JB08:

RRS John Biscoe
South Georgia and Bransfield Strait
Marine Biology (OBP8)
December 1987 - March 1988

MARINE LIFE SCIENCES DIVISION - Cruise 0BP08 1987-88

BRITISH ANTARCTIC SURVEY

NATURAL ENVIRONMENT RESEARCH COUNCIL

Julian Priddle

May 1988

0BP08 cruise report
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Nick Owens - Plymouth Marine Laboratory
Moragh Stirling - IOS Deacon Laboratory

Marine Life Sciences Division - 1987-88 cruise 0BP08

Julian Priddle

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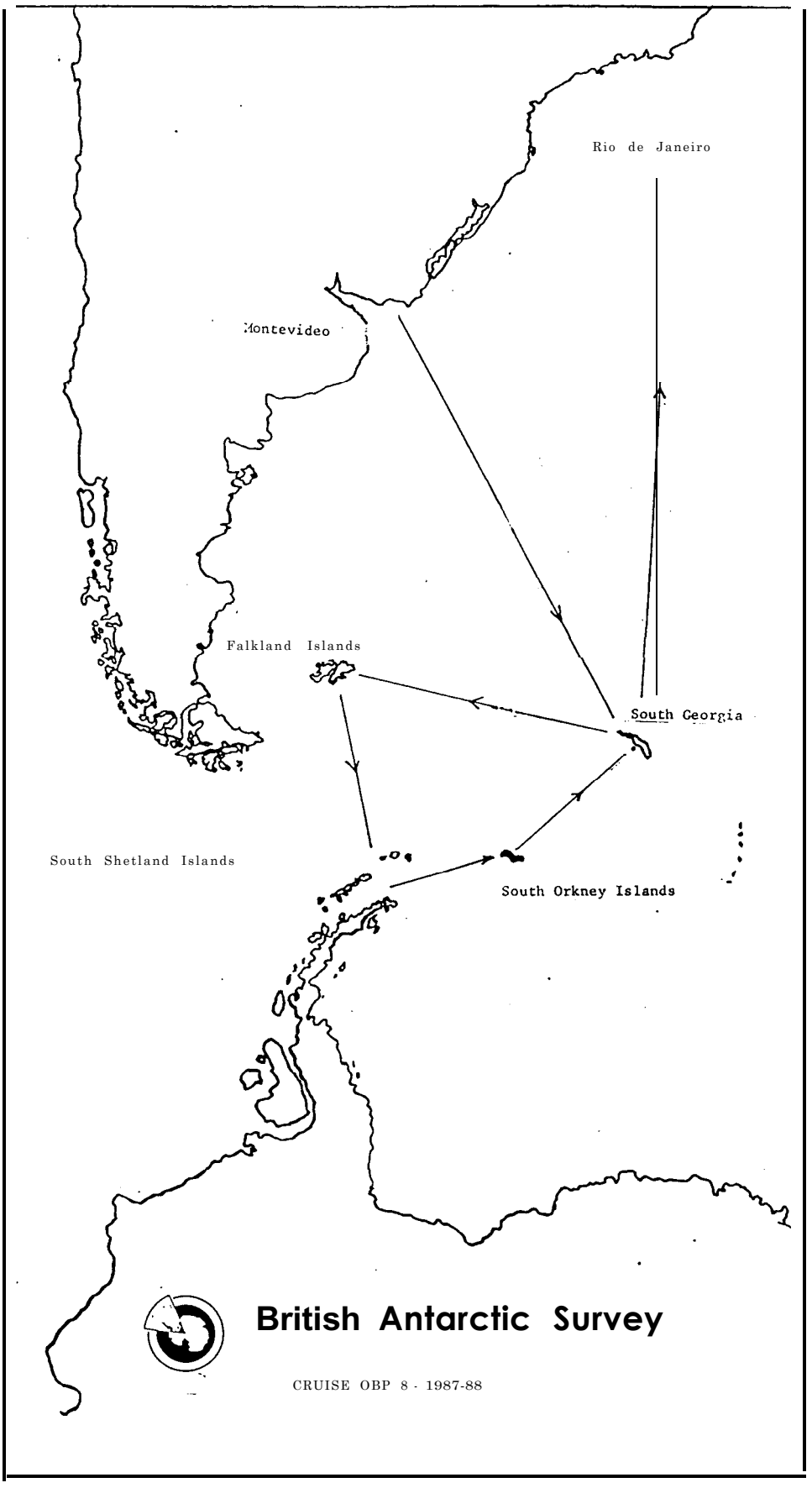

FIGURE: 1. Cruise track for MLSD cruise 0BP08, 1987-88

INTRODUCTION

The Marine Life Sciences Division cruise on RRS John Biscoe during the 1987-88 field season was the eighth in the Offshore Biological Programme (OPB), devoted to the investigation of the Southern Ocean pelagic ecosystem with special reference to living resources. It was the second cruise in a series planned for the collection of data for the construction of a production-and-loss budget for microbial particulate material in the Southern Ocean euphotic zone.

Research was concentrated in two geographic areas. The first part of the cruise was undertaken around South Georgia. This has been the main research area for OBP and a large and useful body of data already exists, complemented both by current research on the biology of birds and seals, and historical oceanographic research of the 'Discovery' Investigations.

The second region for the cruise research was the Bransfield Strait. This area is hydrologically more diverse than the South Georgia Zone and provides a wide variety of environments in which to carry out more experimentally-oriented projects. Abundant use of the passages to and from the two main sites was made to collect physical and biological information over a wide geographic area.

Two further reports cover specialist aspects of the cruise. Eugene Murphy describes shipsboard data analyses and Glen Middleton deals with the electronics.

NARRATIVE

15-22 December 1987. Science Group joined RRS John Biscoe in Montevideo.

The majority of the lab and deck gear was set up whilst in port.

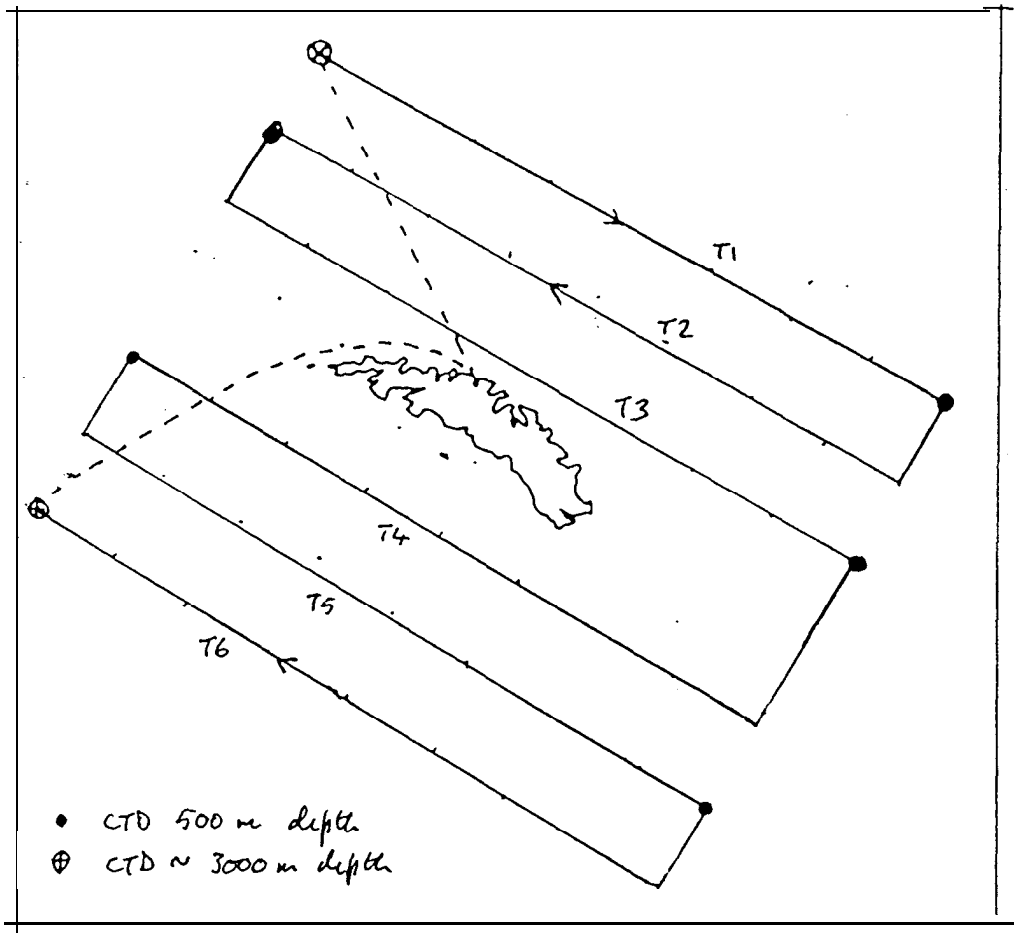

FIGURE 2. Planned layout of transects around South Georgia, with additional CTD stations. In the pre-cruise plans, a seventh transect between the positions of T3 and T4 was suggested but this was abandoned when it became obvious that there was insufficient time. In the event, T5 was curtailed and T6 lost during the transecting phase but both were recovered later (see Fig. 3)

23-29 December. Passage from Montevideo to South Georgia. The period was used to test all major items of equipment, including towing tests with the PML Undulating Oceanographic Recorder (UOR) Surface samples were taken for biological monitoring. Problems were encountered with the water-bottle rosette system but fortunately these were repaired before work began in earnest.

A surprising number of icebergs was encountered on this passage. The first berg was sighted one day out of Montevideo, at 36° S There were still numerous bergs around South Georgia, although not in the very high densities reported by Biscoe earlier in the season.

29-31 December. Fishing for Krill with the 8m² Rectangular Midwater Trawl (RMT8), in support of the Krill Target Strength Experiment based at Stromness.

31 December - 1 January 1988. New Year 's Eve in Grytviken.

1-9 January 1988. The first phase of the microbiological programme around South Georgia. Seven transects had been planned, each 240 nautical miles long, with the aim of mapping the OBP South Georgia Zone using surface sensors and other underway instrumentation. It soon became clear that poor navigational conditions would necessitate the cancellation of one transect (Fig. 2). The data collected are summarised under the specific topic (see below). The UOR was deployed over selected parts of these transects, providing vertical sections over approximately 50 m depth range.

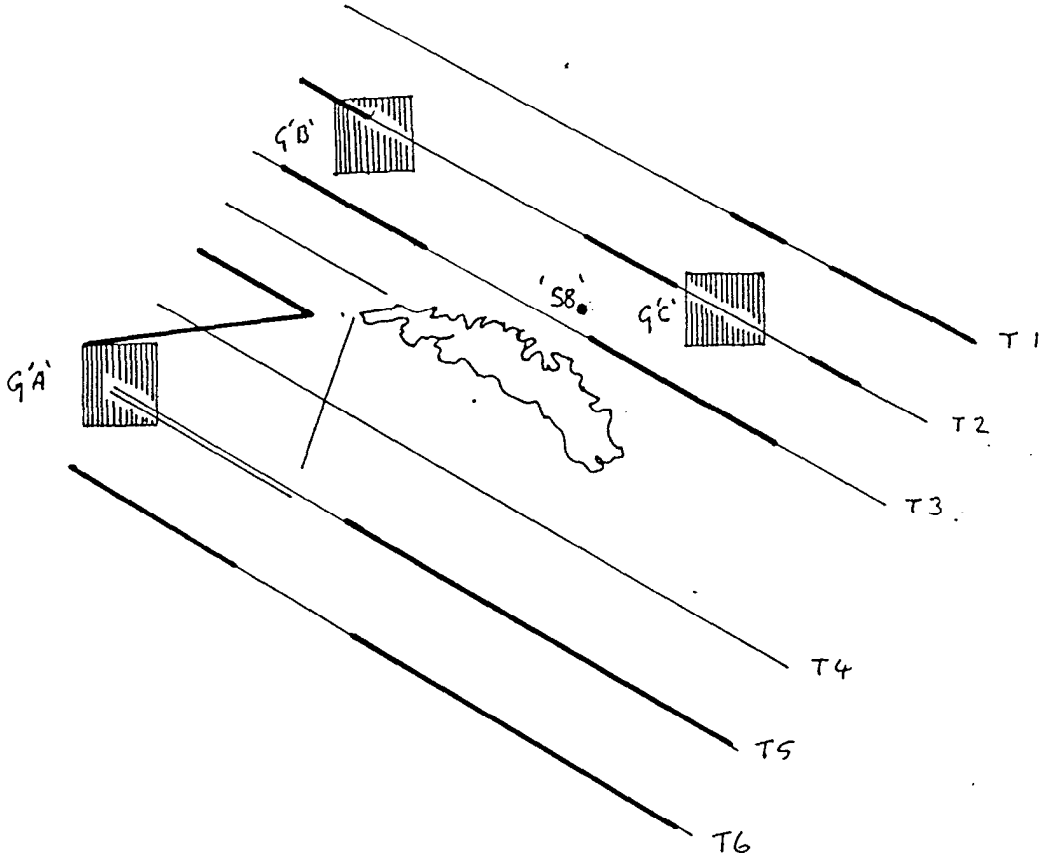

FIGURE 3. The final layout of work around South Georgia during OBP08. The three shaded squares are microbial station grids. Thin lines are the major surface-sampling transects, the thickened portions represent UOR deployments

A medical emergency required evacuation to Grytviken when the ship was part of the way along Transect 5.

A number of CTD-rosette casts for microbiological sampling was undertaken during this phase. An Anglian-TV film crew was on board to film the ship-based activities.

10-14 January. Following a day at Grytviken, we sailed to Stromness. There we first transferred the depot for the Husvik field party. The second block of krill-fishing was then completed. A trial deployment of the PML in situ incubation rig was then carried out.

15 January - 6 February. Second phase of the South Georgia microbiological study. Three sites were selected to represent the spatial variability of the South Georgia Zone, as indicated by the results of the recently completed mapping activities. At each site three stations were selected. These each comprised a twenty-four hour incubation for microbial growth and activity studies, with supporting environmental data. Physical measurements in the upper- water column were made on a regular grid of CTD stations, in which the microbial stations were set (Fig. 3). Grid A, to the south-west of the island, was situated in a comparatively long-lived intrusion of warm water and was executed to plan. The diary records finishing the grid 15 min late! Following this, the transects abandoned at the end of the first phase were undertaken. These, and some subsidary transects completed the mapping of the South Georgia Zone.

