovered for Adjustments.  
1455 - Lat: 29 24.1 N. Long: 43 10.6 W. BRIDGET Re-Deployed, Station 95/13/#10B.  
1530 - Avon Work-Boat Recovered and Secured.  
2157 - Lat: 29 26.7 N. Long: 43 13.7 W. BRIDGET Vehicle Recovered.  
2230 - Lat: 29 26.8 N. Long: 43 14.0 W. Commenced Wire Test; Station 95/14/#04N.

**Sunday 20th. August '95.**

0050 - Lat: 29 27.3 N. Long: 43 14.8 W. Complete Instrument Wire Test.  
0101 - Lat: 29 27.3 N. Long: 43 14.8 W. Commenced Wire Test; Station 95/15/#05N.  
0354 - Lat: 29 27.6 N. Long: 43 15.8 W. Complete Instrument Wire Test.  
0714 - Lat: 29 07.6 N. Long: 43 08.3 W. Acoustic Nav. Transponder Fish Deployed.  
0756 - Lat:29 07.74 N. Long:43 08.28 W. Acoustic Transponder `A' Deployed; St'n.95/16/#01X.  
0952 - Lat:29 07.67 N. Long:43 11.75 W. Acoustic Transponder `B' Deployed. St'n.95/17/#02X.  
1140 - Lat:29 10.32 N. Long:43 11.81 W. Acoustic Transponder `C' Deployed. St'n.95/18/#03X.

Noon Position: Lat: 29 10.3 N. Long: 43 10.5 W.

1258 - Lat:29 10.88 N. Long:43 08.83 W. Acoustic Transponder `D' Deployed. St'n.95/19/#04X.

1325 - Commenced Acoustic Transponder Calibration Runs at 5.0 Knots.

1524 - Lat: 29 09.0 N. Long: 43 09.9 W. Completed Acoustic Calibration Runs.

1537 - Acoustic Navigation Fish Recovered.

1543 - Set Course 191 at Full Speed.

1715 - Lat: 28 55.0 N. Long: 43 13.0 W. Vessel Hove To, for Weight Testing of  
Renewed Termination of Main Conducting Cable.

1912 - Complete Weight Testing to 2 Tonnes, using Anchor Clumps.

2010 - Lat: 28 56.0 N. Long: 43 13.4 W. BRIDGET Deployed; Station 95/20/#11B.

2242 - Lat: 28 57.6 N. Long: 43 12.7 W. Neuston Net Deployed.

2306 - Lat: 28 58.2 N. Long: 43 12.5 W. Neuston Net Recovered.

**Monday 21st. August '95.**

0430 - Lat: 29 05.7 N. Long: 43 10.7 W. Acoustic Navigation Fish Deployed.

Noon Position: Lat: 29 19.7 N. Long: 43 06.1 W.

1907 - Lat: 29 32.0 N. Long: 43 00.6 W. BRIDGET Vehicle Recovered.

1933 - Lat: 29 32.1 N. Long: 43 00.3 W. Commenced Wire Test; Station 95/21/#06N.

2024 - Acoustic Navigation Fish Recovered.

2115 - 10 Khz. PES Fish Recovered.

2124 - Lat: 29 32.9 N. Long: 43 00.8 W. Complete Instrument Wire Test.

2222 - Lat: 29 26.8 N. Long: 43 01.4 W. BRIDGET Deployed; Station 95/22/#12B.

**Tuesday 22nd. August '95.**

Noon Position: Lat: 29 11.8 N. Long: 43 07.9 W.

**Wednesday 23rd. August '95.**

0218 - Lat: 28 52.5 N. Long: 43 09.5 W. BRIDGET Vehicle Recovered.

0354 - Lat: 28 54.6 N. Long: 43 10.6 W. BRIDGET Deployed; Station 95/23/#13B.

( Net Monitor attached to BRIDGET Frame for Comparative Testing to 3000 metres ).

0436 - 10 Khz PES Fish Streamed.

0757 - Lat: 28 54.9 N. Long: 43 10.6 W. BRIDGET Vehicle Recovered; Complete Wire Test.

0852 - Lat: 28 55.6 N. Long: 43 13.2 W. RMT Nets Deployed; Station 95/24/#07N.

Noon Position: Lat: 29 02.1 N. Long: 43 12.2 W.

2106 - Lat: 29 22.3 N. Long: 43 04.6 W. RMT Nets Recovered.

2133 - Equipment Changed, All Secure; Set Course 221 True at Full Speed.

2331 - Lat: 29 10.0 N. Long: 43 17.0 W. BRIDGET Deployed; Station 95/25/#14B.



**Thursday 24th. August '95.**

0919 - Lat: 29 09.9 N. Long: 43 04.6 W. BRIDGET Vehicle Recovered.  
0930 - All Secure; Set Course 214 True at Full Speed.  
1111 - Lat: 28 58.1 N. Long: 43 13.6 W. RMT Nets Deployed; Station 95/26/#08N.  
Noon Position: Lat: 28 59.9 N. Long: 43 13.2 W.  
2227 - Lat: 29 23.1 N. Long: 43 06.9 W. RMT Nets Recovered.  
2248 - Equipment Changed, All Secure; Set Course 199 True at Full Speed.

**Friday 25th. August '95.**

0102 - Lat: 29 05.1 N. Long: 43 13.8 W. BRIDGET Deployed; Station 95/27/#15B.  
0848 - Lat: 29 04.8 N. Long: 43 05.6 W. BRIDGET Vehicle Recovered.  
0900 - All secure; Set Course 221 True at Full Speed.  
1016 - Lat: 28 58.1 N. Long: 43 13.6 W. RMT Nets Deployed; Station 95/28/#09N.  
Noon Position: Lat: 29 01.8 N. Long: 43 12.5 W.  
2135 - Lat: 29 19.9 N. Long: 43 04.7 W. RMT Nets Recovered.  
2158 - All Secure; Set Course 234 True at Full Speed.  
2306 - Lat: 29 15.1 N. Long: 43 12.7 W. BRIDGET Deployed; Station 95/29/#16B.

**Saturday 26th. August '95.**

0620 - Lat: 29 14.4 N. Long: 43 04.0 W. BRIDGET Vehicle Recovered.  
0742 - Lat: 29 19.6 N. Long: 43 07.2 W. RMT Nets Deployed; Station 95/30/#10N.  
Noon Position: 29 12.4 N. Long: 43 09.7 W.  
1940 - Lat: 28 59.6 N. Long: 43 12.7 W. RMT Nets Recovered.  
2031 - Lat: 29 00.1 N. Long: 43 16.3 W. BRIDGET Deployed; Station 95/31/#17B.

**Sunday 27th. August '95.**

0524 - Lat: 28 59.5 N. Long: 43 04.0 W. BRIDGET Vehicle Recovered.  
0548 - All Secure; Set Course 346 True at Full Speed for Mooring Site.  
0842 - Lat: 29 24.1 N. Long: 43 10.0 W. Echo Sounder Survey of Mooring Site.  
0923 - Lat: 29 24.3 N. Long: 43 11.5 W. Acoustic Navigation Fish Streamed.  
1005 - Commenced Deploying Current Meter Mooring `A'; Station 95/32/#01M.  
1104 - Lat: 29 23.98 N. Long: 43 10.51 W. Mooring `A' Deployed.  
1145 - Acoustic Navigation Fish Recovered; Set Course 154 True.  
Noon Position: Lat: 29 22.7 N. Long: 43 10.4 W.  
1250 - Lat: 29 18.1 N. Long: 43 07.6 W. RMT Nets Deployed; Station 95/33/#11N.  
1300 - 3.5 kHz. Fish Recovered.  
2342 - Lat: 29 01.4 N. Long: 43 12.4 W. RMT Nets Recovered.

**Monday 28th. August '95.**

0006 - Science Suspended; Set Course 120 True, to Increase Distance from Approaching Hurricane Humberto: Passing on a Northerly Track to the West.

0800 - Lat: 28 54.3 N. Long: 42 20.5 W. Alter Course 300 True.

Noon Position: Lat: 29 09.5 N. Long: 42 51.4 W.

1412 - Lat: 29 19.0 N. Long: 43 11.6 W. Reducing Speed, Approaching Station.

1520 - Lat: 29 20.1 N. Long: 43 12.7 W. BRIDGET Deployed; Station 95/34/#18B.

1526 - 3.5 kHz. Fish Streamed.

**Tuesday 29th. August '95.**

0255 - Lat: 29 19.6 N. Long: 42 56.3 W. BRIDGET Vehicle Recovered.

0542 - Lat: 29 15.9 N. Long: 43 08.8 W. RMT Nets Deployed; Station 95/35/#12N.

0550 - Acoustic Navigation Fish Streamed.

Noon Position: Lat: 29 04.3 N. Long: 43 11.9 W.

1506 - Lat: 28 59.4 N. Long: 43 12.6 W. RMT Nets Recovered.

1717 - Commenced Deploying Current Meter Mooring `H'; Station 95/36/#02M.

1832 - Lat: 29 00.18 N. Long: 43 08.10 W. Mooring `H' Deployed.

1913 - Completed Interrogation of Mooring.

2049 - Lat: 29 07.7 N. Long: 43 15.0 W. BRIDGET Deployed; Station 95/37/19B.

**Wednesday 30th. August '95.**

0538 - Lat: 29 07.0 N. Long: 43 02.0 W. BRIDGET Vehicle Recovered.

0727 - Lat: 29 16.8 N. Long: 43 07.9 W. RMT Nets Deployed; Station 95/38/#13N.

Noon Position: Lat: 29 09.3 N. Long: 43 10.4 W.

1808 - Lat: 29 00.2 N. Long: 43 12.3 W. RMT Nets Recovered.

1922 - Commenced Deploying Current Meter Mooring `G'; Station 95/39/#03M.

2030 - Lat: 28 59.89 N. Long: 43 09.95 W. Mooring `G' Deployed.

2116 - Complete Interrogation of Mooring.

2302 - Lat: 29 13.1 N. Long: 43 09.9 W. BRIDGET Deployed; Station 95/40/#20B.

**Thursday 31st. August '95.**

0734 - Lat: 29 04.5 N. Long: 43 11.8 W. BRIDGET Vehicle Recovered.

0749 - Acoustic Nav. Fish Inboard; Vessel Hove To.

0852 - Lat: 29 04.2 N. Long: 43 12.5 W. Vessel Proceeding towards Mooring Site.

1000 - Lat: 29 00.1 N. Long: 43 12.9 W. Commenced Mooring Site Survey.

1056 - Commenced Deploying Current Meter Mooring `F'; Station 95/41/#04M.

Noon Position: Lat: 29 01.0 N. Long: 43 11.8 W.

1226 - Lat: 29 00.20 N. Long: 43 11.78 W. Mooring `F' Deployed.

1310 - Complete Interrogation of Mooring.

1432 - Lat: 29 12.7 N. Long: 43 15.6 W. BRIDGET Deployed; Station 95/42/#21B.

2318 - Lat: 29 12.4 N. Long: 43 03.3 W. BRIDGET Vehicle Recovered.

**Friday 1st. September '95.**

0114 - Lat: 29 18.0 N. Long: 43 07.5 W. Rock Chipper Deployed; Station 95/43/#01C.

0311 - Lat: 29 18.2 N. Long: 43 07.6 W. Rock Chipper Inboard.

0336 - Lat: 29 18.9 N. Long: 43 07.2 W. Rock Chipper Deployed; Station 95/44/#02C.

0537 - Lat: 29 19.1 N. Long: 43 07.7 W. Rock Chipper Inboard.

0605 - Lat: 29 20.0 N. Long: 43 07.0 W. Rock Chipper Deployed; Station 95/45/#03C.

0835 - Lat: 29 20.3 N. Long: 43 07.2 W. Rock Chipper Inboard.

0906 - Lat: 29 21.2 N. Long: 43 05.5 W. Rock Chipper Deployed; Station 95/46/#04C.

1054 - Lat: 29 21.3 N. Long: 43 05.7 W. Rock Chipper Inboard.

Noon Position: Lat: 29 22.1 N. Long: 43 04.7 W.

1208 - Lat: 29 22.1 N. Long: 43 04.7 W. Rock Dredge Deployed; Station 95/47/#01D.

1504 - Lat: 29 21.9 N. Long: 43 06.1 W. Rock Dredge Recovered.

1625 - Lat: 29 14.9 N. Long: 43 09.5 W. BRIDGET Deployed; Station 95/48/#22B.

**Saturday 2nd. September '95.**

0120 - Lat: 29 02.5 N. Long: 43 13.3 W. BRIDGET Vehicle Recovered.

0226 - Lat: 29 00.1 N. Long: 43 11.3 W. RMT Nets Deployed; Station 95/49/#14N.

Noon Position: Lat: 29 16.7 N. Long: 43 06.7 W.

1359 - Lat: 29 18.8 N. Long: 43 04.3 W. RMT Nets Recovered.

1657 - Commenced Deploying Current Meter Mooring 'E'; Station 95/50/#05M.

1821 - Lat: 29 00.08 N. Long: 43 14.33 W. Mooring 'E' Deployed.

1900 - Complete Interrogation of Mooring. Set Course 022 True.

2100 - Lat: 29 09.1 N. Long: 43 10.9 W. Vessel Hove To on Station.

2322 - Acoustic Navigation Fish Deployed.

2350 - Lat: 29 08.9 N. Long: 43 11.0 W. SHRIMP Deployed; Station 95/51/#01S.

**Sunday 3rd. September '95.**

0334 - Lat: 29 09.9 N. Long: 43 09.3 W. SHRIMP Camera Vehicle Fast on Seabed.

0423 - Lat: 29 09.8 N. Long: 43 10.0 W. SHRIMP Clear of Seabed.

