CG78

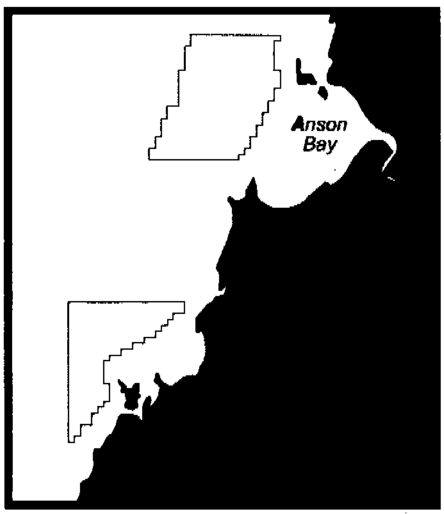
CAMBRIDGE GULF EXPLORATION NL

Combined Mineral Exploration Report

Mineral Exploration Licences NT-3 and NT-4

for the period 16 May 1996 to 15 May 1997

Confidential Report Lodged in compliance with
Licence Condition 13 (a) of Mineral Exploration Licences
NT-3-MEL and NT-4-MEL
granted under the Offshore Minerals Act, 1994



Tenements	1:100 000 Map Ref	Tenement Holder
NT-3-MEL	Ford 13/2	Cambridge Gulf Exploration NL
NT-4-MEL	Cape Scott 13/4	ACN 059 458 374
	Dombey 13/5	Level 4, Southshore Piazza
	Pearce 19/1	81-83 The Esplanade
		P.O. Box 740
		South Perth WA 6151

Report compiled by:
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Report Date: 15 August 1997

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1. SUMMARY

In November 1995 a baseline environmental survey was completed in the tenements held by Cambridge Gulf Exploration NL (CGE) in the Joseph Bonaparte Gulf, including NT-3-MEL and NT-4-MEL; in the last twelve months the samples that were collected have undergone a variety of analyses. The results of those analyses form the foundation of an environmental database to which information is constantly being added.

In November 1996 Cambridge Gulf Exploration received the results from a study that the Company commissioned on the wind and wave climate of the Joseph Bonaparte Gulf. This was undertaken in the absence of any direct measurements of the wind and wave climate, as an understanding of these processes are essential for the planning and implementation of any exploration operation in the Daly Prospect. This data will also assist with ongoing environmental studies in the area.

During most of 1996 the design and planning of a small and large diameter drill programme was undertaken within the Company and with advice from a range of external experts. A drill barge, the Gulf Explorer, was acquired and fitted out for exploration in the Company's tenements. It is intended that small and large diameter drilling be undertaken in NT-3-MEL and NT-4-MEL, in some of the target areas identified from the interpretation of seismic data acquired in 1994 and 1995.

1.1 Expenditure Statement for NT-3-MEL

In the twelve months from 16 May 1996 to 15 May 1997 the following expenditure was incurred in NT-3-MEL:

1. Environmental studies	
– general research	$382
– chemical and biological analysis	$2 815
– wind and wave study	$2 799
2. Interpretation of seismic data, digitising and plotting[1]	$2 699
3. Phase III 1996/97 drilling programme	
– equipment (inc. purchase, hire, maintenance and repairs)	$313 730
– vessel expenses (including crew and support vessel)	$84 130

[1] This work was reported in the previous annual report although some invoices were received in the current year.

– contractors and consultants	$75 319
– transport, travel and accomodation, and communications	$9 500
– reproduction, mapping, publications and standards	$1 307
4. Publications, reproduction and mapping	$706
5. General geology research	$3 248
6. Transport, freight, travel and accomodation	$1 256
7. Technical staff salaries	$70 316
Sub-total	**$568 207**
8. Office overheads (20%)	$113 641
Total expenditure (16-5-96 to 15-5-97)	**$681 848**

1.2 Expenditure Statement for NT-4-MEL

In the twelve months from 16 May 1996 to 15 May 1997 the following expenditure was incurred in NT-4-MEL:

1. Environmental studies	
– general research	$493
– chemical and biological analysis	$1 251
– wind and wave study	$1 639
2. Interpretation of seismic data, digitising and plotting[2]	$1724
3. Phase III 1996/97 drilling programme	
– equipment (inc. purchase, hire, maintenance and repairs)	$293 940
– vessel expenses (including crew and support vessel)	$81 006
– contractors and consultants	$70 229
– transport, travel and accomodation, and communications	$9 500
– reproduction, mapping, publications and standards	$1 302
4. Publications, reproduction and mapping	$706
5. General geology research	$2 006
6. Transport, freight, travel and accomodation	$1 307
7. Technical staff salaries	$43 660
Sub-total	**$508 763**
8. Office overheads (20%)	$101 752
Total expenditure (16-5-96 to 15-5-97)	**$610 515**

[2] This work was reported in the previous annual report although some invoices were received in the current year.