The second site was to the north of the island, in an area of high phytoplankton biomass. A storm on 28 January resulted in the

abandoning of the grid after two of the microbial stations had been completed. After being hove-to for nearly a day, the ship worked along the northern coast of South Georgia. Plans for a second pair of short transects, to 'plug the gap' east of Cooper Island, were abandoned as the weather was still bad. The ship entered Hound Bay for repairs. The third grid of stations, north-east of the island, was worked in a dense belt of icebergs and, with deteriorating weather also had to be abandoned after two microbial stations had been worked. The full complement of CTD profiles was completed, however. An isolated on-shelf station was selected as a 'refuge' but was also abandoned owing to bad weather.

7-9 February. Third and final block of Krill fishing was carried out off Bird Island and close to Hound Bay.

10-12 February. Passage to Falkland Islands. Horizontal profiling was undertaken along this track. The UOR was lost during recovery on 10 February.

13-16 February. Time-off in Stanley.

16 February. Steam to Beauchene Island to start a density section across Drake Passage.

17-21 February. Transect from Beauchene Island to Elephant Island to complete a density section using CTD casts with interpolated XBT temperature profiles. Three TOGA buoys were deployed.

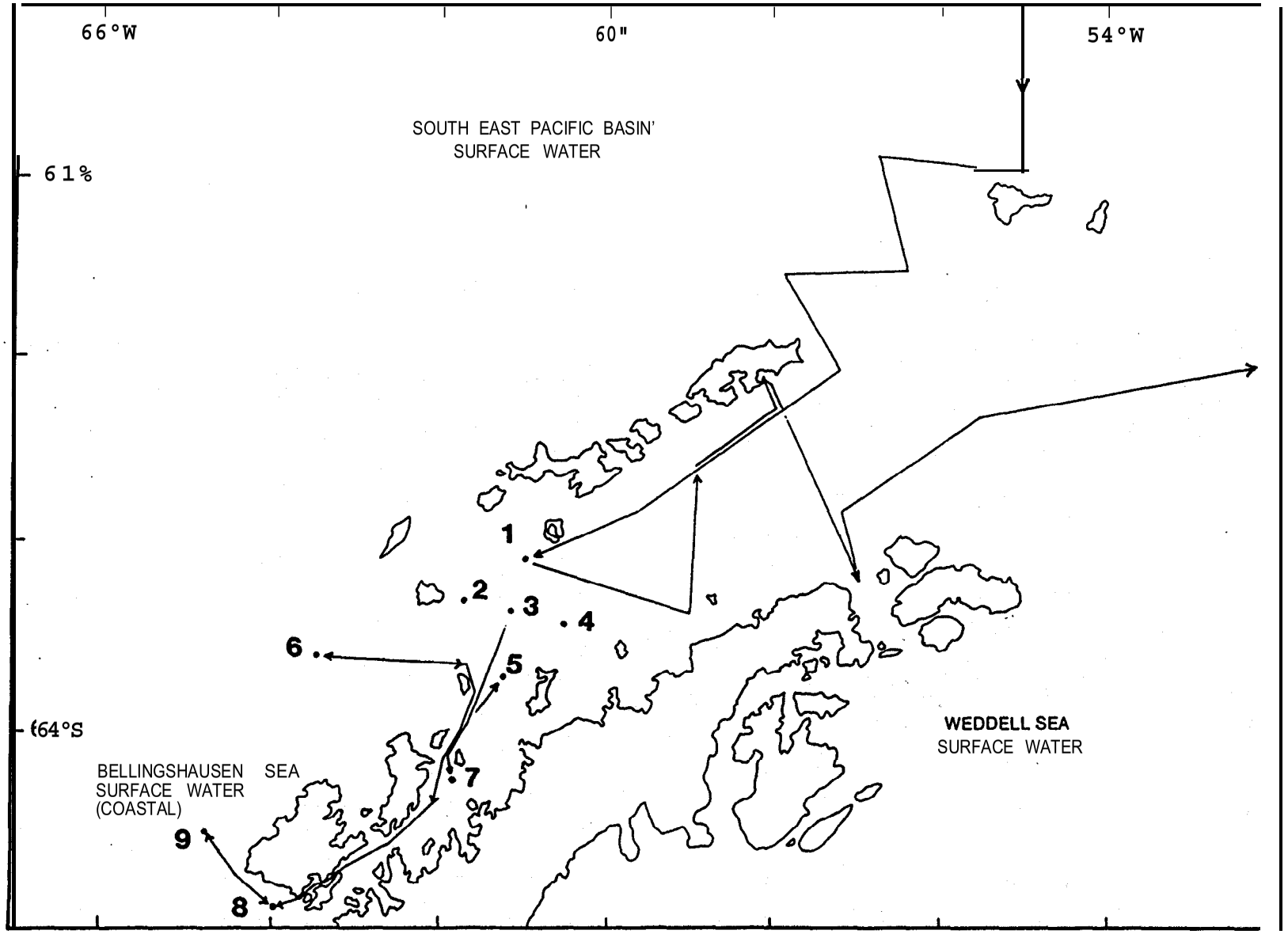

FIGURE 4. Cruise track within the Bransfield Strait region. Numbers indicate CTD stations - microbial work was undertaken at 3, 6, 7 and 8.

21-22 February. Horizontal profiling in the eastern Bransfield Strait, on passage to the main research site in the south-western part of the strait.

23-24 February. Microbial productivity station in the south-western Bransfield Strait, centered on a previous SIBEX station. In order to gain some insight into the hydrology of the area, five CTD stations were worked in a cruciform pattern, the microbial station being set at the centre. Deteriorating weather, prevented deployment of the in situ experiment rig, necessitating the use of the deck incubator.

25-26 February. Microbial productivity station in Gerlache Strait. Very high phytoplankton biomass was encountered but this proved to be very patchy. The 'station' was progressively repositioned to remain within a high biomass area. A fine-scale mapping grid was followed, in order to study the interrelationships between environment, phytoplankton and krill. Following the recovery of the in situ rig from a position uncomfortably close to an iceberg, the acoustic current meter was deployed.

27-28 February. Microbial productivity station north-west of Brabant Island. Again this was sited at the coordinates of an old STBEX station, to allow comparison with earlier data. The current meter was deployed under fair conditions. The in situ rig was set up the following morning but was recovered early owing, again, to deteriorating weather conditions. The experiment was completed in the deck tanks.

28-29 February. On passage to Bismark Strait via Gerlache Strait, and Neumayer Channel. High winds (gusting to 80 kts) prevented deployment of the UOR but surface profiling and acoustics were run.

29 February - 1 March. Microbial productivity station in Bismark Strait. It was surprisingly calm after the conditions experienced in Gerlache Strait. An additional CTD cast off Anvers Island was made, again a repeat of a SIBEX station. Poor weather again prevented deployment of the in situ rig, so that the deck incubator was used to simulate the natural irradiance profile. Returned to Gerlache Strait site to repeat the density and phytoplankton biomass profiles to investigate the effects of the storms.

2-3 March. Repeat CTD casts at the five stations in Bransfield Strait, again to investigate possible effects of the storm. The ship then steamed for King George Island to collect samples for bacterial and hydrocarbon studies. The transect, running across the Strait to Antarctic Sound, was curtailed because of the high density of icebergs in the area.

4-6 March. Density section from north-east Bransfield Strait to Signy Island. The high incidence of bergs caused some problems with station positioning.

6-7 March. Call at Signy.

8-11 March. Density section from Coronation Island to South Georgia. The Science Group started packing gear.

12-15 March. Remainder of gear packed at South Georgia. Stromness and Husvik field parties and their gear brought on board.

PRELIMINARY REPORTS ON SPECIFIC TOPICS

A list of the projects undertaken on the cruise is provided in Appendix 2. The following sketches summarise the main aims and achievements in the main research areas. In nearly all cases these can only be preliminary as complete data analysis was not possible on ship.

1. Phytoplankton production and ecology (Nicola Fenton, Nick Owen, Julian Priddle).

Phytoplankton production was studied by estimation of carbon and nitrogen flux, using isotopic tracer techniques. As a routine procedure, incubation in situ of water from five different irradiance depths was used to measure assimilation of carbon (CO_2 by ^{14}C uptake) and nitrogen (uptake of $^{15}NO_3$ and $^{15}NH_4$) Size fractionation using 20, 2 and 0.2 um screens was applied to the carbon uptake measurements.

At three research sites around South Georgia, species composition and abundance of phytoplankton varied markedly. Chlorophyll biomass at microbial site B, to the north of South Georgia, was as high as 8 m^{-3} at the other two sites. The increased biomass was contributed largely by the largest size-fraction (>20 μm) and carbon uptake by these cells was low compared with the smaller groups. Thus total carbon uptake by the phytoplankton at Site B was only double that elsewhere, whereas biomass was nearly ten times as high.

Further estimates of production were made at Bransfield Strait sites in the second part of the cruise, including work at a site of very high biomass (over 30 mg m^{-3} chlorophyll a) in Gerlache Strait.

In addition to the estimation of phytoplankton production for the microbial particulate budget, a specific project on phytoplankton ecology was undertaken. The relationship between phytoplankton and light climate and vertical mixing is the topic of an NERC CASE-studentship between BAS and University College of North Wales School of Ocean Sciences. The cruise provided a large amount of the field work for the project. An underwater spectroradiometer was used to measure the vertical irradiance profiles at all sites of microbial study. The second part of the cruise was specifically designed to collect data from sites representing a wide variety of physical environments and phytoplankton biomass.

A number of complementary shipboard experiments was carried out. Results from deck incubations compared favourably with the corresponding *in situ* results. Experiments were undertaken to investigate the possibility of photoadaptation by phytoplankton populations from different depths. The photosynthetic behaviour of water samples from near-surface and close to the bottom of the euphotic zone was compared over a range of irradiance in order to assess the possible establishment of physiologically distinct groups responding to ambient irradiance. As far as could be found, photoadaptation was not present and the phytoplankton was physiologically homogeneous within the euphotic zone.

The apparent paradox of low phytoplankton production in the high nutrient environment of the Southern Ocean was investigated briefly in some longer experiments. Earlier workers had suggested that vertical movement of algal cells results in decreased growth rate, and that water samples maintained in the uniform illumination on deck typically show rapid growth. Such experiments were repeated on a larger scale during this cruise, with large volumes (up to 40 dm^3) seawater being subsampled at daily intervals to

follow changes in biomass, productivity, species composition and nutrient concentrations. Data available so far confirm that rapid growth is possible under these conditions and provide useful information on the potential in situ growth rate.

2. Bacterial production and activity (Brian Mullins, Nick Owens)

Bacterial studies fell into two groups. The work around South Georgia contributed primarily to the microbial particulate budget, with measures of growth rate-and turnover of selected substrates. Over a wider scale, the spatial variation of bacterial metabolic characteristics was studied in twin projects to relate to hydrography and to environmental temperature.

Studies around South Georgia, and at some later microbial stations, used a suite of standard techniques. Biomass will be estimated in UK using image analysis methods for calculation of biovolume. Until these data are available the full implications of the bacterial growth and activity measurements cannot be assessed. Bacterial growth rate was estimated by the thymidine-uptake method. Measurements of the uptake of selected organic substrates were undertaken using radioisotope tracers in combination with estimation of ambient concentrations of the natural compounds. The latter included the use of HPLC to characterise and quantify the amino acid pool.

At the three South Georgia sites, there was evidence for horizontal and vertical spatial variation. Site B, with its high phytoplankton biomass, had a threefold high growth rate than that at the other two sites. Growth rate decreased dramatically with depth at all stations, by approximately an order of magnitude over the top 100m of the water column.

Bacterial activity, measured by the uptake of labelled organic substrates, varied less both with depth and between sites. In spite of high levels of dissolved amino acids at Site B (40 μmol m^{-3}, as opposed to 10-15 at A and C), amino acid uptake appeared to be similar at all stations.

A pilot study of methane concentrations in the SGZ was undertaken to evaluate possible production of this compound by microbes. Concentrations were close to saturation, suggesting little.biological or benthic influence.

Routine bacteriological work continued into the second part of the cruise. Concentrations of amino acids were again high at more productive sites (ie. those with high phytoplankton biomass). Amino acid uptake in the Bransfield Strait area was generally higher than that found around South Georgia, and was more variable between sites. Study of growth rates was extended to deeper samples, and showed negligible thymidine uptake at 500 m and deeper at most stations.

Large-scale spatial variation in bacterial abundance, characteristics, growth and activity were investigated with reference to hydrography and to environmental temperature, the latter using a temperature gradient block. Results await analysis.

3. Microbial grazing study (Moragh Stirling - first part of cruise only)

An investigation of the phagotrophic members of the microbial community was undertaken at the South Georgia sites. Water samples from the surface supply and from vertical profiles were collected for enumeration of

photoautotrophs and protozoan microphagotrophs. Studies on passage to and from South Georgia showed that picoplanktonic cyanobacteria appeared to be absent from waters with temperatures lower than 4°C. This accords with recently published data and suggests that the microbial dynamics of Antarctic surface waters may differ markedly from the other areas of the world ocean.

Estimation of protozoan grazing on bacteria and algae was carried out using the dilution assay technique. Preliminary results were equivocal, but generally indicated low grazing rates.

4. Horizontal variability (Eugene Murphy, Alistair Murray, Nick Owens, Julian Priddle)

Horizontal profiling in the main research areas and on passage was undertaken for two purposes. First, the study of microbial processes in the South Georgia Zone required a preparatory mapping phase to provide the information for the placing of sites so that representative coverage could be achieved. This implied the processing of data on ship to an extent not undertaken on previous cruises. Second, and possibly of greater long-term benefit to the division's research, it has become clear that the data collected on earlier cruises needed baseline data with a scale common to all variables if maximum utilization of the information could be made.