0500 - Acoustic Navigation Fish Inboard.

0559 - Lat: 29 09.8 N. Long: 43 10.2 W. SHRIMP Vehicle Inboard.

0842 - Lat: 29 00.1 N. Long: 43 11.7 W. RMT Nets Deployed; Station 95/52/#15N.

Noon Position: Lat: 29 05.9 N. Long: 43 10.5 W.

2029 - Lat: 29 23.7 N. Long: 43 02.6 W. RMT Nets Recovered.

2126 - Lat: 29 22.2 N. Long: 43 04.5 W. Rock Dredge Deployed; Station 95/53/#02D.

**Monday 4th. September '95.**

0243 - Lat: 29 24.1 N. Long: 43 03.5 W. Rock Dredge Recovered.

0325 - Lat: 29 22.9 N. Long: 43 00.4 W. Rock Dredge Deployed; Station 95/54/#03D.

0616 - Lat: 29 25.4 N. Long: 42 58.7 W. Rock Dredge Recovered.

0725 - Lat: 29 23.1 N. Long: 42 56.1 W. Rock Dredge Deployed; Station 95/55/#04D.

1047 - Lat: 29 25.7 N. Long: 42 54.0 W. Rock Dredge Recovered.

1142 - Set Course 211 True, Full Speed, for next Station.

Noon Position: Lat: 29 23.7 N. Long: 42 55.7 W.

1503 - Lat: 28 57.5 N. Long: 43 13.7 W. Commenced Inspection of Conducting Cable.

1537 - Rochester Deep Tow Cable Veered to 500 m, for visual and conductivity tests.

1602 - Lat: 28 57.9 N. Long: 43 13.6 W. Deep Tow Cable Inboard.

1620 - Deployment of RMT Nets postponed, due to release malfunction.

1831 - Lat: 28 57.8 N. Long: 43 16.6 W. RMT Nets Deployed; Station 95/56/#16N.

**Tuesday 5th. September '95.**

0541 - Lat: 29 21.7 N. Long: 43 06.4 W. RMT Nets Recovered.

0559 - Set Course 186 True, Full Speed, for next Station.

0921 - Lat: 28 51.6 N. Long: 43 10.2 W. Load Test on Deep Tow Swivel/Termination.

1022 - Lat: 28 51.6 N. Long: 43 10.2 W. BRIDGET Deployed; Station 95/57/#23B.

1041 - Lat: 28 51.7 N. Long: 43 10.0 W. BRIDGET Vehicle Recovered for adjustment.

1053 - Lat: 28 51.6 N. Long: 43 10.1 W. BRIDGET Deployed; Station 95/58/#24B.

Noon Position: Lat: 28 51.6 N. Long: 43 09.2 W.

1745 - Lat: 28 51.3 N. Long: 43 05.8 W. BRIDGET Vehicle Recovered.

2030 - Lat: 29 10.2 N. Long: 43 10.4 W. Vessel Hove To on Station, preparing SHRIMP.

2120 - Acoustic Navigation Fish Deployed.

2125 - Lat: 29 09.5 N. Long: 43 10.7 W. SHRIMP Deployed; Station 95/59/#02S.

2134 - Lat: 29 09.6 N. Long: 43 10.7 W. SHRIMP Recovered for adjustment.

2156 - Lat: 29 09.4 N. Long: 43 10.8 W. SHRIMP Deployed; Station 95/59/#02S.

**Wednesday 6th. September '95.**

0221 - Lat: 29 10.8 N. Long: 43 10.8 W. SHRIMP Camera Vehicle Recovered.

0342 - Lat: 29 07.3 N. Long: 43 11.0 W. SHRIMP Deployed; Station 95/60/#03S.

0840 - Acoustic Navigation Fish Recovered.

0929 - Lat: 29 10.2 N. Long: 43 10.4 W. SHRIMP Camera Vehicle Recovered.

1003 - Commenced Deploying Current Meter/Sediment Trap Mooring 'D'; Station 95/61/#06M.

1043 - Lat: 29 07.16 N. Long: 43 11.48 W. Mooring 'D' Deployed.

1124 - Completed Interrogation of Mooring; Set Course for next Station.

Noon Position: Lat: 29 09.9 N. Long: 43 08.1 W.

1338 - Lat: 29 20.1 N. Long: 42 55.9 W. RMT Nets Deployed; Station 95/62/#17N.

**Thursday 7th. September '95.**

0046 - Lat: 29 42.4 N. Long: 42 49.4 W. RMT Nets Recovered; Set Course 210 T, Full Speed.

0440 - Lat: 29 10.6 N. Long: 43 10.4 W. Vessel Hove To on Station.

0500 - Lat: 29 09.4 N. Long: 43 10.6 W. SHRIMP Deployed; Station 95/63/#04S.

1036 - Lat: 29 12.2 N. Long: 43 10.1 W. SHRIMP Camera Vehicle Recovered.

1045 - Lat: 29 12.4 N. Long: 43 10.1 W. Acoustic Transponder Deployed for Test Purposes.

1126 - Lat: 29 12.8 N. Long: 43 10.2 W. Acoustic Transponder Recovered.

1140 - Lat: 29 12.9 N. Long: 43 10.2 W. Acoustic Navigation Fish Recovered.

Noon Position: Lat: 29 14.1 N. Long: 43 09.2 W.

1200 - Commenced Streaming Trawl Warp, to Remove Slack Turns.

1229 - Lat: 29 14.1 N. Long: 43 08.5 W. Complete Streaming Trawl Warp.

1345 - Lat: 29 17.1 N. Long: 43 06.8 W. RMT Nets Deployed; Station 95/64/#18N.

**Friday 8th. September '95.**

0015 - Lat: 28 59.1 N. Long: 43 12.9 W. RMT Nets Recovered.

0045 - Lat: 28 58.7 N. Long: 43 12.8 W. Set Course 010 True, Full Speed.

0208 - Lat: 29 09.4 N. Long: 43 10.7 W. Acoustic Navigation Fish Deployed.

0256 - Lat: 29 09.5 N. Long: 43 10.7 W. SHRIMP Deployed; Station 95/65/#05S.

0920 - Lat: 29 11.3 N. Long: 43 09.8 W. SHRIMP Recovered. 3.5 KHz. PES Fish Inboard.

Noon Position: Lat: 29 10.6 N. Long: 43 11.9 W.

1212 - Lat: 29 10.6 N. Long: 43 11.9 W. Transponder `C' Recovered.

1402 - Lat: 29 07.7 N. Long: 43 11.8 W. Transponder `B' Recovered.

1511 - Lat: 29 07.6 N. Long: 43 08.4 W. Transponder `A' Recovered.

1625 - Lat: 29 10.6 N. Long: 43 08.9 W. Transponder `D' Recovered.

1634 - Lat: 29 10.6 N. Long: 43 08.9 W. Acoustic Navigation Fish Inboard.

1727 - Commenced Deploying Current Meter/Sediment Trap Mooring `B'; Station 95/66/#07M.

1810 - Lat: 29 09.98 N. Long: 43 10.46 W. Mooring `B' Deployed.

1935 - Commenced Deploying Current Meter/Sediment Trap Mooring `C'; Station 95/67/#08M.

2133 - Lat: 29 10.57 N. Long: 43 10.28 W. Mooring `C' Deployed.

2148 - 2217 - Streaming Conducting Cable, to Remove Slack Turns; and Shifting BRIDGET.

2225 - All Secure; Set Course 038 True, Full Speed.

**Saturday 9th. September '95.**

0053 - Lat: 29 28.9 N. Long: 42 53.9 W. BRIDGET Deployed; Station 95/68/25B.

1130 - Lat: 29 41.5 N. Long: 42 50.2 W. BRIDGET Vehicle Recovered.

Noon Position: Lat: 29 44.8 N. Long: 42 50.8 W.

1243 - Lat: 29 50.0 N. Long: 42 51.9 W. RMT Nets Deployed; Station 95/69/19N.

2330 - Lat: 30 10.9 N. Long: 42 56.6 W. RMT Nets Recovered.

2339 - 10 KHz. PES Fish Inboard.

0000- Lat: 30 12.0 N. Long: 42 54.0 W. All Secure, Set Course 062 True for the Azores Islands.

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R.A. BOURNE

Master

**APPENDIX 2, WAY POINTS AND STATIONS**

Way Point	Latitude °N	Longitude °W	Station number	Code	Operation
(i)	43°N 38.33'	19°W 57.50'	1	B1	TEST
(ii)	43°N 30.60'	20°W 13.89'	2	B2	TEST
(iii)	43°N 30.29'	20°W 14.11'	3	B3	TEST
(iv)	41°N 53.59'	23°W 17.69'	4	B4	TEST
(v)	41°N 44.44'	23°W 34.36'	5	B5	TEST
(iv)	41°N 34.00'	58°W 34.00'	6	B6	TEST + 12 BOTTLES FIRED
(vii)			7	N1	
(viii)			8	N2	
WP 1	29°N 29.00'	43°W 04.00'	C95-9	B7	"Hove to, deploy BRIDGET, proceed at 2kts"
WP 2	29°N 20.00'	43°W 07.60'	C95-9	B7	proceed at 2kts
WP 3	29°N 10.70'	43°W 11.10'	C95-9	B7	proceed at 2kts

WP 4	28°N	56.70'	43°W	14.80'	C95- 9	B7	"Steam thru WP4 until BRIDGET passes same, then hove to for recovery"
WP 5					C95- 10	N3	WIRE TEST
WP 5	28°N	59.00'	43°W	12.20'	C95- 11	B8	"Hove to, deploy BRIDGET, proceed at 2kts"
WP 6	29°N	11.00'	43°W	09.60'	C95- 11	B8	proceed at 2kts
WP 7	29°N	26.00'	43°W	03.40'	C95- 11	B8	"Steam thru WP7 until BRIDGET passes same, then hove to for recovery"
WP 8	29°N	24.50'	43°W	10.90'	C95- 12	B9	"Hove to, deploy BRIDGET, proceed at 2kts"
WP 8	29°N	24.60'	43°W	11.20'	C95- 12	B9	"Hove to, RECOVER BRIDGET. FAILURE"
WP 8	29°N	24.00'	43°W	10.50'	C95- 13	B10	"Hove to and deploy BRIDGET from s/b "A"-frame, drift towards WP6"
WP 8	29°N	24.00'	43°W	10.50'	C95- 13	B10	"Hove to and redeploy BRIDGET from s/b "A"-frame, continue drift towards WP6"
WP 9	29°N	26.00'	43°W	13.60'	C95- 13	B10	"Hove to and recover BRIDGET from s/b "A"-frame, then make wire test. Make for WP7"
WP 10	29°N	26.00'	43°W	13.60'	C95- 14	N4	wire test
WP 10	29°N	26.00'	43°W	13.60'	C95- 15	N5	wire test
WP 11	29°N	07.70'	43°W	11.70'	C95- 16	X1	"Acoustic Xponder drop "A"
WP 12	29°N	10.30'	43°W	11.80'	C95- 17	X2	"Acoustic Xponder drop "C"
WP 13	29°N	10.70'	43°W	08.70'	C95- 18	X3	"Acoustic Xponder drop "D"

WP 14	29°N	07.60'	43°W	08.30'	C95- 19	X4	"Acoustic Xponder drop "B"
WP 18	28°N	55.00'	43°W	13.00'	C95- 20	B11	Go to WP19. Hold for wire test and BRIDGET attachment.
WP 19	28°N	59.00'	43°W	12.20'	C95- 20	B11	Go to WP 20. Hold for BRIDGET deployment. Make for WP21 at 1.5kts
WP 20	29°N	11.00'	43°W	09.60'	C95- 20	B11	Make for WP 22 at 1.5kts
WP 21	29°N	26.00'	43°W	03.40'	C95- 20	B11	Make for WP23 at 1.5kts. Hold 2miles north for BRIDGET recovery.
WP 22	29°N	26.00'	43°W	03.40'	C95- 21	N6	Hold for wire test
WP 23	29°N	25.00'	43°W	02.20'	C95- 22	B12	Hold 2 miles north of WP23 for BRIDGET deployment
WP 24	29°N	13.00'	43°W	07.60'	C95- 22	B12	proceed at 2kts
WP 25	29°N	08.60'	43°W	08.80'	C95- 22	B12	proceed at 2kts
WP 26	28°N	59.00'	43°W	09.10'	C95- 22	B12	Hold 2 miles south of WP26 for BRIDGET recovery
WP 26	28°N	59.00'	43°W	09.10'	C95- 23	B13	wire test. RMT- monitor/BRIDGET CALI.
WP 27	28°N	58.00'	43°W	13.20'	C95- 24	N7	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 28	29°N	11.00'	43°W	10.20'	C95- 24	N7	Make way at 1.5-2kts
WP 29	29°N	17.00'	43°W	08.20'	C95- 24	N7	Hold 2 miles north and recover RMT-nets.



WP 30	29°N	10.00'	43°W	13.80'	C95- 25	B14	Hold for BRIDGET deployment. Make way at 1.5kts min
WP 31	29°N	10.00'	43°W	07.00'	C95- 25	B14	Hold for BRIDGET recovery.
WP 32	28°N	59.00'	43°W	13.00'	C95- 26	N8	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 33	29°N	11.00'	43°W	10.20'	C95- 26	N8	Make way at 1.5-2kts
WP 34	29°N	17.00'	43°W	08.20'	C95- 26	N8	Hold 2 miles north and recover RMT-nets.
WP 35	29°N	05.00'	43°W	14.00'	C95- 27	B15	Hold for BRIDGET deployment. Make way at 1.5kts min
WP 36	29°N	05.00'	43°W	08.00'	C95- 27	B15	Hold for BRIDGET recovery.
WP 37	29°N	17.00'	43°W	08.20'	C95- 28	N9	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 38	29°N	11.00'	43°W	10.20'	C95- 28	N9	Make way at 1.5-2kts
WP 39	28°N	59.00'	43°W	13.20'	C95- 28	N9	Hold 2 miles south and recover RMT-nets.
WP 40	29°N	15.00'	43°W	12.70'	C95- 29	B16	Hold for BRIDGET deployment. Make way at 1.5kts min
WP 41	29°N	15.00'	43°W	05.50'	C95- 29	B16	Hold for BRIDGET recovery.
WP 42	29°N	17.00'	43°W	08.20'	C95- 30	N10	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 43	29°N	11.00'	43°W	10.20'	C95- 30	N10	Make way at 1.5-2kts
WP 44	28°N	59.00'	43°W	13.20'	C95- 30	N10	Hold 2 miles south and recover RMT-nets.

WP 45	29°N	0.00'	43°W	16.20'	C95- 31	B17	Hold for BRIDGET deployment. Make way at 1.5kts min
WP 46	29°N	0.00'	43°W	07.80'	C95- 31	B17	Hold for BRIDGET recovery.
WP 47	29°N	23.98'	43°W	10.53'	C95- 32	M1	"BRIDGE mooring "A" deployed"
WP 48	29°N	17.00'	43°W	08.20'	C95- 33	N11	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 49	29°N	11.00'	43°W	10.20'	C95- 33	N11	Make way at 1.5-2kts
WP 50	28°N	59.00'	43°W	13.20'	C95- 33	N11	Hold 2 miles south and recover RMT-nets.
WP 51	29°N	20.00'	43°W	13.00'	C95- 34	B18	Hold for BRIDGET deployment. Make way at 0.5kts.
WP 52	29°N	20.00'	43°W	12.20'	C95- 34	B18	Make way at 1.5kts.
WP 53	29°N	20.00'	43°W	01.00'	C95- 34	B18	Hold for BRIDGET recovery.
WP 54	29°N	17.00'	43°W	08.20'	C95- 35	N12	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 55	29°N	11.00'	43°W	10.20'	C95- 35	N12	Make way at 1.5-2kts
WP 56	28°N	59.00'	43°W	13.20'	C95- 35	N12	Hold 2 miles south and recover RMT-nets.
WP 57	29°N	0.00'	43°W	08.00'	C95- 36	M2	"BRIDGE mooring "H" deployed"
WP 58	29°N	07.50'	43°W	15.00'	C95- 37	B19	Hold for BRIDGET deployment. Make way at 0.5kts.

WP 59	29°N	07.50'	43°W	14.00'	C95- 37	B19	Make way at 1.5kts.
WP 60	29°N	07.50'	43°W	07.00'	C95- 37	B19	Hold for BRIDGET recovery.
WP 61	29°N	17.00'	43°W	08.20'	C95- 38	N13	Hold and deploy RMT-nets. Make way at 1.5-2kts
WP 62	29°N	11.00'	43°W	10.20'	C95- 38	N13	Make way at 1.5-2kts
WP 63	28°N	59.00'	43°W	13.20'	C95- 38	N13	Hold 2 miles south and recover RMT-nets.
WP 64	29°N	0.00'	43°W	10.00'	C95- 39	M3	"BRIDGE mooring "G" deployed"
WP 65	29°N	13.00'	43°W	09.80'	C95- 40	B20	Hold and deploy Bridget. Make way at 0.5kts
WP 66	29°N	12.00'	43°W	10.00'	C95- 40	B20	Make way at 2kts
WP 67	29°N	06.00'	43°W	10.50'	C95- 40	B20	steam thru at 0.5 kts while Bridget recovered
WP 68	29°N	0.10'	43°W	11.80'	C95- 41	M4	"Steam thru WP from west, turn and hold 2km north and deploy mooring "F."
WP 69	29°N	12.50'	43°W	15.50'	C95- 42	B21	"Hold and deploy BRIDGET, then make way at 0.5 kts"
WP 70	29°N	12.50'	43°W	14.50'	C95- 42	B21	make way at 1.5-2kts
WP 71	29°N	12.50'	43°W	06.50'	C95- 42	B21	steam through at 0.5kts and recover BRIDGET.
WP 72	29°N	18.00'	43°W	07.43'	C95- 43	G1	rock chipper 3335m
WP 73	29°N	18.86'	43°W	07.45'	C95- 44	G2	rock chipper 3306m

WP 74	29°N	19.99'	43°W	07.12'	C95- 45	G3	rock chipper 3434m
WP 75	29°N	21.22'	43°W	05.55'	C95- 46	G4	rock chipper 3281m
WP 76	29°N	22.00'	43°W	04.70'	C95- 47	G5	rock dredge
WP 77	29°N	14.00'	43°W	09.90'	C95- 48	B22	"Hold and deploy BRIDGET, then make way at 0.5 kts"
WP 78	29°N	13.00'	43°W	10.30'	C95- 48	B22	make way at 1.5-2kts
WP 79	29°N	06.00'	43°W	12.30'	C95- 48	B22	steam through at 0.5kts and recover BRIDGET.
WP 80	29°N	0.00'	43°W	11.50'	C95- 49	N14	"Hold and deploy RMT nets, then make way at 2 kts"
WP 81	29°N	11.00'	43°W	09.00'	C95- 49	N14	make way at 2kts
WP 82	29°N	16.00'	43°W	07.00'	C95- 49	N14	steam through at 2kts and recover nets.
WP 83	29°N	0.00'	43°W	14.50'	C95- 50	M5	"deploy mooring "E"
WP 84	29°N	25.00'	43°W	25.00'	C95- 51	S1	Hold and deploy SHRIMP. Make way at 0.5kts
WP 85	29°N	10.20'	43°W	10.20'	C95- 51	S1	top right corner of box
WP 86	29°N	09.60'	43°W	10.80'	C95- 51	S1	bottom left corner of box
WP 87	29°N	0.00'	43°W	11.50'	C95- 52	N15	"Hold and deploy RMT nets, then make way at 2 kts"
WP 88	29°N	11.00'	43°W	09.00'	C95- 52	N15	make way at 2kts
WP 89	29°N	16.00'	43°W	07.00'	C95- 52	N15	steam through at 2kts and recover nets.

WP 90	29°N	22.78'	43°W	04.53'	C95- 53	D6	rock dredge 3489m north neovolcanic tip of seg.17
WP 91	29°N	24.25'	42°W	59.50'	C95- 54	D7	rock dredge 3100m (western NTD wall)
WP 92	29°N	24.12'	42°W	55.33'	C95- 55	D8	rock dredge 3700m southern neovolcanic tip of seg.18
WP 93	29°N	0.00'	43°W	11.50'	C95- 56	N16	"Hold and deploy RMT nets, then make way at 2 kts"
WP 94	29°N	11.00'	43°W	09.00'	C95- 56	N16	make way at 2kts
WP 95	29°N	16.00'	43°W	07.00'	C95- 56	N16	steam through at 2kts and recover nets.
WP 96	29°N	10.00'	43°W	51.30'	C95- 57	B24	Hold and deploy BRIDGET- aborted
WP 97	28°N	51.30'	43°W	10.00'	C95- 58	B24b	Hold and deploy BRIDGET
WP 98	28°N	51.30'	43°W	05.80'	C95- 58	B24b	Hold and recover BRIDGET
WP 99	29°N	10.25'	43°W	10.25'	C95- 59	S2	SHRIMP NE line through Broken Spur
WP 100	29°N	08.40'	43°W	10.30'	C95- 60	S3	"SHRIMP NE line through "Southern Site"
WP 101	29°N	07.20'	43°W	11.50'	C95- 61	M6	"deploy BRIDGE mooring "D"
WP 102	29°N	20.45'	42°W	55.75'	C95- 62	N17	"Hold and deploy RMT nets, then make way at 2 kts, Segment 18"

WP 103	29°N	42.40'	42°W	49.40'	C95- 62	N17	Steam through at 2kts and recover nets.
WP 104	29°N	09.40'	43°W	10.60'	C95- 63	S4	SHRIMP NE line through Broken Spur
WP 105	29°N	12.20'	43°W	10.10'	C95- 63	S4	Hold to recover SHRIMP
WP 106	29°N	17.10'	43°W	06.80'	C95- 64	N18	"Hold and deploy RMT nets, then make way at 2 kts."
WP 107	29°N	59.10'	43°W	12.90'	C95- 64	N18	Steam through at 2kts and recover nets.
WP 108	29°N	09.50'	43°W	10.70'	C95- 65	S5	Hold and deploy SHRIMP NE for line through Broken Spur
WP 109	29°N	11.30'	43°W	09.80'	C95- 65	S5	Hold and recover SHRIMP
WP 110	29°N	10.60'	43°W	11.90'	C95- 66	X1	Hold and recover transponder C
WP 111	29°N	07.70'	43°W	11.80'	C95- 67	X2	Hold and recover transponder B
WP 112	29°N	10.60'	43°W	08.40'	C95- 68	X3	Hold and recover transponder A
WP 113	29°N	10.60'	43°W	08.90'	C95- 69	X4	Hold and recover transponder D
WP 114	29°N	09.98'	43°W	10.46'	C95- 70	M7	"Hold and deploy BRIDGE mooring "B"
WP 115	29°N	10.57'	43°W	10.28'	C95- 71	M8	"Hold and deploy BRIDGE mooring "C"

WP 116	29°N	28.90'	42°W	53.90'	C95-72	25B	Hold and deploy
BRIDGET							
WP 117	29°N	41.50'	42°W	50.80'	C95-72	25B	Hold and recover
BRIDGET							
WP 118	29°N	50.00'	42°W	51.90'	C95-73	N19	"Hold and deploy RMT
nets, then make way at 2 kts, Segment 18"							
WP 119	30°N	10.90'	42°W	56.60'	C95-73	N19	Steam through at 2kts
and recover nets.							

APPENDIX 3, SHRIMP ROV log

SHRIMP		CD95/S1										
Time	J.Day	Lat deg	min	Long deg	min	Slant Range	Speed	Head - ing	Wire Out	Water Depth	Altitude Trans	Comments
11.50	245											Shrimp outboard
00.00	246	29/9.001		43/10.966		185						Vehicle depth not available =>
00.17	246	29/9.175		43/11.031		491	0.0	15.9	438	3200	4485	Flat range not available
00.30	246	N/A		N/A		N/A	0.7	42.9	844	3150	4482	
00.45	246	29/9.552		43/10.864		N/A	0.7	41.8	1225	1230	4500	
00.48	246											AcousticNav now working because SWAT /Bathymetry turned off
01.00	246	29/9.768		43/10.652		1738.5	1.0	57.1	1721	3122	4482	
01.15	246	29/9.894		43/10.451		2109	0.6	50.9	2145	3102	4493	
01.25												Wire out speed increased to 40m/min
01.30	246	29/10.146		43/10.454		2191	0.6	345.3	2635	3099	4492	
01.36	246								2901			Hauling in stopped winch to allow ship to turn winch still stopped
01.45	246	29/10.401		43/10.659		2862	1.0	33.9	2901	3081	4494	
02.00	246	29/10.410		43/10.266		2833	0.7	121.8	2901	3119	4493	
02.15	246	29/10.138		43/10.128		2833	1.7	173.3	2902	3124	4500	
02.28												Wire out at 30m/min after ship manoeuvre
02.30	246	29/9.889		30/10.388		2871	1.0	271.9	2918	3100	4500	Altimeter = 210
02.36									3070	3103		Winch stopped
02.38												Reboot computer
02.38						42m off						Video on & photos on Winch down at 10m/min
02.41												Altitude target = 5m
02.42									3091			Winch stopped
02.43												Winch stopped targeting less than 4 Hauling up quick (15m/min)
02.45	246	29/10.063		43/10.489		3017	1.4	61.4	3063	3096	4472	Winch stopped Hauling up
02.47												In grabber
02.51												On frame 16 at the moment Photos taken every 30 seconds
02.51												Transmissometer blip
02.53												20 photos taken
02.55												22 frames taken
03.02												Going over 20m crevasse
03.03		29/10.074		43/10.046		3058	1.1	76.1	3106	3060	4498	
03.13												Programme stopped, Hauling up at 25m/min
03.14												Rebooting system
												Programme back on line Frames numbers lost
												Turning video back on



Time	J.Day	Lat deg	min	Long deg	min	Slant Range	Speed	Head - ing	Wire Out	Water Depth	Altitude Trans	Comments
03.15	246	29/10.005		43/9.706		3124	0.9	82.1	3184	4500		
03.17												Frame 3
03.18												Frame 4
03.1935												Frame 5
03.2136												Frame 8
03.2350												Frame 11
03.27						4075 =						Transmissometer Reading
03.30												Shrimp possibly snagged on bottom. Ship turning to try reverse out of trap. Paying out to match ships progress.
03.38	246	29/9.872		43/9.272		3412	0.0	61.9	3447	3295		Tranmissometer reading unreliable Still trapped on bottom
03.45	246	29/9.959		43/9.925		3420	1.7	8.6	3464	3283		Shrimp dislodged (possibly!)
03.51						3326						
03.53						3280						
03.54						3258			3349			
03.56						3227			3327			Stop ship
04.00	246	29/10.062		43/9.664		3181	1.1	263.4	3280	3200		Shrimp free
04.16	246	29/9.967		43/9.925		3105	0.3	182.9	3146	3074+60		Hauling in for recovery
04.23												Speed Incrd to 0.5 knots 215 = Altim
04.30	246	29/9.813		43/10.071		2571	0.5	149.1	2879	3091+60		Shrimp in board
06.00	246											