Routine data collection involved estimates of variables from the pumped seawater supply and acoustic estimation of zooplankton biomass. The PML Undulating Oceanographic Recorder (UOR) was used to profile between 20 and 75 m depth, providing data on temperature, light and phytoplankton abundance, but could not be deployed at all times on passage. The

Table 1. Variables and sampling frequencies for OBP08 transect data.

Variable		Sensor
Surface (3m) water temperature		Platinum resistance thermometer
In vivo Chlorophyll fluorescence		Turner 112
"	Nitrate	Autoanalyser
"	Nitrite	"
"	Silica	"
Acoutic biomass of krill		Simrad echosounder
Depth of krill		"
20-75m	In vivo chlorophyll	UOR-fluorometer
"	water temperature	UOR-thermistor
"	downwelling PAR	UOR-photocell
"	downwelling green light	"
"	upwelling green light	"
"	downwelling blue light	"
"	upwelling blue light	"

variables measured are shown in Table 1. Coverage was extensive and included long continuous records such as the passages to and from South America, across Drake Passage and the Scotia Sea. The South Georgia Zone transects alone totalled over 3000 km, with continuous runs of up to 450 km. UOR tows covered 4500 km during the whole cruise, with approximately 80% success rate.

The volume of these data and their availability on ships cannot be overstressed. Eugene Murphy discusses this in depth in a separate report.

5. Hydrocarbon study (Geof Cripps, Brian Mullins)

Sampling on the cruise was devised to follow up specific aspects of previous work on anthropogenically-derived hydrocarbons in the Antarctic marine environment and to undertake pilot work on 'biomarker' compounds as tracers of natural processes in the euphotic zone.

The large-scale distribution of polyaromatic hydrocarbons in seawater was investigated using surface water samples. In the South Georgia area, highest concentrations were found at inshore sites at Husvik, Stromness and Grytviken. In the open ocean, the warmer water had higher aromatic concentrations than cooler areas, but in all cases these remained low in relation to most temperate seas. Expressed as 'natphalene equivalents' concentration ranged from 0.06-0.55 $\mu g\, dm^{-3}$ rising to 0.28-2.19 at inshore sites. Characterisation of aromatic hydrocarbons in particulate material was also undertaken.

An extension of the monitoring component of the programme was a limited investigated of sediments from Signy Island and shorelines samples from Stromness and Grytviken whaling stations at South Georgia.

The potential for bacterial breakdown of polluting hydrocarbons is being investigated. Antarctic bacterioplankton are being incubated on a hydrocarbon medium to test utilization. Spiking of seawater with a hydrocarbon 'cocktail' and testing for uptake after three months will provide an index of possible microbial breakdown of pollutants.

6. Physical oceanography (Barry Heywood, Julian Priddle)

Physical oceanographic measurements were made as components of long-term programmes and in support of the microbial research.

As part of a BAS commitment to WOCE and the Fine Resolution Antarctic Model (FRAM), three CTD density sections with 50 km resolution were executed in the Drake Passage, Scotia Sea and across the Weddell Sea outflow. Interpolated XBT casts and use of continuous profiling of surface water improved the resolution of the temperature field and also provided data to determine the launch-sites for three TOGA oceanographic buoys. This was the first year in which the density sections and buoy developments had been carried out, but they develop previous BAS interest in variability of the frontal zones in the Southern Ocean currents.

Continuing interest in the hydrography of the Bransfield Strait prompted a number of CTD casts in this area, repeating where possible stations worked as part of the BIOMASS-SIBEX programme. An acoustic current was deployed successfully from the ship at some stations in this area. CTD profiles at

six stations were then repeated during the visit after severe storms had been experienced. This provided the opportunity to assess the affects of strong wind mixing on the circulation in the Bransfield Strait - a topic arising from analysis of SIBEX data. However, no major shift in hydrographic boundaries was found although the affects of wind-mixing on local vertical stratification was often dramatic. A site in the Gerlache Strait appeared to be more or less immune to these effects, and this seems. likely to be of great interest for future study of the relationship between phytoplankton growth and the physical environment.

PRINCIPAL SCIENTIST'S NOTES AND RECOMMENDATIONS

The cruise was undertaken in a competent and cheerful fashion by all members of the Science Group. It was especially gratifying to have participation of members of PML, IOS and CNW. The officers and crew were most helpful in the planning and execution of a sometimes complex cruise schedule.

The following comments refer to some specific matters arising from day-to-day activities or from individual incidents. In some cases I feel that action should be taken before the next cruise or the next occasion when similar research is planned. Electronics and software faults and recommendations are covered in a separate Central Services report by Glen Middleton. Input has already been made to the ship's refit specification.

1. Deck safety

It was gratifying that the OBP Principal Scientist is now invited to attend the ship's Safety Committee meetings. Safety procedures adopted by the Science Group were accepted and it was noted that general awareness of safety procedures by the scientists was good.

With the increasing responsibility of the Principal Scientist and Watch Leaders for safety in science operations, revised general instructions and a new guide for Watch Leaders were prepared. These are included here as Appendix 4.

Safety gear provided by BAS is of high quality, although some has now been in use or in stock for a long time. With the increasing number of people

joining single or even part cruises, the multi-use of harnesses and hard hats implies increasing vigilance when these gear are reissued.
ACTION. I feel that the job of Safety Officer within OBP should devolve on one competent person rather than switching around between cruises.

I am pleased to see that alternative safety footwear will now be provided for OBP personnel on ship. Rubber boots and RBLTs are not always ideal, for instance in the case of cargo work.
ACTION. I have also suggested that overalls, hard hat and safety footwear are no longer part of kitbag issue but are available all the time for both ship and UK duties.

The quality of work gloves issued to some personnel, and those available to the ships crew, was inadequate.
ACTION. It would be useful for Logistics to be able to discuss this matter with experienced members of the OBP Science Group. The "slop chest" will also need restocking - perhaps this is the sensible venue for the secondhand gear from visitors etc.

The CTD monorail system caused the usual problems when working the gear in rough seas. The high coaming at the outboard entrance to the waterbottle annex necessitates an awkward lift when moving the CTD to an from the hydrographic platform with a full rosette of water bottles, this hear weighs over 100 kg. One member of the Science Group damaged his back by misbalancing during this manouvre. He appears to have recovered fully but this does serve to highlight the problem.

A second strongpoint for clipping on harnesses at the hydrographic platform has been inserted in the refit specification.

The loss of the PML UOR underlined for all personnel the need for great care in the use and deployment of towed gear. It was fortunate that the wire parted in such a fashion as not to endanger anyone, but it provided a graphic demonstration of the behaviour of a steel cable which has parted under load.

2. Laboratory safety

The ship's laboratory accommodation is becoming overstretched as programmes become more sophisticated and involve larger amounts of equipment. Nevertheless, sensible laboratory procedure prevented any accidents and non-trivial contamination.

ACTION. However, the potential for accidents remains, and I would recommend that for all future cruises, the possible laboratory hazards both from equipment and chemicals and from work procedures are assessed adequately well in advance of sailing date. Ideally, safety should be included as a section of the standard project proposal. It would then be the Principal Scientist's overall responsibility to ensure that the facilities for dealing with hazards are either already available on ship or have been provided by the Science Group for the cruise. As as example, chemicals which absorb or neutralise spillage should be carried, but must be specific to the classes of chemicals in use. Specific general recommendations are for more Winchester bottle carriers, and for provision of Vermiculite for absorbing most spillages.

An extemporary First Aid Kit was made up for the laboratory area by the ship's medical officer.

ACTION. In future, a full kit should be provided by OBP as part of its equipment. This should comprise a standard laboratory First Aid Kit, supplemented where necessary to cover common chemical hazards. Sterile eyewash packs should also be provided, complete with the appropriate mountings and instructions.

3. New equipment and facilities used during 0BP08.

Provision of a shipboard liquid scintillation counter was a great boon in experiments using radioisotope tracers, enabling confirmation of techniques at sea. The unit, a Beckman LS 1701, worked well throughout the cruise.

Use of high pressure liquid chromatography (HPLC) on ship was also a novelty for us. Again the set-up worked well except for the failure of one pump. This was rectified and a spare part obtained later at the Stanley call. The only other problems associated with this technique were not caused by shipboard use per se but related from the need frequently to change columns for different analyses. Use of several columns with a switching valve would appear to offer a solution.

A gas chromatograph was used by PML. The attendant gas cylinders were stored easily on the after deck but provision of a custom-made rack for both storage and transport should be considered for future seasons.

The PML UOR proved to be a very efficient way of collecting data from the upper water column while underway. It was simple to deploy and recover. navigation hazards such as fog and ice sometimes necessitated a reduction in ship's speed below that necessary to provide the force for the UOR to undulate. The non-undulating version provided as replacement for the unit

lost between South Georgia and Stanley was very much less easy to use. Undulations were generated by continuous veering and hauling of the winch, which was both an unpopular job with crew and scientists and caused 'excessive noise in the scientists' accommodation.

A floating rig for in situ incubation of microbial production experiments was also provided by PML. This was launched and recovered with comparative ease from the well-deck.

Large amounts of data processing were carried out on board, using PC' s This worked well on the whole and is dealt with in detail in Eugene Murphy's report.

4. Cargo management

The cargo list written by Roger Coggan using the RMS data handling package was used again of this trip, following its successful introduction on OBP06. The system is effective but slow, and has a few annoying idiosyncrasies.

ACTION. Now that more IBM-compatible microcomputers are available on ship, the use of a spreadsheet such as 'Framework' or 'Lotus l-2-3' for this task should be considered.

5. Ship's navigation

Much of the science programmes on OBP are dependent on the correct positioning of the ship. This in turn depends largely on the Magnavox satellite navigation system and its associated sensors. Whilst it is agreed that the present system is not 'state-of-the-art', it is a great

pity that the Magnavox performance is degraded by the consistent under performance or failure of the Simrad acoustic log. I trust that measures taken during this refit will rectify the problem.

6. Other points arising from the cruise

i. Protocols for the disposal of dangerous chemicals, including radioisotopes should be established formally within BAS.

ii. Air conditioning in the electronics laboratories failed completely. Although electronics did work satisfactorily without this, it would be desirable that the air conditioning be refurbished to its original functional specification.

iii. A new protocol for communication between the CTD operator and the bridge was established following a near-loss of the unit. The Loudaphone telephone system proved unreliable and VHF radio was used instead. If there were no water-bottle stops close to the surface, the CTD operator informed the bridge of the CTD depth on ascent at 50m intervals shallower than 250m. Hopefully, repair of the meters on the hydrographic winch controls will increase the safety of operations, but the present practice provides an increased safety margin which could usefully be retained. Incidentally, in an emergency where the bridge is unaware that the CTD is dangerously close to the surface (or even out of the water!) the winch can be stopped by switching off the power pack at either the hydrographic platform or the trawl winch controls.

iv. It would aid appreciation of timetabling if charts of the research area were available in the laboratory or Chief Scientist's Office.

Appendix 1. Personnel participating in 0BP08

Lynette Allen

Geof Cripps

Nicola Fenton (UCNW Ocean Sciences - CASE PhD)

Graham Harvey (MO ex Faraday)

Barry Heywood (second half of cruise only)

Helen Hill

Lesley Holmes

Glen Middleton

Brian Mullins

Eugene Murphy

Alistair Murray

Nick Owens (Plymouth Marine Laboratory)

Julian Priddle

Ken Richard

Moragh Stirling I0S Deacon Laboratory - first half only)

Mick Whitehouse

Appendix 2. Projects carried out on OBP cruise 08 (in whole or part)

a) BAS projects

Production of microbial material in the euphotic zone (PMOG in collaboration with PML, UCNW-OS and IOS-DL)

Recycling of microbial material (as above)

Silicon dynamics in the euphotic zone (PMOG)

Bacterial activity in relation to ambient temperature (BWM)

Bacterial activity and characteristics - spatial variation (BWM)

Bacterial - hydrocarbon interactions (BWM, GC)

Hydrocarbons in the Southern Ocean food-web (GC)

Large-scale spatial variation in hydrocarbon levels (GC)

The fate of natural hydrocarbons in the upper water column (GC)

Variation in the position of frontal zones in the Southern Ocean (RBH)

Transport in the Antarctic Circumpolar Current (RBH)

b) non-BAS projects

Cycling of nitrogen in the Southern Ocean microplankton (Owens, PML)

Composition of nitrogen pools (Owens, PML)

Dynamics of methane cycling (Owens, PML)

Photosynthetic physiology in relation to physical factors (CASE studentship between BAS and UCNW-OS)

IOS-DL - Institute of Oceanographic Sciences - Deacon Laboratory

PML - Plymouth Marine Laboratory

PMOG - Physical and Microbial Oceanography Group (BAS-MLSD)