## SHRIMP

## Deployment CD95/S2

Time	J.Day	Lat deg	min	Long deg	min	Slant Range	Speed	Head - ing	Wire Out	Water Depth	Altitude	Frames	Video	Comments
21:24 21:28 21:40	248	29	9.540	43	10.682		0.0	104.3	56					Shrimp outboard Wire out at 30m/min Shrimp coming in Shrimp on board
21:56		29	9.430	43	10.814		0.0	190.3	55	2259(s)				Shrimp outboard
22:11		29	9.394	43	10.763		0.0	124.9	387	2906(s)				
22:27		29	9.373	43	10.783		0.0	078.3	801	3770(s)				Acoustic Navigate: not operating
22:43		29	9.577	43	10.741		0.0	095.9	1986	3090(s)				
23:00		29	9.681	43	10.645		0.0	094.8	2221	3113(s)				
23:05 23:06		29	9.731	43	10.618		0.0	079.6	2503	3093				Video camera on Video camera off
23:20		29	9.820	43	10.572		0.0	112.1	2909	3096				
23:33		29	9.837	43	10.530		0.0	079.6	3027		1000			
23:39			10.011	43	10.507		0.0							Video on
23:48		29	10.011	43	10.507		0.0	092.9	3077		2400			
23:53		29	10.022	43	10.445		0.0	093.6	3101					Ship on Saracens head
23:58	248	29	10.448	43	10.034		0.1	091.6	3105		0005			
00:08	249	29	10.138	43	10.388		0.0	090.5	3068					on bottom for 1 min
00:26	249	29	10.213	43	10.288		0.0	084.6	3088		0010			
00:29									3083		0005			
00:41		29	10.335	43	10.228		0.0	074.6	3083		0005			
00:56		29	10.449	43	10.103		0.0	071.3	3079		0005			
01:00														Video off
01:07		29	10.534	43	10.151		0.2	77.9	2866					Bringing up to repeat line

## SHRIMP

## CD95/S3

Time	J.Day	Lat deg	lon min	Long deg	min	Slant Range	Speed	Head - ing	Wire Out	Water Depth	Altitude	Frames	Video	Comments
03.50	249													Shrimp deployment
05.00	249	29	7.832	43	10.857		0.0	83.6	2840					
05.01	249	29	7.868	43	10.807		0.0	88.1	2348					Video on
05.16	249	29	7.938	43	10.736		0.0	89.8	3121		0005			
05.31	249	29	8.030	43	10.734		0.0	89.4	3192		0006			
05.96	249	29	8.153	43	10.697		0.0	77.3	3157					
06.01	249	29	8.299	43	10.701		0.0	069.4	3110		0010			
06.15	249	29	8.927	43	10.632		0.0	066.8	3100					
06.31	249	29	8.557	43	10.665		0.0	052.6	3151		0005			
06.40	249													Shrimp on cliff
06.47	249	29	8.679	43	10.683		0.0	062.8	3159		0005			
07.02	249	29	8.842	43	10.773		0.0	030.6	3033		0010			
07.16	249	29	9.015	43	10.791		0.0	075.3	3046		0007			
07.28	249	29	9.106	43	10.755		0.0	057.6	3066		0005			
07.45	249	29	9.283	43	10.707		0.0	086.6	3112		0000			
07.59	249	29	9.286	43	10.643		0.0	052.3	3141		0005			Video off: Briging up
09.30	249													Shrimp on board

## SHRIMP

## CD95/S4

Time	J.Day	Lat deg	min	Long deg	min	Slant Range	Speed	Head - ing	Wire Out	Water Depth	Altitude	Frames	Video	Comments
05:03	250	29	09.41	43	10.61		0.08	061		3120				Deploy SHRIMP
05:15	"						0.00		200					X-ponder on wire
05:45	"	29	09.5	43	10.55		0.00	145	980	3196				diving - AcNav. not working
06:00	"	29	09.421	43	10.524	0.30		135	1376	3100				diving at 40m min
06:15		29	09.341	43	10.483	0.00		134	1940	3250				" " "
06:30		29	09.444	43	10.491	0.10		075	2550	3099				" " "
06:45		29	09.587	43	10.477	0.00		061	3002		84m		On	Video on 06:44 mins
06:52		29	09.	43	10.		0.00	060	3122		4m			Close to bottom 1st time
06:54								061			touch	*		On bottom/Off bottom
06:58							0.00	054	3134		6m			Close for n/min
07:00		29	09.765	43	10.504	0.00		057	3145		4m		*	On bottom/Off bottom
07:04							0.00	059	3120		4m		*	Close range, touch down
07:08									3126		mid-water			13m @ 07:09H
07:10								059	3148		5m	*		Touch down/clear/touch at 12:40s
07:15		29	09.901	43	10.510	0.00		059	3122		5m			Note drift at 0:3kts @ 019N
07:16.30									3110		touch	*		
07:18.40									3095		touch	*		Off at 3089m @ 07:19:00H
07:21.30									3089		15m			Stopped hauling
07:23.30									3093		touch	*		and off after 30 secs
07:25		29	10.052	43	10.501	0.00		058	3104		12m			
07:41		29		43					3119		on bottom	**		Off 3100m w/o to 20m alt.
07:45											5m			
07:49									3112		7m			
07:51									3112		on bottom	*		Off 3083 w/o, graben step up
07:53.41									3084		10m			
07:57											8m			
07:59									3127		touch	*		
08:01									3125		touch			Clear @ 3122m w/o
08:07		29	10.56	43	10.44				3153	3125	touch	**		Cross line W - E
08:23									3166		touch	*		
08:26											5m			
08:29											touch?			
08:36									3149	3149	touch			
08:41	250	29		43									running	Heading NNE (010N)
08:41	250	29	10.96	43	10.35		0.00.5	005N	3157	3100	8m			Undulating ground
08:45	250	29	10.999	43	10.339	0.4	04	005N	3065	3078	8m			
08:48											touch?	*		
08:50.50									3136	3076	touch	*		
08:52.51									3127		touch	*		
08:58											touch?	*		To 08:59:45 secs
09:01														Rubbing on cliff face - off 09:01
09:03														coming up!
09:04.50														Video refuses to quit
10:10.10														Video off
														Video on - 460m depth + recovery.

## SHRIMP

## CD95/S5

Time	J.Day	Lat deg	Lat min	Long deg	Lon min	Speed	Head - ing	Alt	Wire Out	Water Depth	Comments
0.300	251	29	09.507	43	10.701	0	065		=		Deployed Shrimp (3100m)
03.30									200	3100	x-ponder attached to wire
03.45		29	09.673	43	10.597	0.1	074		1140	3075	Ac.Nav fixes on 2 x-ponders only
04.00		29	09.736	43	10.540	0.1	072		1657	3060	Veering at 40m min
04.18		29	09.871	43	10.596	0.2	074		2309	3060	
04.36.37		29	09.830	43	10.641	0.2	138	110	3009	3065	Video camera on Ship crabing south
04.44								<5	3161	3060	Poss. on bottom. Off at 3158 m w/o
04.49							course made good	<5	3132	3060	Up West wall! ^off at 3133m w/o
04.54		29	09.639	43	10.501	0.1	130	~20m	3122	3060	Going back down W.wall
05.05		29	09.740	43	10.527	0.2	030	<5m	3140	"	Up slope
05.08			09.773		10.485	0.2	090	~15	3125	"	Up E.graben wall - down
05.15		29	09.776	43	10.486	0.1	075	<10	3136	"	Up E.graben wall again
05.24		29	09.830	43	10.451	0.1	075	<0	3108	"	Going up E. wall again (stop at 3078m w/o)
05.30		29	09.898	43	10.443	0.1	005	<10	3081		Edge of E.wall: top
05.35		29	09.922	43	10.446	0.0	005	<5-15	3074		Hauling at 10, edge top of E.wall or on mound in centre of Graben! 300m S of B.S.
05.40		29	09.937	43	10.429	0.1	180	<10	3080		
05.45		29	09.965	43	10.411	0.1	355	<10	3093- 3106		100m south of B.S. (S.Head)
05.47		29		43		0.1		<5	3109		Over wasp nest + down cliff
05.51		29	10.028	43	10.401	0.1	045	<5	3113		30m North of wasp nest
05.55		29	10.030	43	10.426	0.2	265				Going down fault face. (E.inner wall)
06.00		29	10.050	43	10.448	0.2	180	<5	3096		Gps jump North - could be on S.H
06.03		29	10.060	43	10.465	0.0	180	<5	3096		Gps jump South - now South of S.H.
06.04											Gps jump North - on W.graben wall + spire
06.08		29	10.022	43	10.444		155	<5	3069		On S.head

Time	J.Day	Lat deg	Lat min	Long deg	Lon min	Speed	Head - ing	Alt	Wire Out	Water Depth	Comments
06.12		29	09.996	43	10.426	0.3	155	<5	3058		On S.HEAD!
06.16		29	09.957	43	10.440	0.00	180	~10	3071		50m S. of S.Head on inner g.wall
06.21		29	09.991	43	10.466	0.1	350	<5	3080		Heading NW at the Spire
06.26			09.999	43	10.467	0.2	350	5	3077		10m S. of The Spire
06.32									3076		Gps glitches taking us north but depth and w/o not changing Still just south of the SPIRE.
06.35	251	29	10.090	43	10.522	0.00		~	3083		Gps still glitched
06.42	251	29	10.072	43	10.471	0.01	175	<5	3073		Heading back South
06.48	251	29	10.027	43	10.482	0.01	230	<5	3073		75m NW of the Spire
06.5025	251	29	09.995	43	10.458	0.01	160	<10m	3068		On the Spire
06.53	251	29	09.993	43	10.461	0.00	stopped	~10m	3068		Going up to Spire?
06.57	251	29	10.012	43	10.453	0.00	"	5m	3071		20m north east of the Spire
07.00	251	29	10.036	43	10.445	0.1	360	<5m	3068		Down & back up by 3m
07.03		29	10.058	43	10.442	0.1	030	<5m	3066		Starting to go NNE along line
07.14	251	29	10.096	43	10.466	0.4	076		3057		Circulating NW of line
07.15	251	29	10.105	43	10.414	0.2	075	15m	3064		Going over NW Target. Over W.wall
07.16	251	29	10.115	43	10.375	0.1	stopped	<5m	3070		Heading for E.wall
07.25	251	29	10.175	43	10.346	0.00	025	<10m	3088		200m NNE of extinct sites
07.28	251	29	10.180	43	10.359	0.00	355	~15m	3093		Passing NW across E.Wall, inner graben
07.3143	251	29	10.206	43	10.360	0.06	355	~5m	3021		In inner graben floor
07.34	251	29	10.216	43	10.345	0.03	045	~10m	3108		Grazing E.wall, inner graben
07.36	251	29	10.232	43	10.328	0.1	045	~10m	3096		Recovering Shrimp. Video off

- 01 -

## BRIDGET Bottle log 1

Time (z)	J.Day	Lat.Deg	Lat.Min	Lon.Deg	Lon.Min	Speed	Heading	Bridget	WireOut	Water	Comment		
						kts	°N	Depth	m	Depth			
<b>B7</b>													
6.36	230	29°N	19.13	43°W	7.85	1.6	181.9	2969	3659	3248	Bottle no 1 Fired		
6.4	230	29°N	19.04	43°W	7.90	1.8	183.3	2900	3569	3413	Bottle no 2 fired		
6.42	230	29°N	18.99	43°W	7.90	1.8	183.9	2850	3516	3354	Bottle no 3 fired		
6.44	230	29°N	18.95	43°W	7.91	1.6	184.6	2800	3475	3413	Bottle no 4 fired		
6.48	230	29°N	18.87	43°W	7.95	1.6	185.6	2700	3344	3415	Bottle no 5 fired		
6.52	230	29°N	18.79	43°W	7.98	1.5	189.3	2600	3202	3424	Bottle no 6 fired		
22.44	230	28°N	58.68	43°W	14.19	1.7	191.4	2600	3845	3427	Bottle 7 fired		
22.48	230	28°N	58.57	43°W	14.22	1.1	192.4	2700	3962	3474	Bottle 8 fired		
22.52	230	28°N	58.43	43°W	14.26	1.5	191.1	2800	4084	3449	Bottle 9 fired		
22.54	230	28°N	58.38	43°W	14.30	1.6	192.1	2860	4144	3493	Bottle 10 fired		
22.56	230	28°N	58.35	43°W	14.26	1.7	191.9	2900	4187	3510	Bottle 11 fired		
23	230	28°N	58.22	43°W	14.26	1.3	191.9	3000	4310	3521	Bottle 12 fired		
<b>B10</b>													
20.09	231	29°N	25.95	43°W	12.72	0	306.8	3000	2979	3179	Bottle 1 fired		
20.12	231	29°N	25.97	43°W	12.74	0	315.9	2900	2895	3188	Bottle 2 fired		
20.14	231	29°N	25.99	43°W	12.76	0	307.9	2850	2845	3222	Bottle 3 fired		
20.16	231	29°N	26.02	43°W	12.79	0.5	307.3	2800	2790	3229	Bottle 4 fired		
20.2	231	29°N	26.04	43°W	12.85	0.2	295.6	2700	2720	3273	Bottle 5 fired		
20.24	231	29°N	26.07	43°W	12.86	0	286.3	2595	2604	3288	Bottle 6 fired		
20.28	231	29°N	26.06	43°W	12.90	0.6	280	2500	2465	3293	Bottle 7 fired		
20.32	231	29°N	26.08	43°W	12.89	0.8	274.6	2400	2364	3274	Bottle 8 fired		
20.47	231	29°N	26.08	43°W	13.50	1	264.8	2000	1967	3298	Bottle 9 fired		
21.03	231	29°N	26.17	43°W	13.17	0	31.8	1500	1463	3328	Bottle 10 fired		
21.19	231	29°N	26.39	43°W	13.37	0.7	312.6	1000	962	3326	Bottle 11 fired		
<b>B11</b>													
1.24	233	29°N	1.05	43°W	11.85	1.7	28.4	3000	3608	3344.5	Bottle 1 fired		
1.28	233	29°N	1.10	43°W	11.84	1.6	27.9	2900	3512	3312.5	Bottle 2 fired		
1.29	233	29°N	1.15	43°W	11.85	1.7	28.9	2847	3461	3301	Bottle 3 fired		
1.31	233	29°N	1.20	43°W	11.85	1.6	28.6	2800	3415	3320	Bottle 4 fired		

APPENDIX 4, BRIDGET bottle log

## BRIDGET Bottle log 3

6.27	236	29°N	10.03	43°W	7.67	1.8	90.6	2900	3621	2909	Bottle 8 Fired, water depth from Simrad	
6.29	236	29°N	10.02	43°W	7.61	1.7	88.9	2850	3581	2764	Bottle 9 Fired	
6.31	236	29°N	10.01	43°W	7.57	1.7	88.6	2800	3535	2763	Bottle 10 Fired	
6.33	236	29°N	10.03	43°W	7.48	1.7	89.1	2700	3434	2763	Bottle 11 Fired	
6.36	236	29°N	10.06	43°W	7.40	1.7	90.1	2600	3336	2800	Bottle 12 Fired	
<b>B15</b>												
3.19	237	29°N	4.98	43°W	12.08	0.6	94.4	2600	2656	3278	Bottle 1 Fired	
3.22	237	29°N	4.95	43°W	11.97	0.6	82.3	2700	2770	3236	Bottle 2 Fired	
3.25	237	29°N	4.98	43°W	11.91	0.6	91.9	2800	2866	3234	Bottle 3 Fired	
3.27	237	29°N	4.99	43°W	11.91	0.5	98.5	2850	2915	3223	Bottle 4 Fired	
3.29	237	29°N	4.98	43°W	11.89	0.8	97.8	2900	2971	3182	Bottle 5 Fired	
3.33	237	29°N	4.98	43°W	11.79	0.9	94.9	3000	3097	3258	Bottle 6 Fired	
6.18	237							3000	3516		Bottle 7 fired	
6.21	237							2900	3426		Bottle 8 fired	
6.23	237							2850	3367		Bottle 9 fired	
6.24	237							2800	3311		Bottle 10 fired	
6.29	237							2700	3204		Bottle 11 fired	
<b>B16</b>												
2.58	238	29°N	15.01		7.60	0.7	117.6	2600	3027	3240	Bottle 1 fired	
3.01	238	29°N	15.01	43°W	7.52	0.5	16.3	2700	3128	3240	Bottle 2 fired	
3.05	238	29°N	15.02	43°W	7.39	0.5		2800	3226		Bottle 3 fired	
3.06	238	29°N	14.97	43°W	7.34	0.7		2850	3272		Bottle 4 fired	
3.08	238	29°N	14.95	43°W	7.35	0.5		2900	3332		Bottle 5 fired	
3.11	238	29°N	14.99	43°W	7.31	0.6	115.3	3000	3427		Bottle 6 fired	
4.04	238	29°N	14.90	43°W	6.25	1.1	105.9	2600	2965	3052	Bottle 7 fired	
4.06	238	29°N	14.91	43°W	6.17	1.1	104.4	2700	3065	3200	Bottle 8 fired	
4.1	238	29°N	14.92	43°W	6.12	1	103.9	2800	3187	2988	Bottle 9 fired	
4.12	238	29°N	14.92	43°W	6.07	1	102.4	2850	3234	2962	Bottle 10 fired	
1.14	238	29°N	14.91	43°W	6.05	0.7	102.9	2900	3295	2962	Bottle 11 fired	
4.17	238	29°N	14.93	43°W	5.94	0.8	103.1	3000	3390	2863	Bottle 12 fired	
<b>B17</b>												
0.25	239	28°N	60.00	43°W	12.00	1.4	105.1	3000	3876	3488	Wire Up @30m/min Bottle 1 Fired	



## BRIDGET Bottle log 1

Time (z)	J.Day	Lat.Deg	Lat.Min	Lon.Deg	Lon.Min	Speed kts	Heading °N	Bridget Depth	WireOut m	Water Depth	Comment		
<b>B7</b>													
6.36	230	29°N	19.13	43°W	7.85	1.6	181.9	2969	3659	3248	Bottle no 1 Fired		
6.4	230	29°N	19.04	43°W	7.90	1.8	183.3	2900	3569	3413	Bottle no 2 fired		
6.42	230	29°N	18.99	43°W	7.90	1.8	183.9	2850	3516	3354	Bottle no 3 fired		
6.44	230	29°N	18.95	43°W	7.91	1.6	184.6	2800	3475	3413	Bottle no 4 fired		
6.48	230	29°N	18.87	43°W	7.95	1.6	185.6	2700	3344	3415	Bottle no 5 fired		
6.52	230	29°N	18.79	43°W	7.98	1.5	189.3	2600	3202	3424	Bottle no 6 fired		
22.44	230	28°N	58.68	43°W	14.19	1.7	191.4	2600	3845	3427	Bottle 7 fired		
22.48	230	28°N	58.57	43°W	14.22	1.1	192.4	2700	3962	3474	Bottle 8 fired		
22.52	230	28°N	58.43	43°W	14.26	1.5	191.1	2800	4084	3449	Bottle 9 fired		
22.54	230	28°N	58.38	43°W	14.30	1.6	192.1	2860	4144	3493	Bottle 10 fired		
22.56	230	28°N	58.35	43°W	14.26	1.7	191.9	2900	4187	3510	Bottle 11 fired		
23	230	28°N	58.22	43°W	14.26	1.3	191.9	3000	4310	3521	Bottle 12 fired		
<b>B10</b>													
20.09	231	29°N	25.95	43°W	12.72	0	306.8	3000	2979	3179	Bottle 1 fired		
20.12	231	29°N	25.97	43°W	12.74	0	315.9	2900	2895	3188	Bottle 2 fired		
20.14	231	29°N	25.99	43°W	12.76	0	307.9	2850	2845	3222	Bottle 3 fired		
20.16	231	29°N	26.02	43°W	12.79	0.5	307.3	2800	2790	3229	Bottle 4 fired		
20.2	231	29°N	26.04	43°W	12.85	0.2	295.6	2700	2720	3273	Bottle 5 fired		
20.24	231	29°N	26.07	43°W	12.86	0	286.3	2595	2604	3288	Bottle 6 fired		
20.28	231	29°N	26.06	43°W	12.90	0.6	280	2500	2465	3293	Bottle 7 fired		
20.32	231	29°N	26.08	43°W	12.89	0.8	274.6	2400	2364	3274	Bottle 8 fired		
20.47	231	29°N	26.08	43°W	13.50	1	264.8	2000	1967	3298	Bottle 9 fired		
21.03	231	29°N	26.17	43°W	13.17	0	31.8	1500	1463	3328	Bottle 10 fired		
21.19	231	29°N	26.39	43°W	13.37	0.7	312.6	1000	962	3326	Bottle 11 fired		
<b>B11</b>													
1.24	233	29°N	1.05	43°W	11.85	1.7	28.4	3000	3608	3344.5	Bottle 1 fired		
1.28	233	29°N	1.10	43°W	11.84	1.6	27.9	2900	3512	3312.5	Bottle 2 fired		
1.29	233	29°N	1.15	43°W	11.85	1.7	28.9	2847	3461	3301	Bottle 3 fired		
1.31	233	29°N	1.20	43°W	11.85	1.6	28.6	2800	3415	3320	Bottle 4 fired		

## BRIDGET Bottle log 4

0.27	239	28°N	59.94	43°W	11.92	1.3	104.6	2900	3788	3538	Bottle 2 Fired		
0.29	239	28°N	59.96	43°W	11.89	1.1	105.4	2850	3746	3535	Bottle 3 Fired		
0.31	239	28°N	59.97	43°W	11.84	1.3	103.4	2800	3702	3521	Bottle 4 Fired		
0.33	239	28°N	59.98	43°W	11.76	1.5	104.6	2700	3620	3517	Bottle 5 Fired		
0.36	239	28°N	59.99	43°W	11.67	1.6	105.9	2600	3538	3465	Bottle 6 Fired		
1.31	239	29°N	0.01	43°W	10.14	1.1	113.6	3000	4003	3075	Bottle 7 Fired		
1.36	239	28°N	59.97	43°W	10.05	1.2	114.6	2900	3856	3105	Bottle 8 Fired		
1.38	239	28°N	59.98	43°W	10.00	1.2	113.8	2850	3779	3105	Bottle 9 Fired		
1.41	239	28°N	59.97	43°W	9.93	1.1	114.3	2800	3710	3058	Bottle 10 Fired		
1.46	239	28°N	59.96	43°W	9.84	1.3	113.3	2700	3558	3050	Bottle 12 Fired		
1.5	239	28°N	59.91	43°W	9.74	1.2	111.3	2600	3421	2994	Bottle 11 Fired		
<b>B18</b>													
21.25	240	29°N	19.97	43°W	5.24	1.6	113.6	3000	4203	3374	Bottle 1 Fired		
21.29	240	29°N	19.98	43°W	5.15	1.5	113.9	2900	4078	3412	Bottle 2 Fired		
21.31	240	29°N	19.96	43°W	5.11	1.6	114.6	2850	4026	3435	Bottle 3 Fired		
21.33	240	29°N	19.95	43°W	5.03	1.6	114.4	2800	2966	3586	Bottle 4 Fired		
21.37	240	29°N	19.88	43°W	4.92	1.3	113.6	2700	3840	3610	Bottle 5 Fired		
21.41	240	29°N	19.94	43°W	4.81	1.6	112.6	2600	3708	3610	Bottle 6 Fired		
23.08	240	29°N	19.98	43°W	2.43	1.4	114.9	2600	3602	2909	Wire out at 30m/min, Bottle 7 Fired		
23.12	240	29°N	19.99	43°W	2.30	1.3	115.4	2700	3750	3006	Bottle 8 Fired		
23.17	240	29°N	19.97	43°W	2.17	1.9	114.9	2800	3857	2955	Bottle 9 Fired		
23.19	240	29°N	19.96	43°W	2.07	1.7	114.4	2850	3935	2975	Bottle 10 Fired		
23.22	240	29°N	19.96	43°W	2.00	1.5	114.6	2900	4004	2921	Bottle 11 Fired		
23.26	240	29°N	19.95	43°W	1.92	1.5	110.9	3000	4107	2921	Bottle 12 Fired		
<b>B19</b>													
1.02		29°N	7.39		9.71	1.6	126.1	3000	3815	3211	Bottle 1 fired		
1.05		29°N	7.39		9.59	1.6	127.3	2900	3738		Bottle 2 fired		
1.07		29°N	7.38		9.54	1.2	126.6	2840	3670		Bottle 3 fired		
1.08		29°N	7.39		9.49	1.5	125.6	2800	3650		Bottle 4 fired		
1.12		29°N	7.42		9.40	1.5	125.5	2700	3541		Bottle 5 fired		
1.15		29°N	7.40		9.31	1.6	125.4	2600	3467	3180	Bottle 6 fired		
<b>B21</b>													

## BRIDGET Bottle log 5

18.55	243	29°N	12.33	43°W	8.97	0.5	94.1	3000	3829		Bottle 1 fired		
18.58	243	29°N	12.34	43°W	8.89	0.4	95.9	2900	3720		Bottle 2 fired		
19.02	243	29°N	12.33	43°W	8.82	0.4	95.6	2830	3638		Bottle 3 fired		
19.03	243	29°N	12.33	43°W	8.80	0.5	95.9	2800	3603		Bottle 4 fired		
19.07	243	29°N	12.33	43°W	8.72	0.6	91.3	2700	3470		Bottle 5 fired		
19.12	243	29°N	12.34	43°W	8.61	0.4	90.6	2600	3361	3110	Bottle 6 fired		
20.19	243	29°N	12.39	43°W	6.84	0.7	79.2	2600	3335		Bottle 7 fired		
20.23	243	29°N	12.39	43°W	6.73	0.8	76.1	2700	3461		Bottle 8 fired		
20.27	243	29°N	12.37	43°W	6.62	0.6	75.9	2800	3550		Bottle 9 fired		
20.29	243	29°N	12.40	43°W	6.58	0.6	75.1	2850	3605		Bottle 10 fired		
20.32	243	29°N	12.43	43°W	6.57	0.8	75.4	2900	3663		Bottle 11 fired		
20.36	243	29°N	12.43	43°W	6.43	0.7	74.3	3000	3773	2672	Bottle 12 fired		

Time	Net Depth	m.w.o.	Depth Reading	Northing °N/mins	Westing °W/mins	Flow Blips	Remarks
N7							
903							Net shot
910		218	711				
912				43/13.21	28/56.24		
920		443	807				
930		558	1000	43/13.21	28/56.93		
940		940	75				
945				43/13.18	28/57.43		
950		1331	216				
1000	1280	1719	340	43/13.20	28/57.98		
1010	1490	2111	450				
1015				43/13.13	28/58.56		
1030	1960	2800		43/13.00	28/59.04		
1045	2405	3357		43/12.88	28/59.49		
1058	2700	3775	Flat Range				
1108	2620	3780	2725	43/12.65	29/00.30		Net open
1115	2550	3780					
1117							Paying out at 20m/min
1120	2560	3866		43/12.54	29/00.72		
1130	2620	4062	3217				
1138	2700	4208					Stopped paying out
1140	2680	4209	3246	43/12.36	29/01.42		
1150	2650	4211					
1200	2550	4215	3356	43/12.19	29/02.20		
1210	2495						Pay out
1215	2490	4265	3463	43/12.08	29/02.76		
1230	2495	4406	3623	43/11.95	29/03.35		Stop paying out
1240	2450						Pay out
1245	2480	4497	3751	43/11.78	29/03.97		
1300	2600	4792	4025	43/11.58	29/04.58		
1315	2690	5098	4331	43/11.45	29/05.22		
1330	2750	5359	4600	43/11.37	29/05.89		Stop
1342	2750						Pay out at 20m/min