UCNW-OS - School of Ocean Sciences, University College of North Wales, Bangor

Wed Mar 23

Event log for Jbee

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
1	1	27-12-87 13:20	T0001	S001	STD	27-12-87 17:10	[illegible] CAST
2	1	27-12-87 18:35	T0001	S001	UOR	28-12-87 18:25	[illegible] 24HR TEST
3	1	27-12-87 18:35	T0001	S000	ECHO	28-12-87 18:25	CAST CELLED
4	1	28-12-87 01:44	T0001	S000	H2O	28-12-87 01:44	
5	1	28-12-87 13:25	T0001	S000	H2O	28-12-87 13:25	
6	1	28-12-87 17:32	T0001	[illegible]	H2O	28-12-87 17:55	[illegible] SH CONC EXIT
7	1	28-12-87 18:31	T0001	S001	STD	28-12-87 18:55	[illegible] CAST NO WATER BOTTLES
8	1	28-12-87 19:32	T0001	S001	H2O	28-12-87 19:37	
9	1	29-12-87 19:44	T0001	S000	H2O	29-12-87 19:47	
10	1						
11	1	30-12-87 02:29	T0001	S000	RMT	30-12-87 03:03	
12	1	30-12-87 08:45	T0001	S000	RMT	30-12-87 09:08	
13	1	30-12-87 10:04	T0001	S000	RMT	30-12-87 11:00	
14	1						
15	1						
16	1	30-12-87 16:18	T0001	S000	RMT	30-12-87 17:22	CANCELLED IN ERROR
17	1	30-12-87 19:34	T0001	S000	RMT	30-12-87 20:22	
18	1	30-12-87 22:45	T0001	S000	H2O	30-12-87 22:50	[illegible]NM
19	1	31-12-87 00:00	T0001	S000	RMT	31-12-87 00:35	
20	2	31-12-87 13:07	T0001	S000	H2O	31-12-87 13:10	
21	2	31-12-87 13:33	T0001	S000	H2O	31-12-87 13:35	
22	2	31-12-87 13:14	T0001	S000	H2O	31-12-87 13:15	
23	2	01-01-88 17:03	T0002	S000	UOR	01-01-88 23:40	
24	2	02-01-88 07:59	T0002	S002	STD	02-01-88 09:55	
25	2	02-01-88 10:54	T0003	S005	ECHO	03-01-88 15:17	
26	2	02-01-88 11:47	T0003	S000	UOR	02-01-88 20:04	
27	2	02-01-88 15:03	T0003	S000	H2O	02-01-88 15:05	WATER SAMPLE FENTON
28	2	02-01-88 16:45	T0003	S000	H2O	02-01-88 16:49	
29	2	02-01-88 22:00	T0003	S000	H2O	02-01-88 22:19	
30	2	02-01-88 22:42	T0003	S000	UOR	03-01-88 00:01	
31	2	02-01-88 23:11	T0003	S000	H2O	02-01-88 23:14	
32	2	03-01-88 06:42	T0003	S000	UOR	03-01-88 08:08	
33	2	03-01-88 08:49	T0003	S000	H2O	03-01-88 08:51	WATER GC
34	2	03-01-88 10:11	T0003	S000	UOR	03-01-88 15:19	
35	2	03-01-88 16:34	T0003	S003	STD	03-01-88 17:20	
36	2	03-01-88 16:57	T0003	S003	H2O	03-01-88 16:57	WATER MORAG
37	2	03-01-88 18:17	T0004	S000	H2O	03-01-88 18:17	
38	2	03-01-88 20:51	T0004	S000	UOR	03-01-88 23:16	
39	2	03-01-88 20:56	T0004	S000	ECHO	05-01-88 10:33	
40	2	03-01-88 22:11	T0004	S000	H2O	03-01-88 22:13	
41	2	04-01-88 07:17	T0004	S000	H2O	04-01-88 07:20	
42	2	04-01-88 10:24	T0004	S000	UOR	04-01-88 13:02	
43	2	04-01-88 12:45	T0004	S000	H2O	04-01-88 14:00	
44	2	04-01-88 14:36	T0004	S000	H2O	04-01-88 14:39	
45	2	05-01-88 00:43	T0004	S000	H2O	05-01-88 00:50	
46	2	05-01-88 01:51	T0004	S000	H2O	05-01-88 02:01	
47	2	05-01-88 06:38	T0004	S000	UOR	05-01-88 10:40	
48	2	05-01-88 10:55	T0004	S004	STD	05-01-88 12:08	
49	2	05-01-88 14:35	T0005	S000	H2O	05-01-88 14:38	WATER GC
50	2	05-01-88 14:35	T0005	S000	ECHO	06-01-88 17:36	

Event	Phase	Start time	Grid Crossref	Station	Activity	End time	Comments
54	1	05-31-88 15:52	T0005	S000	UOR	05-01-88 23:17	
55	1	05-01-88 21:02	T0005	S000	H2O	05-01-88 21:05	
56	1	06-01-88 04:01	T0005	S000	H2O	06-01-88 04:02	3H THYMIDINE CONCENTRATION
57	2	06-01-88 05:09	T0005	S000	H2O	06-01-88 05:13	WATER GGCC
58	2	06-01-88 07:21	T0005	S000	UOR	06-01-88 11:36	
59	2	06-01-88 11:48	T0005	S000	H2O	06-01-88 11:51	WATER GC
60	2	06-01-88 15:45	T0005	S000	PAR	06-01-88 19:20	TEST IRGAD METER
61	2	06-01-88 20:15	T0005	S000	STD	06-01-88 23:00	500m
62	2	07-01-88 04:23	T0005	S000	FNET	07-01-88 04:38	
63	2	07-01-88 04:48	T0005	S000	FNET	07-01-88 09:04	
64	2	07-01-88 10:13	T0005	S000	H2O	07-01-88 10:16	WATER
65	2	07-01-88 10:14	T0006	S000	ECHO	08-01-88 10:37	
66	2	07-01-88 10:33	T0006	S000	UOR	07-01-88 12:36	
67	2	07-01-88 16:36	T0006	S000	H2O	07-01-88 16:39	
68	2	07-01-88 19:37	T0006	S000	UOR	07-01-88 20:40	
69	2	07-01-88 20:10	T0006	S000	H2O	07-01-88 20:14	
70	2	08-01-88 09:20	T0006	S000	H2O	08-01-88 09:20	
71	2	08-01-88 15:52	_0000	S000	H2O	08-01-88 15:55	BETWEEN T0006 AND T0007
72	2	08-01-88 20:33	_0000	S000	H2O	08-01-88 20:56	BETWEEN T0006 AND T0007
73	2	08-01-88 22:53	T0007	S000	ECHO	09-01-88 11:09	
74	2	08-01-88 22:56	T0008	S000	H2O	08-01-88 23:00	WATER PUMP
75	2	09-01-88 11:58	T0008	S000	H2O	09-01-88 12:02	WATER PUMP
76	2	09-01-88 15:35	T0009	S000	UOR	10-01-88 02:14	
77	2	09-01-88 17:24	T0009	S000	ECHO	10-01-88 01:33	
78	3	12-01-88 20:50	G0000	S000	RMT	12-01-88 21:06	
79	3	13-01-88 02:34	G0000	S000	FNET	13-01-88 02:51	10 MIN NET
80	3	13-01-88 08:00	G0000	S000	RMT	13-01-88 08:35	
81	3	13-01-88 08:51	G0000	S000	RMT	13-01-88 09:25	
82	3	13-01-88 12:33	G0000	S000	H2O	13-01-88 12:33	3H GLUTAMATE TIME EXPT
83	3	13-01-88 12:50	G0000	S000	RMT	13-01-88 13:04	
84	3	13-01-88 13:47	G0000	S000	RMT	13-01-88 14:10	
85	3	13-01-88 14:20	G0000	S000	RMT	13-01-88 14:57	
86	3	13-01-88 17:30	G0000	S000	RMT	13-01-88 18:17	CANCELLED ON NAVLOG ERROR
87	3	13-01-88 17:55	G0000	S000	H2O	13-01-88 18:00	14C GLUCOSE CONC TEST
88	3						
89	3	13-01-88 23:19	G0000	S000	RMT	14-01-88 02:07	
90	4	14-01-88 19:37	G0000	S000	H2O	14-01-88 19:41	WATER PUMP
91	4	14-01-88 19:38	T0001	S000	ECHO	15-01-88 04:20	
92	4	14-01-88 20:08	T0001	S000	UOR	15-01-88 02:34	
93	4	15-01-88 07:00	T0002	S000	H2O	15-01-88 07:03	WATER GGCC
94	4	15-01-88 07:17	T0002	S000	ECHO	15-01-88 11:58	
95	4	15-01-88 07:17	T0002	S000	UOR	15-01-88 11:38	
96	4	15-01-88 08:20	T0002	S000	H2O	15-01-88 08:20	14C GLUCOSE EXPT 2
97	4	15-01-88 12:40	T0002	S000	UOR	15-01-88 22:34	
98	4	15-01-88 12:42	T0002	S000	ECHO	15-01-88 14:18	RESUMED ACOUSTIC RUN
99	4	15-01-88 14:27	T0002	S000	H2O	15-01-88 14:30	PUMP WATER
100	4	15-01-88 22:56	T0002	S000	H2O	15-01-88 23:48	PUMP WATER
	4	16-01-88 09:05	G0101	S000	STD	16-01-88 09:26	300M NO WATER
	4	16-01-88 10:10	G0102	S000	STD	16-01-88 10:35	300M NO WATER

Eventlog for JB08

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
101	4	16-01-88 11:30	G0103	S000	STD	16-01-88 11:50	300M NO WATER
102	4	16-01-88 13:03	G0203	S000	STD	16-01-88 13:30	300M NO WATER
103	4	16-01-88 15:10	G0202	S001	PAR	16-01-88 16:14	
104	4	16-01-88 16:54	G0202	S001	STD	16-01-88 18:12	1500M WITH WATER
105	4	16-01-88 18:27	G0202	S001	PNET	16-01-88 18:35	
106	4	16-01-88 19:53	G0201	S000	STD	16-01-88 20:21	300M NO WATER
107	4	16-01-88 21:10	G0301	S000	STD	16-01-88 21:28	300M NO WATER
108	4	16-01-88 22:10	G0302	S000	STD	16-01-88 22:43	300M NO WATER
109	4	16-01-88 23:26	G0303	S000	STD	16-01-88 23:47	300M NO BOTTLES
110	4	17-01-88 02:23	G0202	S001	PNET	17-01-88 02:33	
111	4	17-01-88 02:48	G0202	S001	STD	17-01-88 03:30	
112	4	17-01-88 03:50	G0202	S001	STD	17-01-88 05:02	
113	4	17-01-88 06:15	G0202	S001	BUOY	17-01-88 22:15	OWENS RIG
114	4	17-01-88 12:07	G0202	S001	STD	17-01-88 12:55	300M NO WATER
115	4	17-01-88 14:35	G0202	S001	STD	17-01-88 15:08	250M WITH WATER
116	4	17-01-88 15:54	_0000	S000	PAR	17-01-88 16:45	NEAR RIG
117	4	17-01-88 17:42	G0202	S001	H2O	17-01-88 17:46	WATER FOR BACT. HC
118	4	17-01-88 18:46	G0202	S001	STD	17-01-88 19:07	300M NO WATER
119	4	18-01-88 02:35	G0202	S001	PNET	18-01-88 02:44	LOTS OF KRILL
120	4	18-01-88 09:06	G0401	S000	STD	18-01-88 09:27	300M NO WATER
121	4	18-01-88 10:13	G0402	S000	STD	18-01-88 10:32	300M NO WATER
122	4	18-01-88 11:13	G0403	S000	STD	18-01-88 11:35	300M NO WATER
123	4						
124	4	18-01-88 12:54	G0503	S000	STD	18-01-88 13:11	300M NO WATER
125	4						
126	4	18-01-88 15:15	G0502	S002	PAR	18-01-88 15:54	
127	4	18-01-88 16:29	G0502	S002	STD	18-01-88 17:49	DEEP DROP WITH WATER
128	4	18-01-88 17:07	G0502	S002	H2O	18-01-88 17:09	PUMP WATER
129	4	18-01-88 18:01	G0502	S002	PNET	18-01-88 18:13	
130	4	18-01-88 19:52	G0501	S000	STD	18-01-88 20:21	300M NO WATER
131	4	18-01-88 20:51	G0601	S000	STD	18-01-88 21:36	300M NO WATER
132	4	18-01-88 22:39	G0602	S000	STD	18-01-88 23:02	300M NO WATER
133	4	18-01-88 23:26	G0603	S000	STD	19-01-88 00:06	300M NO WATER
134	4	19-01-88 01:35	G0502	S002	PNET	19-01-88 01:45	
135	4	19-01-88 02:36	G0502	S002	STD	19-01-88 03:08	
136	4	19-01-88 03:40	G0502	S002	STD	19-01-88 04:20	WATER SAMPLES ONLY
137	4	19-01-88 05:50	G0502	S002	BUOY	19-01-88 22:53	OWENS RIG
138	4	19-01-88 09:06	G0502	S002	STD	19-01-88 09:56	300M NO WATER
139	4	19-01-88 12:11	G0502	S002	STD	19-01-88 12:37	300M NO WATER
140	4	19-01-88 14:20	G0000	S000	STD	19-01-88 16:02	DEEP WITH WATER NR. RIG
141	4	19-01-88 16:14	G0000	S000	PAR	19-01-88 17:04	NR. OWENS RIG
142	4	19-01-88 19:06	G0502	S002	STD	19-01-88 19:37	DATA STORAGE FAILED
143	4	19-01-88 19:37	G0502	S002	STD	19-01-88 19:57	300M NO WATER REPEAT 142
144	4	19-01-88 20:07	G0502	S002	H2O	19-01-88 21:00	WATER
145	4	20-01-88 07:05	G0604	S000	STD	20-01-88 07:25	
146	4						
147	4	20-01-88 09:00	G0605	S000	STD	20-01-88 09:19	
148	4	20-01-88 10:34	G0606	S000	STD	20-01-88 10:58	300M NO WATER
149	4	20-01-88 11:42	G0506	S000	STD	20-01-88 12:06	300M NO WATER
150	4						CANCELLED