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1348	2810	5486	4712	43/11.17	29/06.70		Stop
1400	2810	5486	4712	43/11.06	29/07.13		
1408	2805	5486					Net 2 open
1423				43/10.85	29/08.08		Paying out
1430	2860	5790		29/08.32	43/10.79	15	
1432							Stop paying out
1445	2875	5820	5060	29/09.08	43/10.64	26	
1500	2880	5820	5057	29/09.69	43/10.50	36	
1515	2880	5820	5057	29/10.34	43/10.33	48	
1530	2870	5822	5065	29/10.99	43/10.22	57	
1545	2820	5822	5093	29/11.74	43/10.05	70	
1600	2800	5822	5104	29/12.36	43/09.88	81	
1605	2800	5822					Paying out
1615	2880	6021	5288	29/13.01	43/09.58		
1619	2930	6075					Stop
1630	2930	6075	5322	29/13.59	43/09.36	103	
1645	2900	6075	5322	29/14.18	43/09.07	112?	Net 3 open
1700	2910	6075	5333	29/14.85	43/08.83	10	
1715	2920	6075	5327	29/15.40	43/08.62	21	
1730	2910	6077	5333	29/16.09	43/08.47	32	
1745	2950	6077	5313	29/16.73	43/08.30	38	
1800	2990	6077		29/17.34	43/08.16	48	Hauling in
1807	2950	5966					Stop
1815	2975	5967	5172	29/17.92	43/07.97	57	
1822	2990						Haul
1830	2950	5809	5004	29/18.51	43/07.78	67	Stop
1840	2990						Haul
1845	2995	5731	4886	29/19.09	43/07.57		Stop, Net 3 Closed

Time	Sounding	Net Depth	m.w.o.	Flat Range	Northing °N/mins	Westing °W/mins	Flow Blips	Remarks
1112					28/58.24	43/13.65		Nets shot
1130	3272		376		28/58.80	43/13.63		Paying out
1145	3351		640		28/59.34	43/13.42		
1200	3274		972		28/59.83	43/13.14		
1215	3304		1371		29/00.48	43/13.05		Increase to 40m/min
1230	3275	1320	1908	1378	29/01.00	43/12.93		
1245	3278	1795	2517	1764	29/01.50	43/12.79		
1300	3087	2385	3062	1789	29/02.00	43/12.57		
1315		2500	3635		29/02.49	43/12.34		
1330	3194	2810	4144		29/02.97	43/12.07		
1339		3000	4436					Stop paying out
1344	3129	2950	4436	3313	29/03.45	43/11.96		Net 1 open
1347		2900						Pay out 20m/min
1400	3161	2980	4695	3628	29/04.08	43/11.82	7	Stop
1416	3237	2880	4699	3713	29/04.62	43/11.78	17	
1430	3189	2835	4699	3747	29/05.05	43/11.68	26	
1445	3158	2815	4699	3762	29/05.62	43/11.61	35	
1455		2880						Paying out at 20m/min
1500	3171	2875	4845	3900	29/06.16	43/11.40		
1503		2900	4885					Stop
1515	3196	2850	4885	3967	29/06.69	43/11.23		
1530	3199	2805	4884	3998	29/07.27	43/11.09		
1533		2795						Pay out
1544	3152	2850	5041	4158	29/07.89	43/10.98		Stop, net 2 open
1600	3137	2800	5043	4194	29/08.46	43/10.94		
1604		2770	5230					Payout
1615		2850	5254	4414	29/09.00	43/10.76		
1620	3129	2920	5352					Stop
1630	3081	2890	5352	4505	29/09.64	43/10.54		
1645	3139	2820	5352	4549	29/10.38	43/10.42		
1700	3101	2800	5352	4561	29/10.86	43/10.28		Very noisy signal
1717	3107	2780	5351	4572	29/11.56	43/10.00		Net towing approx 35 degrees to starboard aft

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1730	3157	2760	5351	4584	29/12.05	43/09.86	
1745	3216	2750	5351	4590	29/12.62	43/09.66	
1800	3182	2730	5351	4590	29/13.24	43/09.53	
1815	3195				29/13.81	43/09.26	No traces, haul
1820		2730	5230				Net 3 open. stop
1830	3273	2720	5230	4572	29/14.43	43/08.97	
1845	3359	2720?	5224	4577	29/15.05	43/08.77	
1900	3341	2720?	5224	4577	29/15.61	43/08.66	
1915	3350	2680	5224	4484	29/16.24	43/08.43	
1930	3378	2620	5224	4319	29/16.93	43/08.19	
1945	3418	2590	5224	4537	29/17.57	43/07.98	
2000	3425	2595	5224	4576	29/18.17	43/07.76	
2015	3379	2620	5224	4519	29/18.75	43/07.59	
2020							Closed net 3
2022							Start hauling

Time	Bottom Dept	Net Depth	m.w.o.	Flat Range	Northing °N/mins	Westing °W/mins	Flow Blips	Remarks
1012	3310				28/58.17	43/13.63		Nets shot
1030	3325		325		28/58.59	43/13.44		Paying out 25m/min
1040			502					Stopped paying out
1042								Start paying out 30m/min
1045	3286		592		28/59.11	43/13.27		
1100	3266		1016		28/59.63	43/12.21		
1115	3159	1100	1446	939	29/00.17	43/13.02		
1130	3237	1420	1872	1220	29/00.64	43/12.87		
1145	3248	1630	2285	1601	29/01.14	43/12.66		
1200	3139	1800	2690	1999	29/01.74	43/12.51		
1215	3157	1990	3065	2331	29/02.27	43/12.34		
1230	3205	2160	3435	2671	29/02.86	43/12.20		
1215	3167	2395	3841		29/03.42	43/12.06		
1250		2440	3927					Stop
1254	3171	2410	3927	3101	29/03.92	43/11.94		Net 1 open
1315	3195	2350	3932	3152	29/04.57	43/11.67		
1320			4131					Paying out 20m/min
1330	3150	2440	4155	3363	29/05.13	43/11.48		Stopped
1345	3215	2440	4155	3363	29/05.68	43/11.35		
1400	3284	2430	4157	3373	29/06.20	43/11.23		
1415	3185	2405	4155	3388	29/06.77	43/11.15		Payout
1420		2485	4256					Stop
1430	3151	2475	4259	3466	29/07.34	43/11.03		
1440		2450						Payout
1445	3093	2495	4355	3569	29/07.91	43/10.92		Stop
1454	3044	2490	4355	3573	29/08.38	43/10.80		Net 2 open , payout
1500		2470						
1515	3125	2610	4763	3984	29/09.15	43/10.68		
1520		2630	4832					Stop
1530	3124	2630	4832	4054	29/09.67	43/10.56		
1545	3101	2600	4834	4075	29/10.23	43/10.49		Payout
1555	3124	2680	5064					Stop



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1600	3084	2670	5064	4303	29/10.90	43/10.28	
1615	3091	2610	5066	4342	29/11.55	43/10.13	
1630	3137	2590	5066	4354	29/12.11	43/09.86	
1645	3200	2590	5066	4354	29/12.71	43/09.64	Payout 20m/min
1654	3233	2700	5261				Stop
1655							Net 3 open
1700	3190	2760	5359	4594	29/13.30	43/09.39	Payout
1703	3203		5395				Stop
1715	3250	2885	5395	4559	29/13.80	43/09.35	
1727		2900					Haul
1730	3259	2870	5335	4497	29/14.34	43/09.13	Stop
1734		2900					Haul
1742		2850	5186				Stop
1745	3305	2860	5188	4328	29/14.89	43/09.05	
1800	3463	2880	5188	4315	29/15.41	43/08.90	
1815	3251	2850	5187	4334	29/15.90	43/08.73	
1830	3379	2870	5187	4321	29/16.47	43/08.45	
1845	3392	2910	5187	4294	29/16.99	43/08.20	
1854	3379	2930	5187	4280	29/17.28	43/08.06	Net 3 closed, haul

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing Degrees	Northing Minutes	Westing Degrees	Westing Minutes	Flow Blips	Remarks
744					29	19.29	43	7.31		Nets shot
800			313		29	19	43	7.31		
815			551		29	18.47	43	7.54		
830			1063		29	17.8	43	7.92		
845	3356		1430		29	17.4	43	8.11		
900	3326	1190	1869	1441	29	16.87	43	8.37		
915		1650	2438		29	16.44	43	8.49		
930	3405	2140	2981	2075	29	16.03	43	8.59		
943	3360	2560	3482							Stop
945	3307	2560	3482	2360	29	15.59	43	8.77		Net 1 open
1000	3357	2580	3482	2338	29	15.24	43	8.84		
1008		2600								Haul
1015	3332	2520	3347	2203	29	14.94	43	8.9		
1023	3285	2390	3174							Stop
1030	3274	2350	3176	2130	29	14.55	43	9.05		
1045	3207	2335	3175	2151	29	14.16	43	9.14		
1100	3257	2390	3173	2087	29	13.81	43	9.24		
1115	3206	2410	3170	2059	29	13.51	43	9.37		
1130	3215	2440	3168	2021	29	13.17	43	9.48		
1145	3221	2440	3167	2019	29	12.81	43	9.6		
1200	3192	2430	3166	2029	29	12.45	43	9.73		
1215	3139	2380	3165	2086	29	12.06	43	9.84		
1230	3113	2350	3165	2120	29	11.7	43	9.97		
1245	3104	2270	3165	2206	29	11.2	43	10.11		Pay out
1256	3100	2420	3383							Stop
1300	3120	2400	3383	2384	29	10.8	43	10.19		
1315	3127	2380	3381	2401	29	10.35	43	10.34		Net 2 open
1330	3077	2320	3381	2459	29	9.95	43	10.54		
1345	3111	2320	3380	2458	29	9.51	43	10.71		Payout
1351		2380	3460							Stop
1400	3094	2380	3462	2514	29	9.07	43	10.79		
1415	3030	2360	3464	2536	29	8.62	43	10.86		

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1420										Payout
1428			3620							Stop
1430	3103	2460	3620	2656	29	8.16	43	10.94		
1445	3117	2460	3621	2657	29	7.73	43	11.02		
1500	3195	2485	3621	2634	29	7.29	43	11.1		Increase speed to 2.25knots
1515	3185	2480	3621	2638	29	6.81	43	11.2		
1530		2490	3621	2629	29	6.38	43	11.26		
1535	3193	2490	3621	2629	29	6.15	43	11.32		Net 3 open, payout
1546	3235	2590	3789	2766	29	5.85	43	11.41		Stop
1600	3111	2590	3789	2766	29	5.48	43	11.5		
1615	3199	2580	3789	2775	29	5.02	43	11.6		
1630		2550	3787	2803	29	4.52	43	11.76		Pay out
1638		2630	3950							Stop
1645		2630	3950	2947	29	4.02	43	11.92		
1700		2600	3950	2974	29	3.49	43	12.11		
1715	3269	2500	3948	3000	29	3.04	43	12.27		
1730	3180	2530	3948	3031	29	2.53	43	12.44		
1745	3034	2510	3947	3046	29	2.05	43	12.56		
1755			3947							Paying out at 20m/min
1800	3195	2530	4052	3165	29	1.49	43	12.69		Stop
1805		2530	4052	3165	29	1.3	43	12.82		Net 3 closed

APPENDIX 4, BRIDGETT bottle log

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N	mins	Westing °W	mins	Flow Blips	Remarks
1252	3342		0		29°N	18.09	43°W	7.5		Net shot
1330	3293		661		29°N	17.49	43°W	7.51		
1345	3367		1154		29°N	17.18	43°W	7.68		
1400	3340	1260	1572		29°N	16.94	43°W	7.76		
1415	3314	1770	2027	988	29°N	16.6	43°W	7.84		
1430	3226	2140	2472	1237	29°N	16.26	43°W	7.99		
1445	3277	2490	2913	1591	29°N	15.93	43°W	8.14		
1500	3267	2840	3351	1779	29°N	15.55	43°W	8.24		
1507	3309	3000	3541	1881	29°N	15.37	43°W	8.36		Stop net 1 open
1515	3284	2975	3547		29°N	15.2	43°W	8.4		
1526		2905								Pay out
1530	3316	2935	3601	2086	29°N	14.93	43°W	8.69		
1536		2995	3727							Stop
1545	3259	2950	3730	2283	29°N	14.5	43°W	8.91		
1549		2905								Pay out
1555		2975	3850							Stop
1600	3242	2950	3850	2474	29°N	14.05	43°W	9.02		
1608		2890	3850							Pay out
1615	3216	2980	3993	2658	29°N	13.55	43°W	9.13		Stop, Speed 2.5 knots
1630	3233	2940	3993	2702	29°N	13.15	43°W	9.27		
1640		2910								Pay out
1650	3235	3000	4219	2966	29°N	12.58	43°W	9.55		stop
1702	3196	2960	4219	3006	29°N	12.14	43°W	9.74		
1715	3133	2950	4223	3022	29°N	11.79	43°W	9.96		
1730	3110	2925	4224	3047	29°N	11.37	43°W	10.18		
1745	3110	2905	4224	3066	29°N	10.96	43°W	10.41		
1800	3143	2970	4224	3004	29°N	10.55	43°W	10.57		Net 2 open
1810		3000								Haul
1815	3118	2975	4170	2922	29°N	10.16	43°W	10.62		Stop
1826		3000								Haul
1830	3133	2950	4100	2847	29°N	9.7	43°W	10.63		
1833		2925	4045							Stop