Eventlog for JR06

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
151	4	20-01-88 13:00	G0505	S000	STD	20-01-88 1[illegible]:20	300M NO WATER
152	4	20-01-88 14:00	G0504	S000	STD	20-01-88 14:20	300M NO WATER
153	4	20-01-88 15:06	G0405	S003	PAR	20-01-88 15:47	
154	4	20-01-88 16:20	G0405	S003	STD	20-01-88 1[illegible]:50	DEEP DROP WITH WATER
155	4	20-01-88 17:53	G0405	S003	PNET	20-01-88 1[illegible]:03	50M DEPTH 200M MESH
156	4	20-01-88 19:03	G0406	S000	STD	20-01-88 19:14	300M NO WATER
157	4	20-01-88 20:21	G0306	S000	STD	20-01-88 2[illegible]:41	300M NO WATER
158	4	20-01-88 21:29	G0305	S000	STD	20-01-88 2[illegible]:56	300M NO WATER
159	4	20-01-88 22:50	G0304	S000	STD	20-01-88 2[illegible]:05	300M NO WATER
160	4	21-01-88 00:05	G0404	S000	STD	21-01-88 0[illegible]:20	300M NO WATER
161	4	21-01-88 00:30	G0404	S000	FNET	21-01-88 0[illegible]:40	
162	4	21-01-88 02:33	G0405	S003	STD	21-01-88 0[illegible]:00	300M WITH BOTTLES
163	4	21-01-88 03:30	G0405	S003	STD	21-01-88 0[illegible]:10	WATER BOTTLES AS MISC1
164	4	21-01-88 05:55	G0206	S000	STD	21-01-88 0[illegible]:19	300M NO WATER
165	4	21-01-88 06:56	G0205	S000	STD	21-01-88 07:15	300M NO WATER
166	4	21-01-88 08:03	G0204	S000	STD	21-01-88 0[illegible]:20	300M NO WATER
167	4	21-01-88 09:22	G0104	S000	STD	21-01-88 09:38	300M NO WATER
168	4	21-01-88 10:59	G0105	S000	STD	21-01-88 1[illegible]:17	300M NO WATER
169	4	21-01-88 12:26	G0106	S000	STD	21-01-88 1[illegible]:45	300M NO WATER
170	4						
171	4	21-01-88 16:54	T0003	S000	ECHO	22-01-88 2[illegible]:31	ACOUSTIC RUN
172	4	21-01-88 17:09	T0003	S000	UOR	21-01-88 2[illegible]:40	
173	4	21-01-88 17:11	T0003	S000	H2O	21-01-88 17:19	MISC 1
174	4	21-01-88 22:20	T0003	S000	H2O	21-01-88 2[illegible]:37	MISC 1
175	4	22-01-88 06:43	T0003	S000	UOR	22-01-88 2[illegible]:49	
176	4	22-01-88 09:12	T0003	S000	H2O	22-01-88 09:15	WATER GC
177	4	22-01-88 15:44	T0003	S000	H2O	22-01-88 1[illegible]:50	MISC 1
178	4	22-01-88 21:08	G0000	S000	STD	22-01-88 2[illegible]:26	AT END OF TRANSECT
179	4	23-01-88 04:35	T0004	S000	ECHO	24-01-88 09:36	ACOUSTIC RUN
180	4	23-01-88 05:40	T0004	S000	UOR	23-01-88 2[illegible]:22	
181	4	23-01-88 22:19	T0004	S000	H2O	23-01-88 2[illegible]:50	MISC 1
182	4	24-01-88 06:00	T0004	S000	UOR	24-01-88 1[illegible]:22	
183	4	24-01-88 17:25	G0000	S000	H2O	24-01-88 17:43	MISC 1
184	4	25-01-88 01:56	G0000	S000	FNET	25-01-88 0[illegible]:13	
185	4	25-01-88 09:05	G1611	S000	STD	25-01-88 09:46	300M NO WATER
186	4	25-01-88 10:40	G1612	S000	STD	25-01-88 1[illegible]:18	300M NO WATER
187	4	25-01-88 12:23	G1613	S000	STD	25-01-88 1[illegible]:48	300M NO WATER
188	4	25-01-88 13:46	G1513	S000	STD	25-01-88 1[illegible]:13	300M NO WATER
189	4	25-01-88 15:10	G1512	S004	PAR	25-01-88 1[illegible]:00	
190	4	25-01-88 16:30	G1512	S004	STD	25-01-88 18:15	TWO BOTTLES
191	4	25-01-88 17:36	G1512	S004	PNET	25-01-88 17:51	
192	4	25-01-88 19:10	G1511	S000	STD	25-01-88 19:31	300M NO WATER
193	4	25-01-88 20:28	G1411	S000	STD	25-01-88 2[illegible]:49	300M NO WATER
194	4	25-01-88 21:50	G1412	S000	STD	25-01-88 22:14	300M NO WATER
195	4	25-01-88 23:05	G1413	S000	STD	25-01-88 2[illegible]:25	300M NO WATER
196	4	26-01-88 01:56	G0000	S000	FNET	26-01-88 0[illegible]:08	
197	4	26-01-88 02:58	G1512	S004	STD	26-01-88 0[illegible]:42	WATER BOTTLES ONLY
198	4	26-01-88 03:55	G1512	S004	STD	26-01-88 04:22	300M WITH BOTTLES
199	4	26-01-88 05:40	G1512	S004	BUOY	26-01-88 2[illegible]:45	OWENS RIG
200	4	26-01-88 09:30	G0000	S000	STD	26-01-88 0[illegible]:56	300M NO WATER NEAR RIG

Event log for JR86

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
201	4	26-01-88 12:43	G0000	S000	STD	26-01-88 13:00	300M NICKY WATER NR RIG
202	4						
203	4	26-01-88 14:40	G0000	S000	STD	26-01-88 16:37	300M NEAR RIG
204	4						
205	4	27-01-88 12:47	G1312	S000	STD	27-01-88 13:12	300M NO WATER
206	4	27-01-88 14:09	G1313	S000	STD	27-01-88 14:30	300M NO WATER
207	4	27-01-88 15:50	G1212	S005	PAR	27-01-88 16:15	
208	4	27-01-88 16:22	G1212	S005	STD	27-01-88 17:14	500M CAST
209	4	27-01-88 17:16	G1212	S005	PNET	27-01-88 17:46	X2
210	4	27-01-88 18:30	G1213	S000	STD	27-01-88 18:44	300M NO WATER
211	4	27-01-88 19:50	G1113	S000	STD	27-01-88 20:01	300M NO WATER
212	4	27-01-88 20:42	G1112	S000	STD	27-01-88 21:05	300M NO WATER
213	4	27-01-88 21:44	G1111	S000	STD	27-01-88 22:20	300M NO WATER
214	4	27-01-88 22:37	G1111	S000	H2O	27-01-88 22:57	MISC 1
215	4	27-01-88 23:05	G1211	S000	STD	27-01-88 23:25	300M NO WATER
216	4	28-01-88 00:17	G1311	S000	STD	28-01-88 00:35	300M NO WATER
217	4	28-01-88 03:00	G1212	S005	STD	28-01-88 03:44	WATER SAMPLES ONLY
218	4	28-01-88 04:30	G1212	S005	STD	28-01-88 04:57	300M
219	4	28-01-88 05:38	G1212	S005	BUOY	28-01-88 23:00	OWENS RIG
220	4	28-01-88 09:00	_0000	S000	STD	28-01-88 09:18	300M NO WATER, NEAR RIG
221	4	28-01-88 11:53	_0000	S000	STD	28-01-88 12:23	300M NO WATER, NEAR RIG
222	4	28-01-88 14:30	_0000	S000	STD	28-01-88 16:50	DEEP CAST + WATER, NEAR RIG
223	4	28-01-88 17:13	_0000	S000	PAR	28-01-88 17:45	NEAR RIG
224	4	28-01-88 18:00	_0000	S000	STD	28-01-88 18:31	300M NO WATER, NEAR RIG
225	4	28-01-88 21:00	_0000	S000	STD	28-01-88 21:21	300M NO WATER, NEAR RIG
226	4						
227	4						
228	4						
229	4						
230	4						
231	4	31-01-88 20:07	G2523	S000	STD	31-01-88 20:30	300M NO WATER
232	4	31-01-88 21:26	G2522	S000	STD	31-01-88 21:54	300M NO WATER
233	4						
234	4	31-01-88 22:40	G2521	S000	STD	31-01-88 23:10	300M NO WATER
235	4	01-02-88 00:03	G2621	S000	STD	01-02-88 00:24	300M NO WATER
236	4						
237	4	01-02-88 01:21	G2622	S000	STD	01-02-88 01:42	300M NO WATER
238	4						
239	4	01-02-88 03:15	G2623	S000	STD	01-02-88 03:31	300M NO WATER
240	4	01-02-88 04:47	G2624	S000	STD	01-02-88 05:05	300M NO WATER
241	4	01-02-88 06:20	G2625	S000	STD	01-02-88 06:56	300M NO WATER
242	4	01-02-88 08:18	G2626	S000	STD	01-02-88 08:32	300M NO WATER
243	4	01-02-88 09:20	G2526	S000	STD	01-02-88 09:40	300M NO WATER
244	4						
245	4	01-02-88 14:59	G2525	S006	PAR	01-02-88 15:45	
246	4	01-02-88 16:19	G2525	S006	STD	01-02-88 17:42	1500M WITH WATER
247	4	01-02-88 16:57	G2525	S006	PNET	01-02-88 17:03	50M 20UM
248	4	01-02-88 18:40	G2524	S000	STD	01-02-88 18:55	300M NO WATER
249	4	01-02-88 19:50	G2424	S000	STD	01-02-88 20:05	300M NO WATER
250	4	01-02-88 21:04	G2425	S000	STD	01-02-88 21:25	300M NO WATER

Eventlog for JR08

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
251	4	01-02-88 22:18	G2426	S000	STD	01-02-88 22:35	300M NO WATER
252	4	02-02-88 02:12	_0000	S000	FNET	02-02-88 02:22	
253	4	02-02-88 03:00	G2525	S000	STD	02-02-88 04:00	WATER SAMPLES ONLY
254	4	02-02-88 04:07	G2525	S000	STD	02-02-88 04:30	300M WITH WATER
255	4	02-02-88 06:38	_0000	S000	BUOY	02-02-88 23:00	OWENS RIG
256	4	02-02-88 09:35	_0000	S000	STD	02-02-88 09:57	300M NO WATER, NEAR RIG
257	4	02-02-88 11:58	_0000	S000	STD	02-02-88 12:20	300M NO WATER , NEAR RIG
258	4	02-02-88 14:28	_0000	S000	STD	02-02-88 14:08	300M WITH WATER FOR MOKAG
259	4	02-02-88 15:40	_0000	S000	PAR	02-02-88 16:09	NEAR RIG
260	4	02-02-88 16:25	_0000	S000	STD	02-02-88 16:45	300M NO WATER, NEAR RIG
261	4	02-02-88 19:40	_0000	S000	STD	02-02-88 19:40	300M NO WATER, NEAR RIG
262	4	03-02-88 02:04	_0000	S000	FNET	03-02-88 02:15	
263	4	03-02-88 08:50	G2226	S000	STD	03-02-88 09:10	300M NO WATER
264	4	03-02-88 09:55	G2126	S000	STD	03-02-88 10:10	300M NO WATER
265	4	03-02-88 11:20	G2125	S000	STD	03-02-88 11:42	300M NO WATER
266	4	03-02-88 12:39	G2124	S000	STD	03-02-88 13:00	300M NO WATER
267	4	03-02-88 14:08	G2224	S000	STD	03-02-88 14:32	300M NO WATER
268	4	03-02-88 15:42	G2323	S007	PAR	03-02-88 16:14	
269	4	03-02-88 16:28	G2323	S007	STD	03-02-88 17:15	
270	4	03-02-88 17:25	G2323	S007	FNET	03-02-88 17:35	50M 200, CANCELLED ON NAVLOG
271	4	03-02-88 18:44	G2324	S000	STD	03-02-88 19:12	300M NO WATER
272	4	03-02-88 20:02	G2325	S000	STD	03-02-88 20:27	300M NO WATER
273	4	03-02-88 21:13	G2225	S000	STD	03-02-88 21:36	300M NO WATER
274	4	04-02-88 00:05	G2423	S000	STD	04-02-88 00:25	300M NO WATER
275	4	04-02-88 01:46	G2422	S000	STD	04-02-88 02:04	300M NO WATER
276	4	04-02-88 03:29	G2323	S007	STD	04-02-88 03:48	300M WITH WATER
277	4	04-02-88 04:20	G2323	S007	STD	04-02-88 05:10	WATER SAMPLES
278	4	04-02-88 06:15	G2323	S007	BUOY	04-02-88 22:45	OWENS RIG
279	4	04-02-88 09:37	G2222	S000	STD	04-02-88 09:50	300M NO WATER
280	4	04-02-88 11:00	G2223	S000	STD	04-02-88 11:25	300M NO WATER
281	4	04-02-88 13:31	G2123	S000	STD	04-02-88 13:28	3000M WITH WATER
282	4	04-02-88 16:34	G2122	S000	PAR	04-02-88 17:05	
283	4	04-02-88 17:40	G2122	S000	STD	04-02-88 17:59	300M NO WATER
284	4	04-02-88 18:46	G2121	S000	STD	04-02-88 19:06	300M NO WATER
285	4	05-02-88 02:04	_0000	S000	FNET	05-02-88 02:14	
286	4	05-02-88 02:38	G2221	S000	STD	05-02-88 02:59	300M NO WATER
287	4	05-02-88 04:23	G2321	S000	STD	05-02-88 04:40	300M NO WATER
288	4	05-02-88 05:47	G2322	S000	STD	05-02-88 06:05	300M NO WATER
289	4	05-02-88 07:28	G2421	S000	STD	05-02-88 07:44	300M NO WATER
290	4	05-02-88 16:05	_0000	S008	PAR	05-02-88 16:45	C.20M OFF CUMBERLAND BAY
291	4	05-02-88 17:15	_0000	S008	STD	05-02-88 17:45	190M WITH WATER, C.20M OFF CUMBERLAND BAY
292	4	05-02-88 17:56	_0000	S008	FNET	05-02-88 18:03	C.20M OFF CUMBERLAND BAY
293	5	08-02-88 00:10	_0000	S000	RMT	08-02-88 00:25	
294	5	08-02-88 02:28	_0000	S000	RMT	08-02-88 03:14	
295	5	08-02-88 04:22	_0000	S000	RMT	08-02-88 05:00	
296	5	08-02-88 14:45	_0000	S000	RMT	08-02-88 15:45	CANCELLED ON NAVLOG
297	5	08-02-88 16:30	_0000	S000	RMT	08-02-88 18:10	
298	5						WRONG CODE ENTERED
299	5	09-02-88 02:35	_0000	S000	FNET	09-02-88 02:12	CUMBERLAND BAY
300	6	09-02-88 18:05	T0001	S000	ECHO	11-02-88 05:00	STROMNESS TOWARDS STANLEY

Event log for JB08

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
301	6	10-02-88 06:28	T0001	S000	UOR	10-02-88 22:05	DOWN BELOW THE SEA SO FAR, HOW I WONDER WHERE YOU'RE NOW LOST.
302	6	10-02-88 15:27	T0001	S000	H2O	10-02-88 15:38	PUMP WATER
303	6	11-02-88 18:31	T0001	S000	H2O	11-02-88 19:05	SURFACE WATER 3H THYM/BLOCK
304	6	12-02-88 12:43	T0001	S000	H2O	12-02-88 12:48	PUMP
305	6	12-02-88 15:17	T0001	S000	H2O	12-02-88 15:20	SURFACE WATER AMINO ACIDS
306	6	12-02-88 17:30	T0001	S000	H2O	12-02-88 17:33	SURFACE WATER AMINO ACIDS
307	6	12-02-88 20:20	T0001	S000	H2O	12-02-88 20:21	SURFACE WATER AMINO ACIDS
308	7	16-02-88 23:44	T0001	S000	XBT	16-02-88 23:48	
309	7	17-02-88 03:24	T0001	S000	STD	17-02-88 04:25	1000M WITH BOTTLES
310	7	17-02-88 05:26	T0001	S000	XBT	17-02-88 05:28	T-7
311	7	17-02-88 06:12	T0001	S000	XBT	17-02-88 06:15	T-7
312	7	17-02-88 07:08	T0001	S000	STD	17-02-88 07:40	500M
313	7	17-02-88 08:50	T0001	S000	XBT	17-02-88 08:53	FAILED T4
314	7	17-02-88 09:12	T0001	S000	XBT	17-02-88 09:14	T4
315	7	17-02-88 09:54	T0001	S000	XBT	17-02-88 09:55	T4 FAILED AT 90M
316	7	17-02-88 10:08	T0001	S000	XBT	17-02-88 10:09	T4
317	7	17-02-88 10:54	T0001	S000	STD	17-02-88 11:10	
318	7	17-02-88 12:35	T0001	S000	XBT	17-02-88 12:37	T4
319	7	12-02-88 13:22	T0001	S000	XBT	17-02-88 13:24	T4
320	7	17-02-88 14:15	T0001	S000	STD	17-02-88 14:54	SECOND ATTEMPT
321	7	17-02-88 15:55	T0001	S000	XBT	17-02-88 16:00	T4
322	7	17-02-88 16:38	T0001	S000	XBT	17-02-88 16:45	T4
323	7	17-02-88 17:38	T0001	S000	STD	17-02-88 18:58	1800M
324	7	17-02-88 19:55	T0001	S000	XBT	17-02-88 20:00	T7
325	7	17-02-88 20:49	T0001	S000	XBT	17-02-88 20:54	T7
326	7	17-02-88 21:55	T0001	S000	STD	17-02-88 22:20	500M
327	7	17-02-88 23:22	T0001	S000	XBT	17-02-88 23:25	T-7
328	7	18-02-88 00:15	T0001	S000	XBT	18-02-88 00:16	T-7
329	7	18-02-88 01:09	T0001	S000	STD	18-02-88 03:45	3800M
330	7	18-02-88 04:26	T0001	S000	XBT	18-02-88 04:48	T-7
331	7	18-02-88 05:30	T0001	S000	XBT	18-02-88 05:32	T-7
332	7	18-02-88 06:27	T0001	S000	STD	18-02-88 07:30	1000M
333	7	18-02-88 08:04	T0001	S000	UOR	18-02-88 11:40	UOR NO 2!
334	7	18-02-88 12:04	T0001	S000	BUOY	18-02-88 12:05	TOGA BUOY NO 1
335	7	18-02-88 12:37	T0001	S000	UOR	18-02-88 18:09	
336	7	18-02-88 15:38	T0001	S000	H2O	18-02-88 15:40	SURFACE SAMPLE FOR GRADIENT BLOCK
337	7	18-02-88 15:51	T0001	S000	ECHO	18-02-88 18:10	LOGGED TO OCEAN LOGGER
338	7	18-02-88 16:02	T0001	S000	XBT	18-02-88 16:03	T-7
339	7	18-02-88 17:13	T0001	S000	XBT	18-02-88 17:14	T-7
340	7	18-02-88 19:15	T0001	S000	STD	18-02-88 20:20	2100M
341	7	18-02-88 20:48	T0001	S000	UOR	18-02-88 23:59	
342	7	18-02-88 21:29	T0001	S000	XBT	18-02-88 21:30	T-7
343	7	18-02-88 22:17	T0001	S000	XBT	18-02-88 22:18	T-7
344	7	19-02-88 08:41	T0001	S000	STD	19-02-88 09:22	500M
345	7	19-02-88 10:22	T0001	S000	XBT	19-02-88 10:24	TT-7
346	7	19-02-88 11:25	T0001	S000	XBT	19-02-88 11:27	T-7
347	7	19-02-88 12:14	T0001	S000	BUOY	19-02-88 12:15	TOGA BUOY NO 2
348	7	19-02-88 12:24	T0001	S000	STD	19-02-88 14:27	WATCHING OVER TOGA BUOY
349	7	19-02-88 15:30	T0001	S000	XBT	19-02-88 15:31	T-7

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
350	7	19-02-88 16:19	T0001	S000	XBT	19-02-88 16:20	T-7
351	7	19-02-88 17:19	T0001	S000	STD	19-02-88 17:50	FAILED TO CLOSE OPENDATA
352	7	19-02-88 17:53	T0001	S000	STD	19-02-88 18:18	REPEAT OF E351
353	7	19-02-88 18:19	T0001	S000	STD	19-02-88 18:43	REPEAT OF E351&E352
354	7	19-02-88 19:52	T0001	S000	XBT	19-02-88 19:53	T-7
355	7	19-02-88 20:42	T0001	S000	XBT	19-02-88 20:43	T-7
356	7	19-02-88 21:40	T0001	S000	STD	20-02-88 01:39	3600M
357	7	20-02-88 02:50	T0001	S000	XBT	20-02-88 02:53	T-7
358	7	20-02-88 03:51	T0001	S000	XBT	20-02-88 03:53	T-7
359	7	20-02-88 04:50	T0001	S000	STD	20-02-88 05:19	500M
360	7	20-02-88 06:22	T0001	S000	XBT	20-02-88 06:25	T-7
361	7	20-02-88 07:10	T0001	S000	XBT	20-02-88 07:14	T-7
362	7	20-02-88 08:20	T0001	S000	STD	20-02-88 08:35	EVENT CANCELLED DUE TO BAD WEATHER
363	7	21-02-88 01:10	T0001	S000	STD	21-02-88 03:11	3500M
364	7	21-02-88 04:18	T0001	S000	XBT	21-02-88 04:20	T-7
365	7	21-02-88 05:05	T0001	S000	XBT	21-02-88 05:07	T-7
366	7	21-02-88 06:05	T0001	S000	STD	21-02-88 06:37	500M
367	7	21-02-88 07:35	T0001	S000	XBT	21-02-88 07:38	T-7
368	7	21-02-88 08:30	T0001	S000	XBT	21-02-88 08:33	T-7
369	7	21-02-88 09:21	T0001	S000	BUOY	21-02-88 09:22	TOGA BUOY NO 3
370	7	21-02-88 09:39	T0001	S000	STD	21-02-88 11:36	3300M
371	7	21-02-88 12:50	T0001	S000	XBT	21-02-88 12:53	T-7
372	7	21-02-88 13:49	T0001	S000	XBT	21-02-88 13:50	T-7
373	8	21-02-88 13:57	T0001	S000	UOR	21-02-88 18:32	
374	8	21-02-88 13:58	T0001	S000	ECHO	21-02-88 18:45	
375	8	21-02-88 19:01	T0002	S000	ECHO	21-02-88 23:04	
376	8	21-02-88 22:55	T0002	S000	H2O	21-02-88 23:16	PUMP WATER
377	8	21-02-88 23:13	T0003	S000	ECHO	22-02-88 06:00	
378	8	22-02-88 06:09	T0004	S000	ECHO	22-02-88 11:39	LOGGED TO OCEAN LOGGER
379	8	22-02-88 12:04	T0005	S000	ECHO	22-02-88 17:15	LOGGED TO OCEAN LOGGER
380	8	22-02-88 16:03	T0005	S000	H2O	22-02-88 16:05	SURFACE SAMPLE FOR 3H AA BLOCK EXPT
381	8	22-02-88 17:25	_0000	S000	PAR	22-02-88 18:24	
382	8	22-02-88 19:49	_0000	S000	STD	22-02-88 20:30	
383	8	22-02-88 20:42	T0006	S000	UOR	23-02-88 11:05	
384	8	22-02-88 20:42	T0006	S000	ECHO	23-02-88 11:02	LOGGED TO OCEAN LOGGER
385	8	22-02-88 21:58	T0006	S000	H2O	22-02-88 22:39	PUMP INLET
386	8	23-02-88 00:01	T0006	S000	H2O	23-02-88 00:02	SURFACE SAMPLE FOR BACTERIA COUNTS
387	8	23-02-88 03:10	T0006	S000	H2O	23-02-88 03:18	SURFACE SAMPLE FOR BACTERIA COUNTS
388	8	23-02-88 06:50	T0006	S000	H2O	23-02-88 06:55	SURFACE SAMPLE FOR BACTERIA COUNTS
389	8	23-02-88 11:05	_0000	S001	H2O	23-02-88 11:06	SURFACE SAMPLE FOR BACTERIA COUNTS
390	8	23-02-88 11:21	_0000	S001	STD	23-02-88 11:53	
391	8	23-02-88 14:59	_0000	S002	STD	23-02-88 16:00	500M
392	8	23-02-88 18:08	_0000	S003	PAR	23-02-88 19:03	
393	8	23-02-88 19:14	_0000	S003	STD	23-02-88 20:00	480M
394	8	23-02-88 20:06	_0000	S003	PNET	23-02-88 20:23	50M
395	8						
396	8	23-02-88 22:48	_0000	S004	STD	23-02-88 23:42	600M
397	8						
398	8	23-02-88 04:21	_0000	S003	STD	24-02-88 05:13	WATER ONLY
399	8	24-02-88 05:18	_0000	S003	STD	24-02-88 05:30	WATER ONLY

Eventlog for Jlow

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
400	8	24-02-88 07:00	_0000	S003	C14	25-02-88 07:00	DECK INCUBATION C14 & HI5
401	8	24-02-88 09:10	_0000	S005	STD	24-02-88 04:35	100M
402	8	25-02-88 01:51	_0000	S000	FNET	25-02-88 02:10	
403	8	25-02-88 02:12	_0000	S000	FNET	25-02-88 02:23	
404	8						
405	8						
406	8						
407	8	25-02-88 16:15	_0000	S007	PAR	25-02-88 16:45	
408	8	25-02-88 16:57	_0000	S007	H2O	25-02-88 17:31	SURFACE WATER
409	8	25-02-88 17:11	_0000	S007	STD	25-02-88 17:58	WATER
410	8	25-02-88 18:07	_0000	S007	PNET	25-02-88 18:20	500 200 MESH
411	8						
412	8						
413	8	26-02-88 01:40	_0000	S000	FNET	26-02-88 02:05	
414	8	26-02-88 04:07	_0000	S007	STD	26-02-88 04:23	100M WITH WATER
415	8	26-02-88 05:35	_0000	S007	STD	26-02-88 05:55	100M WITH WATER
416	8	26-02-88 08:04	_0000	S007	BUOY	26-02-88 23:00	OWERS RIG
417	8	26-02-88 09:20	_0000	S000	H2O	26-02-88 09:43	WATER SAMPLE
418		26-02-88 10:50	_0000	S007	C14	26-02-88 12:53	DECK EXPT 3 - GROWTH STUDY
419	8	26-02-88 13:00	_0000	S000	STD	26-02-88 13:35	500M WITH WATER
420	8	26-02-88 13:50	_0000	S000	C14	26-02-88 13:35	DECK EXPT LO-HI LIGHT
421	8	26-02-88 15:47	_0000	S000	STD	26-02-88 16:07	250M
422	8	26-02-88 16:37	_0000	S000	PAR	26-02-88 17:12	
423	8	26-02-88 17:20	T0007	S000	ECHO	26-02-88 21:30	DOR & OCEAN LOGGER - GRID OF TRANSECTS IN GERLACHE ST
424	8	26-02-88 23:33	_0000	S000	PCM	27-02-88 00:05	CURRENT METER AT 40M
425	8	27-02-88 00:20	T0008	S000	ECHO	27-02-88 09:34	LOG TO OLOG
426	8	27-02-88 01:55	T0008	S000	FNET	27-02-88 02:15	
427	8	27-02-88 03:30	T0008	S000	H2O	27-02-88 03:35	SURFACE WATER
428	8	27-02-88 03:45	T0008	S000	DOR	27-02-88 08:17	
429	8	27-02-88 06:30	-0000	S000	H2O	27-02-88 06:35	SURFACE WATER
430	8	27-02-88 08:30	-0000	S000	H2O	27-02-88 08:35	SURFACE WATER
431	8	27-02-88 10:58	-0000	S000	C14	27-02-88 13:20	14C INCUBATION IN HOLDING TANK
432	8	27-02-88 13:56	-0000	S006	STD	27-02-88 14:55	100M PLUS PCM
433	8	27-02-88 16:00	-0000	S006	PAR	27-02-88 16:57	
434	8	27-02-88 17:35	-0000	S006	STD	27-02-88 18:16	250M
435	8	27-02-88 18:08	-0000	S006	PNET	27-02-88 18:35	
436	8	28-02-88 04:01	-0000	S006	STD	28-02-88 05:01	WATER SAMPLES ONLY
437	8	28-02-88 08:00	_0000	S006	BUOY	28-02-88 15:00	
438	8	28-02-88 11:03	_0000	S000	C14	28-02-88 13:05	INCUBATION IN HOLDING TANK
439	8	28-02-88 13:00	_0000	S000	STD	28-02-88 13:06	NEXT TO RIG
440	8	28-02-88 13:08	_0000	S000	C14	28-02-88 17:40	DECK INCUBATION
441	8	28-02-88 15:13	T0009	S000	ECHO	29-02-88 15:16	LOG TO OCEANLOGGER
442	8	28-02-88 18:41	T0009	S000	H2O	28-02-88 18:53	SURFACE WATER SAMPLE
443	8	28-02-88 21:51	T0009	S000	H2O	28-02-88 21:52	SURFACE WATER SAMPLE
444	8	28-02-88 22:39	T0009	S000	H2O	28-02-88 22:44	SURFACE WATER SAMPLE
445	8	29-02-88 01:46	T0009	S000	FNET	29-02-88 01:56	
446	8	29-02-88 02:04	T0009	S000	FNET	29-02-88 02:14	
447	8	29-02-88 03:00	T0009	S000	H2O	29-02-88 03:05	SURFACE WATER SAMPLE
448	8	29-02-88 03:15	T0009	S000	H2O	29-02-88 03:23	SURFACE WATER SAMPLE