Biolog\*CD95-33-N11 2

1845	3098	2970	4045	2746	29°N	9.34	43°W	10.69	
1900	3072	2990	4045	2724	29°N	8.93	43°W	10.72	
1907		3000	4045						Haul
1911	2989	2950	3974						Stop
1915	3106	2950	3974	2663	29°N	8.51	43°W	10.75	
1930	3068	2960	3974	2652	29°N	8.1	43°W	10.84	
1945	3164	2950	3974	2663	29°N	7.66	43°W	10.92	
2000	3156	2930	3974	2685	29°N	7.23	43°W	11	
2015	3199	2860	3972	2756	29°N	6.75	43°W	11.13	
2023									Paying out
2034	3145	2945	4165	2945	29°N	6.13	43°W	11.29	Stopped
2038					29°N	6.01	43°W	11.32	Net 2 closed
2045	3236	2940	4167	2953	29°N	5.87	43°W	11.39	
2100	3117	2910	4167	2983	29°N	5.43	43°W	11.51	
2112		2880							Payout
2115	3220	2905	4205	3040	29°N	5.01	43°W	11.63	
2120		2970	4305						Stop
2130	3203	2945	4305	3140	29°N	4.49	43°W	11.77	
2142		2890							Pay out
2145	3157	2990	4330	3215	29°N	4.09	43°W	11.83	
2146		2950	4370						Stop
2148		2975							Haul
2200		2895	4330	3220	29°N	3.48	43°W	11.96	Net 3 closed

Biolog\*CD95-35-N12 1

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N	mins	Westing °W	mins	Flow Blips	Remarks
542										Net shot
557			242		29°N	15.53	43°W	8.18		
630			1093		29°N	14.56	43°W	9.08		
645	3191	1150	1544		29°N	14.14	43°W	9.18		
700	3214	1460	2000	1367	29°N	13.55	43°W	9.31		
716	3226	1900	2504	1631	29°N	13.1	43°W	9.48		
730	3204	2020	2845	2003	29°N	12.69	43°W	9.62		Stop, Net 1 open
731		2000								Pay out
739	3193	2090	3015							Stop
745		2080	3015	2183	29°N	12.22	43°W	9.81		
755		2060								Pay out
800	3115	2100	3110	2294	29°N	11.76	43°W	10.01		
811			3325							Stop
815	3106	2200	3325	2493	29°N	11.26	43°W	10.14		
830	3115	2170	3324	2518	29°N	10.75	43°W	10.32		
845	3111	2155	3326	2533	29°N	10.28	43°W	10.49		
849										Paying out
855		2200	3439							Stop
900	3121	2200	3442	2647	29°N	9.78	43°W	10.57		
902										Net 2 open
915	3139	2230	3441	2622	29°N	9.27	43°W	10.68		
930	3079	2230	3441	2579	29°N	8.82	43°W	10.83		Haul
945	3139	2110	3188	2390	29°N	8.42	43°W	10.89		
953	3095	2020	3040							Stop
1000	3146	1995	3040	2294	29°N	7.92	43°W	10.97		
1005		1990								Payout
1015	3185	2100	3260	2494	29°N	7.43	43°W	11.09		Stop
1030	3209	2105	3260	2489	29°N	6.98	43°W	11.2		
1045	3167	2105	3260		29°N	6.5	43°W	11.31		Payout
1055		2187	3355							Stop
1102	3194	2175	3357	2537	29°N	5.95	43°W	11.45		Net 3 open
1115	3190	2190	3358	2546	29°N	5.55	43°W	11.6		

Biolog\*CD95-35-N12 2

1130	3161	2200	3360	2540	29°N	5.15	43°W	11.71	
1145	3173	2190	3361	2550	29°N	4.69	43°W	11.75	
1200	3199	2220	3363	2526	29°N	4.28	43°W	11.88	
1204		2220							Payout
1208	3176	2280	3456						Stop
1215	3168	2300	3456	2580	29°N	3.79	43°W	12	Haul
1231	3237	2040	3147	2396	29°N	3.3	43°W	12.17	Stop
1245	3193	2030	3147	2405	29°N	2.9	43°W	12.24	
1302	3126	2030	3147	2405	29°N	2.36	43°W	12.33	
1315	3125	2010	3147	2421	29°N	1.86	43°W	12.47	Net 3 closed

Time	Bottom	Net Depth	M.W.O.	Flat Range	Northing	Westing	Flow	Remarks		
	Depth				Degrees	mins	Degrees	mins	Blips	
730					29°N	16.68	43°W	7.83		Net shot
800			479		29°N	15.84	43°W	8.15		
815			760		29°N	15.40	43°W	8.45		
830			1071		29°N	14.98	43°W	8.69		
845	3312	1120	1595	1136	29°N	14.48	43°W	8.89		
900		1530	2317	1740	29°N	13.98	43°W	9.04		
915	3211	1940	2620	1761	29°N	13.59	43°W	9.19		
930	3239	2250	3100	2132	29°N	13.17	43°W	9.42		
945	3222	2650	3589	2420	29°N	12.72	43°W	9.60		
955	3202	2950	3891	2537	29°N	12.50	43°W	9.73		Stop, Net 1 open
1004		2940								Payout
1011	3174	3050	4017							Stop
1016	3129	3025	4017	2643	29°N	12.01	43°W	9.98		
1030	3093	3010	4017	2660	29°N	11.64	43°W	10.03		
1045	3116	3050	4017		29°N	11.29	43°W	10.17		
1055		3070								
1100	3088	3050	4017	2614	29°N	10.97	43°W	10.25		
1115	3142	3025	4017	2643	29°N	10.53	43°W	10.38		
1130	3090	2995	4016	2675	29°N	10.13	43°W	10.45		
1145	3115	2930	4015	2745	29°N	9.66	43°W	10.48		
1155	3075	2900	4015	2777	29°N	9.42	43°W	10.54		Net 2 open
1210		2890								Pay out
1215	3055	2910	4075	2853	29°N	8.84	43°W	10.65		
1219		2950	4125							Stop
1225		2950								Payout
1230	3073	2955	4165	2935	29°N	8.44	43°W	10.78		
1235		2975	4200							Stop
1245	3143	2990	4200	2950	29°N	8.04	43°W	10.93		
1255		2955								Payout
1300	3057	3000	4275	3046	29°N	7.60	43°W	10.98		Stop
1310		2990								Payout
1319	3212	3050	4375	3137	29°N	7.05	43°W	11.02		Stop



Biolog\*CD95-38-N13 2

1327										
1329			4356							Stop, echo sounder out
1330	3277	3020	4356	3139	29°N	6.71	43°W	11.05		
1342		2990								Payout
1348	3238	3030	4430							Stop,
1355	3227	3030	4431	3233	29°N	5.95	43°W	11.17		Net 3 open
1407		3060								Haul
1412		3035	4385							Stop
1415	3259	3030	4385	3170	29°N	5.50	43°W	11.34		
1430	3161	3030	4385	3170	29°N	5.09	43°W	11.48		Haul
1433		3000	4355							Stop
1445	3149	3025	4355	3133	29°N	4.66	43°W	11.63		
1450		3050								Haul
1500	3220	3025	4270	3014	29°N	4.30	43°W	11.73		
1505		3000	4218							Stop
1515		3025	4218	2940	29°N	3.93	43°W	11.83		Haul
1527		2990	4081							Stop
1530	3134	2980	4081	2788	29°N	3.55	43°W	11.92		
1537		2995								Haul
1544	3193	2980	4010	2683	29°N	3.24	43°W	11.95		Stop
1555		2965	4010	2700	29°N	2.89	43°W	12.03		Net 3 closed

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N	mins	Westing °W	mins	Remarks
0232					29°N	00.37	43°W	11.14	Net shot
0305					29°N	01.16	43°W	11.30	
0333		1260	1491		29°N	01.98	43°W	11.17	
0347		1600	1977		29°N	02.27	43°W	11.06	
0400	3468	2030	2435		29°N	02.65	43°W	10.95	
0415	3421	2480	2960		29°N	03.12	43°W	10.85	
0430	3344	2925	3475	1876	29°N	03.43	43°W	10.78	Stop, Net 1 open
0436		2900							Payout
0445	3412	2905	3567	2042	29°N	03.80	43°W	10.69	
0449		2925	3610	2116					Stop
0455		2900							Payout
0500	3416	2925	3675	2225	29°N	04.20	43°W	10.63	
0504		2950	3720	2266					Stop
0511		2900							Payout
0515	3432	2910	3783	2417	29°N	04.64	43°W	10.51	
0521		2950	3865						
0530	3326	2910	3865	2544	29°N	05.03	43°W	10.38	
0533		2900							Payout
0540		2970	3968						Stop
0545	3319	2980	3968	2620	29°N	05.42	43°W	10.26	
0600	3326	2935	3969	2670	29°N	05.90	43°W	10.21	
0615	3310	2910	3969	2698	29°N	06.28	43°W	10.22	Payout
0623	3243	2980	4103						Stop
0645	3212	2920	4105	2885	29°N	07.11	43°W	10.21	
0651									Paying out
0700	3211	2940	4259	3081	29°N	07.66	43°W	10.12	Stop, Net 2 open
0715	3237	2880	4259		29°N	08.04	43°W	10.12	Paying out
0727	3234	2950	4430	3305	29°N	08.48	43°W	10.02	Stop
0745	3265	2925	4430	3327	29°N	08.99	43°W	09.89	
0751		2900							Payout
0800	3219	2980	4581	3479	29°N	09.41	43°W	09.79	Stop
0815	3233	2975		3484	29°N	09.90	43°W	09.70	

Biolog\*CD95-49-N14 2

0830	3179	2920	4583	3532	29°N	10.37	43°W	09.59	
0845	3232	2910	4583	3541	29°N	10.82	43°W	09.51	
0900	3256	2910	4583	3541	29°N	11.25	43°W	09.43	
0915	3126	2940	4583	3516	29°N	11.65	43°W	09.22	
0930	3119	2955	4583	3503	29°N	12.08	43°W	09.01	
0933		2965							Net 3 open
0940		3000							Haul
0943		2975	4542						
0945	3263	2975	4543	3433	29°N	12.49	43°W	08.81	
1000	3241	2990	4544	3420	29°N	12.85	43°W	08.61	
1015	3194	2990	4544	3420	29°N	13.29	43°W	08.40	
1021		2910							Payout
1031	3174	2950	4675	3627	29°N	13.81	43°W	08.10	Stop
1045	3256	2910	4675	3659	29°N	14.18	43°W	07.91	
1050		2910							Payout
1059	3285	2970	4841	3823	29°N	14.68	43°W	07.67	Stop
1115	3243	2910	4845	3874	29°N	15.22	43°W	07.39	
1130	3249	2880	4845		29°N	15.69	43°W	07.15	
1133	3283	2870	4845	3903	29°N	15.80	43°W	07.09	Net closed
1135									Hauling in

Biolog\*CD95-52-N15 1

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N mins	Westing °W mins	Remarks
0842							Net shot
0847					29°N 00.15	43°W 11.67	
0915			550		29°N 00.86	43°W 11.31	
0930			1035		29°N 01.37	43°W 11.24	
0945			1438		29°N 01.81	43°W 11.20	
1000	3417	1450	1824	1107	29°N 02.21	43°W 11.09	
1015	3468	1850	2297	1362	29°N 02.65	43°W 10.96	
1030	3424	2050	2657	1690	29°N 03.03	43°W 10.82	
1045	3358	2360	3086	1988	29°N 03.47	43°W 10.75	
1103	3304	2580	3504	2371	29°N 04.04	43°W 10.81	
1118	3415	2780	3900	2735	29°N 04.52	43°W 10.75	
1130	3388	2980	4219	2987	29°N 04.90	43°W 10.64	
1133	3319	3000	4293				Stop
1134		2950	4295	3122	29°N 05.05	43°W 10.64	Net 1 open
1142		2895					Pay out
1145	3217	2900	4339	3228	29°N 05.45	43°W 10.64	
1156		2925	4548				Stop
1200	3327	2915	4551	3495	29°N 05.92	43°W 10.50	
1203		2900					Payout
1212		2935	4740				
1215	3303	2920	4740	3734	29°N 06.44	43°W 10.33	Stop
1220		2890					Payout
1230	3224	2900	4870	3912	29°N 07.01	43°W 10.16	
1232		2915	4890				Stop
1237		2900					Payout
1245	3234	2930	5025	4082	29°N 07.56	43°W 10.03	Stop
1251		2900					Payout
1300	3247	2930	5193	4287	29°N 08.17	43°W 09.98	Stop
1307		2890					Payout
1316	3252	2970	5364	4467	29°N 08.81	43°W 09.90	Stop
1330	3233	2940	5364	4487	29°N 09.46	43°W 09.79	
1335		2930	5364	4493	29°N 09.53	43°W 09.77	Net 2 open