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
448	8	29-02-88 06:00	T0009	S005	H2O	29-02-88 06:05	SURFACE WATER SAMPLE
450	8	29-02-88 09:00	T0009	S006	H2O	29-02-88 09:03	SURFACE WATER SAMPLE
451	8	29-02-88 09:46	T0009	S006	H2O	29-02-88 09:49	SURFACE WATER SAMPLE
452	8	29-02-88 11:08	T0009	S006	C14	29-02-88 13:10	INCUBATION IN HOLDING TANK
453	8	29-02-88 14:16	T0009	S006	H2O	29-02-88 14:18	SURFACE WATER SAMPLE
454	8	29-02-88 16:01	T0000	S008	PAR	29-02-88 16:35	
455	8	29-02-88 16:46	T0000	S005	STD	29-02-88 17:38	650M
456	8	29-02-88 17:44	_0000	S008	PNET	29-02-88 18:00	50M DEPTH, 20U MESH
457	8	29-02-88 18:00	T0010	S009	ECHO	29-02-88 21:53	LOG TO OCEAN LOGGER
458	8	29-02-88 21:59	T0000	S009	STD	29-02-88 22:45	PLUS SURFACE WATER
459	8	29-02-88 22:19	T0000	S009	H2O	29-02-88 22:43	SURFACE WATER SAMPLE
460	8	29-02-88 23:09	T0011	S000	UOR	01-03-88 03:39	
461	8	29-02-88 23:09	T0011	S000	ECHO	01-03-88 03:39	LOG TO OCEAN LOGGER
462	8	01-03-88 01:10	T0011	S000	H2O	01-03-88 01:13	SURFACE WATER SAMPLE
463	8	01-03-88 04:01	T0000	S008	STD	01-03-88 04:59	WATER SAMPLES ONLY
464	8	01-03-88 06:38	T0000	S008	C14	02-03-88 06:34	DECK INCUBATION
465	8	01-03-88 07:30	T0012	S000	ECHO	02-03-88 06:34	LOG TO OCEAN LOGGER
466	8	01-03-88 11:00	T0012	S000	C14	01-03-88 12:58	INCUBATION IN HOLDING TANK
467	8	01-03-88 12:57	T0012	S000	UOR	01-03-88 17:25	NOT TV AS RECORDED ON NAVLOG
468	8	01-03-88 17:44	T0000	S007	PAR	01-03-88 18:10	
469	8	01-03-88 20:48	T0000	S007	STD	01-03-88 22:00	PLUS CURRENT METER
470	8	02-03-88 00:26	T0013	S000	ECHO	02-03-88 07:55	LOG TO OCEAN LOGGER
471	8	02-03-88 03:00	T0013	S000	H2O	02-03-88 03:25	SURFACE WATER FOR TEMP GRADIENT BLOCK
472	8	02-03-88 07:50	T0000	S005	STD	02-03-88 03:25	100M WITH WATER
473	8	02-03-88 08:29	T0014	S000	ECHO	02-03-88 13:34	LOG TO OCEAN LOGGER
474	8	02-03-88 10:37	T0014	S000	UOR	02-03-88 13:33	
475	8	02-03-88 11:00	T0014	S000	C14	02-03-88 13:02	INCUBATION IN HOLDING TANK
476	8	02-03-88 11:00	T0000	S004	STD	02-03-88 13:02	
477	8	02-03-88 14:38	T0015	S000	UOR	02-03-88 16:49	
478	8	02-03-88 14:38	T0015	S000	ECHO	02-03-88 16:50	LOG TO OCEAN LOGGER
479	8	02-03-88 17:32	T0000	S003	STD	02-03-88 18:20	
480	8	02-03-88 18:34	T0016	S000	UOR	02-03-88 21:58	
481	8	02-03-88 18:34	T0016	S000	ECHO	02-03-88 21:58	LOG TO OCEAN LOGGER
482	8						CANCELLED
483	8	02-03-88 22:22	_0000	S002	STD	02-03-88 22:52	150M
484	8	02-03-88 22:57	T0017	S000	ECHO	03-03-88 03:04	LOG TO OCEAN LOGGER
485	8	03-03-88 03:15	_0000	S001	STD	03-03-88 03:55	680M
486	8	03-03-88 04:08	T0018	S000	ECHO	03-03-88 19:42	LOG TO OCEAN LOGGER
487	8	03-03-88 09:05	T0018	S000	UOR	03-03-88 13:08	
488	8	03-03-88 10:14	T0018	S005	H2O	03-03-88 10:17	SURFACE WATER SAMPLED FROM WELLDECK FOR HELEN
489	8						
490	8	03-03-88 11:17	T0018	S000	C14	03-03-88 13:15	INCUBATION IN HOLDING TANK
491	8	03-03-88 13:55	T0018	S000	UOR	03-03-88 18:30	
492	9	03-03-88 19:42	_0000	S001	STD	03-03-88 20:25	KING GEORGE BAY
493	9	03-03-88 20:29	_0000	S001	H2O	03-03-88 20:32	SURFACE WATER SAMPLED FROM WELLDECK FOR HELEN
494	9	03-03-88 20:35	T0001	S000	UOR	03-03-88 22:31	
495	9	03-03-88 20:35	T0001	S000	ECHO	03-03-88 22:33	LOG TO OCEAN LOGGER
496	9	03-03-88 22:36	_0000	S002	STD	04-03-88 00:01	1880M WITH WATER
497	9	04-03-88 00:09	T0002	S000	ECHO	04-03-88 04:16	LOG TO OCEANLOGGER
498	9	04-03-88 04:25	_0000	S003	STD	04-03-88 04:55	500M

Eventlog for J1808

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
499	9	04-03-88 05:08	T0003	S000	ECHO	04-03-88 06:40	LOG TO OCEANLOGGER
500	9	04-03-88 05:26	T0003	S000	H2O	04-03-88 05:29	SURFACE WATER SAMPLED FROM WELLBECK FOR HELEN
501	9	04-03-88 08:09	T0004	S000	ECHO	04-03-88 14:00	LOG TO OCEANLOGGER
502	9	04-03-88 09:49	T0004	S000	UOR	04-03-88 14:00	
503	9	04-03-88 11:07	T0004	S000	C14	04-03-88 13:09	INCUBATION IN HOLDING TANK
504	10	04-03-88 14:07	_0000	S001	STD	04-03-88 14:45	650M
505	10						
506	10	04-03-88 14:56	T0001	S000	UOR	04-03-88 17:36	
507	10	04-03-88 14:59	T0001	S000	ECHO	04-03-88 17:35	LOG TO OCEANLOGGER
508	10	04-03-88 17:45	_0000	S002	STD	04-03-88 18:19	
509	10	04-03-88 18:13	T0002	S000	ECHO	04-03-88 20:42	LOG TO OCEANLOGGER
510	10	04-03-88 18:26	T0002	S000	H2O	04-03-88 18:28	SURFACE WATER FOR GLUT/MICRO
511	10	04-03-88 20:47	_0000	S003	STD	04-03-88 21:07	
512	10	04-03-88 21:18	T0003	S000	UOR	05-03-88 00:07	
513	10	04-03-88 21:18	T0003	S000	ECHO	05-03-88 00:07	LOG TO OCEANLOGGER
514	10	05-03-88 00:36	_0000	S004	STD	05-03-88 01:13	
515	10						
516	10	05-03-88 01:24	T0004	S000	ECHO	05-03-88 05:10	LOG TO OCEANLOGGER
517	10	05-03-88 05:20	_0000	S005	STD	05-03-88 06:34	
518	10	05-03-88 06:34	T0005	S000	ECHO	05-03-88 09:34	LOG TO OCEANLOGGER
519	10	05-03-88 06:57	T0005	S000	H2O	05-03-88 07:01	SURFACE WATER FOR TEMP GRADIENT BLOCK EXPT
520	10	05-03-88 09:36	_0000	S006	STD	05-03-88 11:26	
521	10	05-03-88 11:05	_0000	S006	C14	05-03-88 11:13	INCUBATION IN HOLDING TANK
522	10	05-03-88 11:35	T0006	S000	UOR	05-03-88 14:16	FIXED DEPTH
523	10	05-03-88 11:35	T0006	S000	ECHO	05-03-88 14:26	LOG TO OCEANLOGGER
524	10						
525	10						
526	10	05-03-88 15:21	_0000	S007	STD	05-03-88 17:00	3000M
527	10						
528	10	05-03-88 17:50	_0000	S007	H2O	05-03-88 17:53	SURFACE WATER FOR HELEN
529	10	05-03-88 17:51	T0007	S000	UOR	05-03-88 21:00	
530	10	05-03-88 17:52	T0007	S000	ECHO	05-03-88 21:17	LOG TO OCEANLOGGER
531	10	05-03-88 21:20	_0000	S008	STD	05-03-88 23:30	3000M
532	10	05-03-88 23:38	T0008	S000	ECHO	06-03-88 03:36	LOG TO OCEANLOGGER
533	10	06-03-88 07:18	T0009	S000	ECHO	06-03-88 08:23	LOG TO OCEANLOGGER
534	10	06-03-88 08:23	_0000	S009	STD	06-03-88 09:25	1000M
535	10	06-03-88 09:37	T0010	S000	ECHO	06-03-88 11:48	STOPPED DIFF STN
536	10	06-03-88 11:11	_0000	S000	C14	06-03-88 14:08	INCUBATION IN HOLDING TANK
537	10	06-03-88 11:59	_0000	S010	STD	06-03-88 13:36	2500M
538	10	06-03-88 13:43	T0011	S000	ECHO	06-03-88 17:04	LOTS OF ICEBERGS ABOUT
539	10	06-03-88 17:12	_0000	S011	STD	06-03-88 17:48	800M
540	10	06-03-88 18:04	T0012	S000	ECHO	06-03-88 20:40	LOG TO OCEANLOGGER
541	10	06-03-88 20:45	_0000	S012	STD	06-03-88 21:16	150M
542	10	06-03-88 21:23	T0013	S000	ECHO	06-03-88 23:09	ARRIVED AT SIGNY IS.
543	10	06-03-88 23:00	_0000	S000	H2O	06-03-88 23:05	SIGNY IS. WATER SAMPLE GC
544	10	07-03-88 11:06	_0000	S000	C14	07-03-88 13:19	INCUBATION IN HOLDING TANK
545	11	07-03-88 20:00	_0000	S000	H2O	07-03-88 20:08	
546	11	07-03-88 20:07	T0001	S000	ECHO	08-03-88 01:59	LOG TO OCEANLOGGER
547	11	08-03-88 02:06	_0000	S018	STD	08-03-88 02:27	160M
548	11	08-03-88 02:37	T0002	S000	ECHO	08-03-88 06:30	LOG TO OCEANLOGGER

Eventlog for JB08

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
549	11	08-03-88 02:38	T0002	S000	UOR	08-03-88 06:27	
550	11	08-03-88 06:40	_0000	S017	STD	08-03-88 10:10	
551	11	08-03-88 10:14	T0003	S000	ECHO	08-03-88 13:15	LOG TO OCEANLOGGER
552	11	08-03-88 10:14	T0003	S000	UOR	08-03-88 12:52	RECOVERED EARLY DUE TO ICE
553	11	08-03-88 11:04	_0000	S000	C14	08-03-88 13:09	INCUBATION IN HOLDING TANK
554	11	08-03-88 13:07	_0000	S016	STD	08-03-88 14:38	CLOSE!
555	11	08-03-88 14:51	T0004	S000	UOR	01-03-88 17:18	
556	11	08-03-88 14:52	T0004	S000	ECHO	01-03-88 17:23	LOG TO OCEANLOGGER
557	11	08-03-88 17:30	_0000	S015	STD	08-03-88 18:22	3200M
558	11	08-03-88 18:32	T0005	S000	UOR	08-03-88 21:15	
559	11	08-03-88 18:33	T0005	S000	ECHO	08-03-88 21:45	LOG TO OCEANLOGGER
560	11	08-03-88 18:33	_0000	S014	STD	08-03-88 21:15	1480M
561	11	08-03-88 22:50	T0006	S000	UOR	09-03-88 02:50	
562	11	08-03-88 22:50	T0006	S000	ECHO	09-03-88 07:50	LOG TO OCEANLOGGER
563	11	09-03-88 02:56	_0000	S013	STD	09-03-88 04:28	2500M
564	11	09-03-88 03:52	_0000	S013	ZNET	09-03-88 04:56	40M 300U
565	11	09-03-88 04:38	T0007	S000	ECHO	09-03-88 08:03	LOG TO OCEAN LOGGER
566	11	09-03-88 04:43	T0007	S000	UOR	09-03-88 09:03	NOT UNDULATING!
567	11	09-03-88 08:02	_0000	S012	STD	09-03-88 09:57	NO WATER
568	11	09-03-88 10:15	T0008	S000	ECHO	09-03-88 12:54	LOG TO OCEANLOGGER
569	11	09-03-88 10:15	T0008	S000	UOR	09-03-88 12:54	
570	11	09-03-88 11:13	_0000	S000	C14	09-03-88 13:09	INCUBATION IN HOLDING TANK
571	11	09-03-88 12:56	_0000	S011	STD	09-03-88 14:42	
572	11	09-03-88 14:58	T0009	S000	UOR	09-03-88 17:32	
573	11	09-03-88 14:58	T0009	S000	ECHO	09-03-88 17:48	LOG TO OCEANLOGGER
574	11	09-03-88 17:51	_0000	S010	STD	09-03-88 19:44	3175M
575	11	09-03-88 19:54	T0010	S000	ECHO	09-03-88 23:00	LOG TO OCEANLOGGER
576	11	09-03-88 19:54	T0010	S000	UOR	09-03-88 22:46	
577	11	09-03-88 23:03	_0000	S009	STD	10-03-88 01:25	3600M
578	11	10-03-88 01:34	T0011	S000	UOR	10-03-88 04:31	BACKTRACK TO CHPL FEATURE - LAST TOW!
579	11	10-03-88 01:34	T0011	S000	ECHO	10-03-88 09:51	BACKTRACK TO CHPL FEATURE - LOG TO OCEANLOGGER
580	11	10-03-88 10:15	_0000	S008	STD	10-03-88 12:14	NO WATER
581	11	10-03-88 11:06	_0000	S000	C14	10-03-88 13:21	INCUBATION IN HOLDING TANK
582	11	10-03-88 12:24	T0012	S000	ECHO	10-03-88 15:13	LOG TO OCEANLOGGER
583	11	10-03-88 14:42	T0012	S000	H2O	10-03-88 14:58	3H AMINO ACID TEMP GRADIENT BLOCK EXPT
584	11	10-03-88 15:22	_0000	S007	STD	10-03-88 17:03	NO WATER, 3275M
585	11	10-03-88 17:05	T0013	S000	ECHO	10-03-88 19:53	LOG TO OCEAN LOGGER
586	11	10-03-88 19:59	_0000	S006	STD	10-03-88 20:00	NO WATER, 3005M
587	11	10-03-88 22:09	T0014	S000	ECHO	10-03-88 20:00	LOG TO OCEANLOGGER
588	11	11-03-88 02:06	_0000	S005	STD	11-03-88 04:05	
589	11	11-03-88 04:40	T0015	S000	ECHO	11-03-88 07:33	LOG TO OCEANLOGGER
590	11	11-03-88 07:40	_0000	S004	STD	11-03-88 09:50	3200M
591	11	11-03-88 09:57	T0016	S000	ECHO	11-03-88 12:43	
592	11	11-03-88 13:10	_0000	S003	STD	11-03-88 15:45	
593	11	11-03-88 15:49	T0017	S000	ECHO	11-03-88 18:36	LOG TO OCEANLOGGER
594	11	11-03-88 18:43	_0000	S002	STD	11-03-88 19:04	
595	11	11-03-88 19:14	T0018	S000	ECHO	11-03-88 22:12	LOG TO OCEANLOGGER
596	11	11-03-88 22:17	_0000	S001	STD	11-03-88 22:31	150M
597	11	11-03-88 22:42	T0019	S000	ECHO	12-03-88 09:15	LOG TO OCCEANLOGGER
598	11	11-03-88 23:42	T0019	S000	H2O	11-03-88 23:45	

Event log for JR88

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
599	12	12-03-88 18:33	_0000	S000	H2O	12-03-88 18:35	STROMNESS
600	12	12-03-88 18:49	_0000	S000	H2O	12-03-88 19:03	STROMNESS
601	12	17-03-88 17:15	_0000	S000	H2O	17-03-88 17:23	GRYTVIKEN
602	12	17-03-88 17:38	T0001	S000	ECHO	19-03-88 11:53	LOG TO OCEANLOGGER
603	12	17-03-88 17:59	T0001	S000	H2O	17-03-88 18:02	
604	12	17-03-88 20:18	T0001	S000	XBT	17-03-88 20:19	T-4
605	12	17-03-88 21:05	T0001	S000	H2O	17-03-88 21:08	WELLDECK SAMPLE FOR HELEN
606	12	17-03-88 21:12	T0001	S000	XBT	17-03-88 21:14	T-4
607	12	17-03-88 22:23	T0001	S000	XBT	17-03-88 22:24	T-7
608	12	17-03-88 22:38	T0001	S000	XBT	17-03-88 22:39	T-4 AT APPROX SAME TIME AS #607
609	12	17-03-88 23:20	T0001	S000	XBT	17-03-88 23:24	T-7
610	12	18-03-88 00:20	T0001	S000	XBT	18-03-88 00:23	T-7
611	12	18-03-88 01:18	T0001	S000	XBT	18-03-88 01:20	T-7
612	12	18-03-88 02:44	T0001	S000	XBT	18-03-88 02:46	T-7
613	12	18-03-88 04:05	T0001	S000	XBT	18-03-88 04:07	T-7
614	12	18-03-88 05:20	T0001	S000	XBT	18-03-88 05:25	T-7
615	12	18-03-88 06:38	T0001	S000	XBT	18-03-88 06:41	T-7
616	12	18-03-88 07:58	T0001	S000	XBT	18-03-88 08:02	T-7
617	12	18-03-88 09:00	T0001	S000	XBT	18-03-88 09:02	T-7
618	12	18-03-88 10:00	T0001	S000	XBT	18-03-88 10:03	T-7
619	12	18-03-88 11:00	T0001	S000	XBT	18-03-88 11:04	T-7
620	12	18-03-88 12:00	T0001	S000	XBT	18-03-88 12:04	T-7
621	12	18-03-88 13:00	T0001	S000	XBT	18-03-88 13:04	T-7
622	12	18-03-88 13:32	T0001	S000	H2O	18-03-88 13:35	WELLDECK SAMPLE FOR HELEN
623	12	18-03-88 13:39	T0001	S000	XBT	18-03-88 13:42	T-7
624	12	18-03-88 14:01	T0001	S000	XBT	18-03-88 14:03	T-7
625	12	18-03-88 14:47	T0001	S000	XBT	18-03-88 14:49	T-7
626	12	18-03-88 15:30	T0001	S000	XBT	18-03-88 15:31	T-7
627	12	18-03-88 15:47	T0001	S000	H2O	18-03-88 15:50	WELLDECK SAMPLE FOR HELEN
628	12	18-03-88 15:54	T0001	S000	H2O	18-03-88 15:58	
629	12	18-03-88 16:20	T0001	S000	XBT	18-03-88 16:21	T-7
630	12	18-03-88 16:35	T0001	S000	H2O	18-03-88 16:38	WELLDECK SAMPLE FOR HELEN
631	12	18-03-88 17:58	T0001	S000	H2O	18-03-88 17:59	BLOCK EXIT MICRO
632	12	18-03-88 16:52	T0001	S000	XBT	18-03-88 16:53	T-7
633	12	18-03-88 18:00	T0001	S000	XBT	18-03-88 18:01	T-7
634	12	18-03-88 19:13	T0001	S000	XBT	18-03-88 19:14	T-7
635	12	18-03-88 20:15	T0001	S000	XBT	18-03-88 20:16	T-7
636	12	18-03-88 21:15	T0001	S000	XBT	18-03-88 21:16	T-7
637	12	18-03-88 22:16	T0001	S000	XBT	18-03-88 22:17	T-7
638	12	18-03-88 23:26	T0001	S000	XBT	18-03-88 23:27	T-7
639	12	19-03-88 00:15	T0001	S000	XBT	19-03-88 00:16	T-7
640	12	19-03-88 01:15	T0001	S000	XBT	19-03-88 01:16	T-7
641	12	19-03-88 02:15	T0001	S000	XBT	19-03-88 02:16	T-7
642	12	19-03-88 02:42	T0001	S000	XBT	19-03-88 02:43	T-7
643	12	19-03-88 03:34	T0001	S000	XBT	19-03-88 03:36	T-4 FAILED
644	12	19-03-88 03:51	T0001	S000	XBT	19-03-88 03:54	T-7
645	12	19-03-88 04:27	T0001	S000	XBT	19-03-88 04:29	T-7 FAILED
646	12	19-03-88 04:45	T0001	S000	XBT	19-03-88 04:48	T-7
647	12	19-03-88 05:39	T0001	S000	XBT	19-03-88 05:42	T-7
648	12	19-03-88 05:39	T0001	S000	H2O	19-03-88 05:42	WELLDECK SAMPLE FOR HELEN

Eventlog for JB08

Event	Phase	Start time	Grid Transect	Station	Activity	End time	Comments
649	12	19-03-88 06:40	T0001	S000	XBT	19-03-88 06:44	T-7
650	12	19-03-88 07:42	T0001	S000	XBT	19-03-88 06:45	T-7
651	12	19-03-88 08:45	T0001	S000	XBT	19-03-88 08:50	T-7
652	12	19-03-88 09:41	T0001	S000	XBT	19-03-88 09:44	T-7
653	12	19-03-88 11:44	T0001	S000	XBT	19-03-88 11:47	T-4
654	12	19-03-88 13:06	T0001	S000	H2O	19-03-88 13:16	MICRO WATER
655	12	19-03-88 13:41	T0001	S000	XBT	19-03-88 13:44	T-7
656	12	19-03-88 16:12	T0001	S000	H2O	19-03-88 16:15	
657	12	20-03-88 02:30	T0001	S000	H2O	20-03-88 02:33	WELLDECK SAMPLE FOR HELEN
658	12	20-03-88 15:39	T0001	S000	H2O	20-03-88 15:45	
659	12	20-03-88 22:30	T0001	S000	H2O	20-03-88 22:33	WELLDECK SAMPLE FOR HELEN
660	12	21-03-88 15:29	T0001	S000	H2O	21-03-88 15:35	NOT NAVLOGGED POSN 3817.01S 400.04W

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                    -Number of  Total  Time
Cruise  Activity       events     (hours)
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JB08    BUOY                8      120.30
JB08    C14                18       87.18
JB08    ECHO               69      579.75
JB308   FNET               19        4.72
JB08    H20               110       14.00
JB08    PAR                21       17.42
JB08    PCM                 1         .53
JB08    PNET               12        2.85
JB08    RMT                19       14.88
JB08    STD               211      157.65
JB08    TOGA                3         .05
JB08    UOR                51      286.75
JB08    XBT                81        3.48
JB08    ZNET                1         .07

14 records selected.

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Appendix 4. Revised "General Safety Notes", and "Instructions for Watch Leaders"

SAFETY PROCEDURES - 0BP08 (1987-88)

This notice highlights or amplifies particular topics in the NERC 'Guidance Notes for Safety in Marine Operations' - it is in no way a substitute for that document. All members if the science group should have familiarised themselves with the appropriate parts of the 1987 revision of the NERC document before undertaking any deckwork or other tasks of potentially hazardous nature.

In the case of deck operation, the ship's officer, petty officer, senior seaman or science group watch leader is responsible for all aspects of safety. He or she will stop operations in the event of non-compliance with the safety code or of any other hazard.

In the case of laboratory procedures, the principal scientist or watch leader is responsible for safety.

However, in both situations all individuals must take the maximum possible care to ensure their own wellbeing and that of others.

Principal scientist and watch leaders are identified in the duty roster as appropriate.

Safety equipment - hard hats and safety boots (with steel toecaps) - must be worn in designated areas and where personnel are working in the way of warps or suspended loads. Harnesses will be worn and secured to strong

points whilst working gear from the foredeck, hydrographic platform or trawling deck when gates are open.

It is the individuals' responsibility to care for and check their safety gear. If in doubt, the suspect item should be replaced. Only under exceptional circumstances should other people's gear be used.

Trawl gates or other barriers should be open for the minimum time necessary for an operation. Whether closed or open, the trawl gates should be secured with the locking pins.

Members of the science group must not work any winch, or handle ropes on the drum ends.

They should not work aloft except under ideal conditions and with the prior permission of the Chief Officer.

No member of the science group should go onto the foredeck or the fo'c'sle without first obtaining clearance from the officer on the bridge. This rule will extend to all outside activities in rough conditions.

All scientific activities involving the deployment of gear from the ship, either when stationary or underway, should be cleared with the officer on the bridge by the watch leader or someone designated specifically by him/her. This line of communication should be adhered to rigidly. Departure from this practice may result in independent action by deck or bridge personnel which might unwittingly jeopardise personal safety or risk equipment damage.

Whenever gantries or winches are not in use, securing pins must be fitted, clutches disengaged and brakes applied; even if this is only for a short time. This is because hydraulics tend to creep and could cause considerable damage if allowed to do so.

The two bulkhead hydraulic valves for the linehauler should be closed whenever it is not in use. Otherwise, other hydraulic machinery on the ship may be affected adversely.

Those people wishing to view deck operations should ensure that they do so in a way which neither endangers themselves nor puts the crew or science personnel at risk. Ideally they should place themselves on the boat-deck or in the alley-ways, at a safe distance from the working area. They should not enter the working area during operations. Even so, they may require safety gear when moving to or from the safe vantage point.

Finally, please remember to evaluate all actions carefully. Alertness and judgement can both be diminished by long watches and after weeks at sea.

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WATCH LEADER

Those people designated Watch Leader by the Principal Scientist have the full responsibilities outlined in Section 3.3 (page 10) of the NERC Guidance Notes for Safety in Marine Operations. Their paramount consideration should be for the safety of operations during their watch. This covers both personnel and gear.

They should delegate personnel to carry out deck activities and should ensure the following -

Personnel working on deck are adequately instructed in the procedures used ;

Appropriate safety gear is being used and is in good condition;

Personnel are kitted up and ready to work well in time for the scheduled time of the activity.

The Watch Leader should liaise with the bridge regarding the deployment and recovery of gear, and should ensure that any special instructions or deviations from normal practice are agreed in advance.

If there is no-one in the labs, for instance when the ship is hove to in bad weather, the Watch Leader or personnel designated by him or her are responsible for hourly inspection of the laboratories, including the Black Hole, and the tweendecks if safe to do so.

The Watch Leader should update the handwritten event log as events start and finish and should transfer these data to the event-data-entry programme. He or she should also enter the start and finish of events on

the Navlogger, using the keypad in the Wet Lab. Corrected times for events should be marked on the schedule on the lab noticeboard.

When working regular shifts, the Watch Leader should wake people well in time for their allocated shift and should ensure that they are up. People working irregular shifts may leave wake-up requests, and these should be treated similarly.

At handover, the Watch Leader should ensure that his/her replacement is completely familiar with work underway and any potential problems.

The Principal Scientist retains overall responsibility for all aspects of the Science Groups activities. If there is the slightest doubt as to whether it is necessary to refer to him/her, the Watch Leader should contact the Principal Scientist immediately (even when he or she is asleep).

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