Biolog\*CD95-52-N15 2

1345	3223	2910	5364	4506	29°N	09.90	43°W	09.71	Payout
1355	3227	2990	5543						Stop
1400	3167	3000	5543	4661	29°N	10.41	43°W	09.63	
1407									Hauling
1411		2990	5477						Stop
1415	3232	2980	5478	4597	29°N	10.97	43°W	09.52	
1430	3240	2940	5478	4622	29°N	11.55	43°W	09.29	
1445	3217	2990	5477	4589	29°N	12.01	43°W	09.03	
1451					29°N		43°W		Hauling
1457			5372		29°N		43°W		Stop
1500	3228	2975	5374	4475	29°N	12.51	43°W	08.75	
1515	3223	2945	5375	4495	29°N	13.07	43°W	08.50	Net 3 open
1530	3163	2905	5375	4521	29°N	13.64	43°W	08.20	
1539		2900			29°N		43°W		Payout
1542		2910	5405		29°N		43°W		stop
1545	3270	2910	5405	4555	29°N	14.15	43°W	07.95	
1600	3307	2900	5405	4561	29°N	14.68	43°W	07.62	
1604		2880			29°N		43°W		Payout
1617	3212	2985	5631	4775	29°N	15.37	43°W	07.27	Stop
1630	3287	2990	5631	4772	29°N	15.86	43°W	07.05	
1642		3015			29°N		43°W		Haul
1646	3343	2980	5540	4670	29°N	16.43	43°W	06.84	Stop
1700	3338	3000	5540	4657	29°N	16.85	43°W	06.60	
1707					29°N		43°W		Haul
1710	3334	3000	5479		29°N		43°W		Stop
1715	3289	3025	5479	4568	29°N	17.49	43°W	06.14	Net 3 closed
1717									Start haul

Biolog\*CD95-56-N16 1

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N	mins	Westing °W	mins	Remarks
1830					28°N	57.85	43°W	19.60	Net shot
1900			574		28°N	58.84	43°W	13.19	
1918	3299		1033		28°N	59.59	43°W	12.97	
1930			1405		29°N	00.12	43°W	12.86	
1945	3161	1120	1815	1428	29°N	00.78	43°W	12.69	
2000	3220	1360	2217	1751	29°N	01.38	43°W	12.52	
2015	3110	1600	2652	2115	29°N	02.04	43°W	12.40	
2030	3147	1890	3064	2412	29°N	02.70	43°W	12.24	
2045	3259	2080	3437	2736	29°N	03.25	43°W	12.18	
2100	3189	2320	3809	3021	29°N	03.80	43°W	11.95	
2115	3231	2490	4184	3362	29°N	04.41	43°W	11.75	
2130	3223	2670	4540	3672	29°N	05.03	43°W	11.58	
2145	3207	2875	4857	3915	29°N	05.62	43°W	11.48	Stop-no signals clear Net 1 open
2151									Haul
2154		2840	4835						Stop
2200	3166	2770	4835	3963	29°N	06.15	43°W	11.31	
2215	3190	2710	4835	4004	29°N	06.73	43°W	11.15	Payout
2220		2750	4900	3963					Stop
2230	3106	2730	4900	4069	29°N	07.30	43°W	10.98	
2233									Payout
2239		2780	5000						Stop
2245	3196	2775	5000	4159	29°N	07.91	43°W	10.79	
2300	3097	2775	5000	4159	29°N	08.52	43°W	10.61	Net 2 open
2315	3101	2750	5006	4183	29°N	09.12	43°W	10.42	
2330	3100	2770	5006	4170	29°N	09.69	43°W	10.32	
2345	3159	2740	5006		29°N	10.30	43°W	10.20	Depth trace lost in noise
0000	3139	2730	5006	4196	29°N	10.77	43°W	10.12	
0008		2750							Payout
0019	3232	2810	5107	4264	29°N	11.59	43°W	09.78	
0030	3237	2830	5109	4254	29°N	11.93	43°W	09.61	
0045	3211	2840	5109	4247	29°N	12.42	43°W	09.39	

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0101	3237	2880	5109	4220	29°N	13.01	43°W	09.27	Net 3 open
0108									Payout
0111	3230	2950	5190						
0115	3202	2950	5190	4270	29°N	13.51	43°W	09.08	
0130	3279	2940	5190	4277	29°N	14.10	43°W	08.87	
0145	3308	2950	5190	4270	29°N	14.65	43°W	08.70	Payout
0150	3308	2990	5283						Stop
0200	3321	2990	5283	4355	29°N	15.14	43°W	08.49	
0204		3000							Haul
0206		2975	5247						Stop
0215	3334	2985	5247	4315	29°N	15.72	43°W	08.39	
0230	3298	2950	5245	4339	29°N	16.24	43°W	08.19	
0245	3370	2955	5244	4332	29°N	16.77	43°W	08.09	
0300	3389	2970	5243	4322	29°N	17.43	43°W	07.94	Net 3 closed

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Time	Bottom Depth	Net Depth	M.W.O.	Flat Range mins	Northing °N mins	Westing °W mins	Remarks
1338					29°N 20.43	42°W 55.80	Net shot
1400					29°N 20.94	42°W 55.64	
1430	3956		1108		29°N 21.83	42°W 55.39	
1445	3958	1160	1521	982	29°N 22.35	42°W 55.21	
1500	3922	1390	1932	1342	29°N 22.85	42°W 55.09	
1515	3930	1650	2300	1602	29°N 23.35	42°W 54.91	
1530	3798	1940	2741	1936	29°N 23.86	42°W 54.79	
1545	3762	2090	3168	2381	29°N 24.42	42°W 54.65	
1600	3846	2420	3678	2044	29°N 24.91	42°W 54.50	
1615	3763	2630	4145	3204	29°N 25.47	42°W 54.28	
1633	3779	2920	4685	3664	29°N 26.12	42°W 54.02	Net 1 open, stop
1636		2875					Payout
1645	3766	2900	4810	3837	29°N 26.55	42°W 53.88	
1650		2935	4893		29°N	42°W	
1700	3721	2900	4893	3865	29°N 27.03	42°W 53.63	Payout
1710		2945	5015				Stop
1715	3713	2935	5019	4071	29°N 27.60	42°W 53.41	
1730	3711	2890	5019	4103	29°N 28.09	42°W 53.21	Payout
1741	3673	2980	5159				Stop
1745	3722	2980	5159	4211	29°N 28.66	42°W 53.04	
1800	3740	2990	5159	4204	29°N 29.22	42°W 52.88	
1815	3568	3000	5158	4196	29°N 29.78	42°W 52.70	
1833	3602	2990	5158	4203	29°N 30.46	42°W 52.50	Net 2 open
1845	3626	2980	5158	4210	29°N 30.89	42°W 52.37	
1900	3600	2960	5157	4223	29°N 31.48	42°W 52.19	
1915	3589	2945	5156	4233	29°N 32.08	42°W 52.02	
1930	3465	2930	5156	4244	29°N 32.53	42°W 51.85	
1945	3513	2945	5156	4233	29°N 33.10	42°W 51.65	
2000	3355	2965	5156	4219	29°N 33.60	42°W 51.46	
2015	3277	3000	5155	4195	29°N 34.14	42°W 51.36	
2020		3025					Haul in
2033	3197	3000	5028	4035	29°N 34.77	42°W 51.28	Net 3 open



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2045	3205	2970	4908	3907	29°N	35.17	42°W	51.22	Stop
2100	3265	2955	4908	3919	29°N	35.73	42°W	51.08	
2115	3251	2980	4908	3900	29°N	36.22	42°W	50.92	
2130	3240	2980	4909	3901	29°N	36.75	42°W	50.73	
2145	3216	2990	4909	3893	29°N	37.25	42°W	50.56	
2200	3249	3030	4910	3867	29°N	37.73	42°W	50.36	Haul
2210		2955	4780		29°N		42°W		Stop
2215	3306	2950	4780	3761	29°N	38.22	42°W	50.17	
2229		3000			29°N		42°W		Haul
2233	3263	2970	4728	3679	29°N	38.83	42°W	50.03	Net 3 closed

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Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N	mins	Westing °W	mins	Remarks
1347					29°N	17.10	43°W	06.80	Net shot
1415			846		29°N	16.68	43°W	07.49	
1430		1160	1298	582	29°N	16.30	43°W	07.71	
1445		1480	1670	774	29°N	15.99	43°W	07.96	
1500		1920	2160	990	29°N	15.65	43°W	08.24	
1515	3262	2270	2643	1354	29°N	15.21	43°W	08.35	
1530	3303	2630	3115	1669	29°N	14.82	43°W	08.57	
1545	3279	2850	3422	1894	29°N	14.44	43°W	08.75	
1554	3275	2950	3550	1975	29°N	14.14	43°W	08.86	Stop Net 1 open
1600		2900							Payout
1607		2950	3668						Stop
1615	3275	2880	3668	2272	29°N	13.58	43°W	09.14	
1620									Payout
1630	3231	2920	3855	2517	29°N	13.07	43°W	09.38	
1637	3216	2950	3932						Stop
1645	3204	2905	3932	2650	29°N	12.68	43°W	09.56	
1653		2860							Payout
1700	3163	2900	4076	2864	29°N	12.15	43°W	09.84	
1711	3115	2995	4281						Stop
1715	3104	2980	4281	3074	29°N	11.69	43°W	10.08	
1730	3108	2940	4281	3112	29°N	11.22	43°W	10.27	
1745	3090	2960	4281	3093	29°N	10.74	43°W	10.47	
1800	3097	2980		3074	29°N	10.33	43°W	10.56	Net 2 open
1815	3111	3000	4281	3054	29°N	09.86	43°W	10.57	Haul
1819		2975	4220						Stop
1830	3080	2985	4220	2983	29°N	09.40	43°W	10.65	
1841		3000							Haul
1845	3088	2995	4189	2929	29°N	09.01	43°W	10.74	
1851		2965	4131						Stop
1900	3109	2970	4131	2871	29°N	08.56	43°W	10.81	
1915	3151	2960	4131	2882	29°N	08.08	43°W	10.90	
1930	3155	2975	4130	2865	29°N	07.64	43°W	11.00	

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1947	3169	2980	4130	2859	29°N	07.09	43°W	11.06	
2000	3187	2985	4130	2854	29°N	06.22	43°W	11.18	Net 3 open
2015	3174	2980		2859	29°N	06.32	43°W	11.35	
2030	3199	2910		2880	29°N	05.82	43°W	11.47	
2042	3129	2890							Payout
2050	3212	2970	4273	3072	29°N	05.16	43°W	11.58	Stop
2100	3151	2955	4273	3087	29°N	04.87	43°W	11.65	
2115	3249	2955	4273	3087	29°N	04.38	43°W	11.78	
2130	3192	2925	4273	3115	29°N	03.87	43°W	11.93	
2134		2900							Payout
2138		2925	4334						Stop
2145	3210	2900	4334	3221	29°N	03.41	43°W	12.11	
2200	3229	2850	4334	3265	29°N	02.85	43°W	12.32	Net 3 closed

Biolog\*CD95-69-N19 1

Time	Bottom Depth	Net Depth	M.W.O.	Flat Range	Northing °N	mins	Westing °W	mins	Remarks
1245	2681				29°N	50.06	42°W	51.94	
1300	2767				29°N	50.63	42°W	52.15	Net shot
1315	2898				29°N	51.04	42°W	52.27	
1330	3032		1298		29°N	51.5	42°W	52.37	
1345	3085	1370	1828		29°N	51.97	42°W	52.56	
1400	3091	1650	2282	1576	29°N	52.41	42°W	52.7	
1415	3106	2050	2827	1947	29°N	53.01	42°W	52.8	
1430	3106	2440	3285	2199	29°N	53.25	42°W	52.98	
1445	3112	2810	3783	2533	29°N	53.71	42°W	53.08	
1453	3086	3010	4055	2717	29°N	54.2	42°W	53.12	Net 1 open
1507	3106								Payout
1515	3177	2975	4186	2945	29°N	54.6	42°W	53.24	Stop
1530	3214	2900	4186	3019	29°N	55.03	42°W	53.36	
1534									Payout
1542	3244	2960	4336						Stop
1545	3217	2975	4336	3154	29°N	55.51	42°W	53.78	
1600	3279	2920	4336	3205	29°N	55.96	42°W	53.54	
1615	3190	2900	4336	3223	29°N	56.45	42°W	53.68	Payout
1617		2925	4383						Stop
1625		2900							Payout
1633	3166	2920	4467	3380	29°N	57.03	42°W	53.87	\
1638		2925	4522						Stop
1645	3201	2900	4522	3470	29°N	57.43	42°W	53.96	Payout
1651		2920	4578						Stop
1653	3218	2915	4578	3530	29°N	57.72	42°W	54	Net 2 open
1700		2900							Payout
1710		2945	4729						Stop
1715	3299	2930	4729	3712	29°N	58.52	42°W	54.23	
1727		2900							Payout
1730	3283	2940	4787	3778	29°N	59	42°W	54.35	
1736	3217	3000	4906						Stop
1744		3020	4906						Haul

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1748	3244	2995	4819	3775	29°N	59.58	42°W	54.5	Stop
1800	3210	3000	4819	3771	29°N	59.94	42°W	54.53	
1815	3200	2975	4819	3791	30°N	0.49	42°W	54.62	
1830	3306	2930	4819	3826	30°N	1.03	42°W	54.72	
1845	3399	2910	4819	3841	30°N	1.53	42°W	54.75	
1847		2890							Payout
1853	3484	2890	4948	4016	30°N	2	42°W	54.81	Net 3 open
1905		2860	5094						Stop
1915	3331	2915	5094		30°N	2.82	42°W	55.02	
1930	3270	2880	5165	4288	30°N	3.38	42°W	55.18	
1937									Payout
1943	3152	2950	5363						Stop
1945		2930	5362	4491	30°N	3.98	42°W	55.36	
2000	3104	2900	5362	4510	30°N	4.53	42°W	55.52	
2015	3063	2880	5362	4523	30°N	5.13	42°W	55.67	Net not paid out to reduce risk
2030	3069	2880	5362	4523	30°N	5.71	42°W	55.85	
2045	3062	2875	5362	4526	30°N	6.35	42°W	55.99	
2053	3136	2870	5362	4529	30°N	6.67	42°W	56.03	Net 3 closed

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