2. INTRODUCTION

Mineral Exploration Licences NT-3-MEL and NT-4-MEL cover part of the offshore palaeo-drainage system of the Daly and Moyle Rivers. The licences lie beyond the three mile territorial limit (Figure 2-1 and Figure 2-2) and are administered by the Northern Territory Department of Mines and Energy, as the Joint Authority, under the Offshore Minerals Act 1994. Both licences form part of the Daly Prospect together with EL8291 and EL8292.

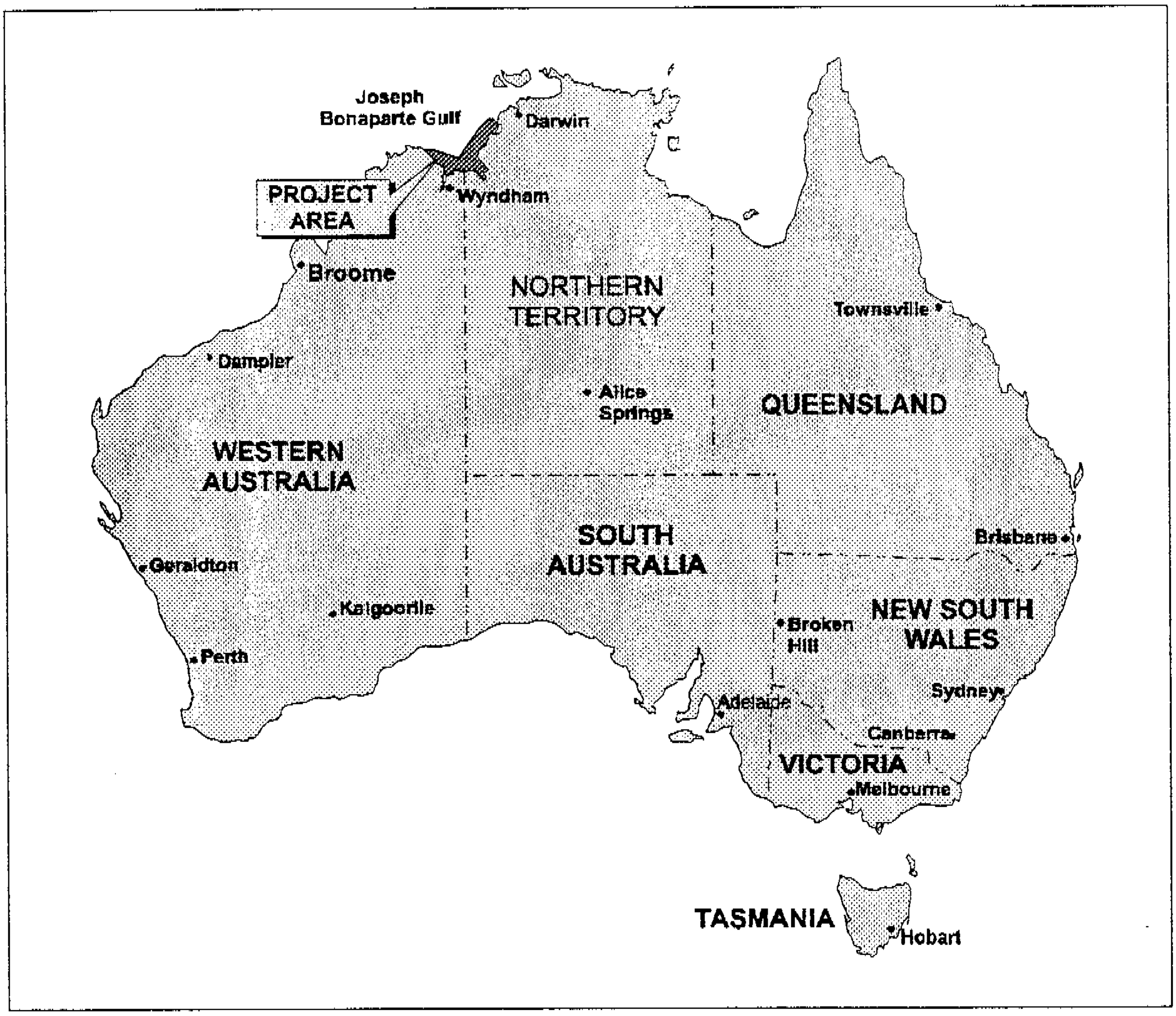

Figure 2-1 Offshore Alluvial Diamond Exploration, Project Location.

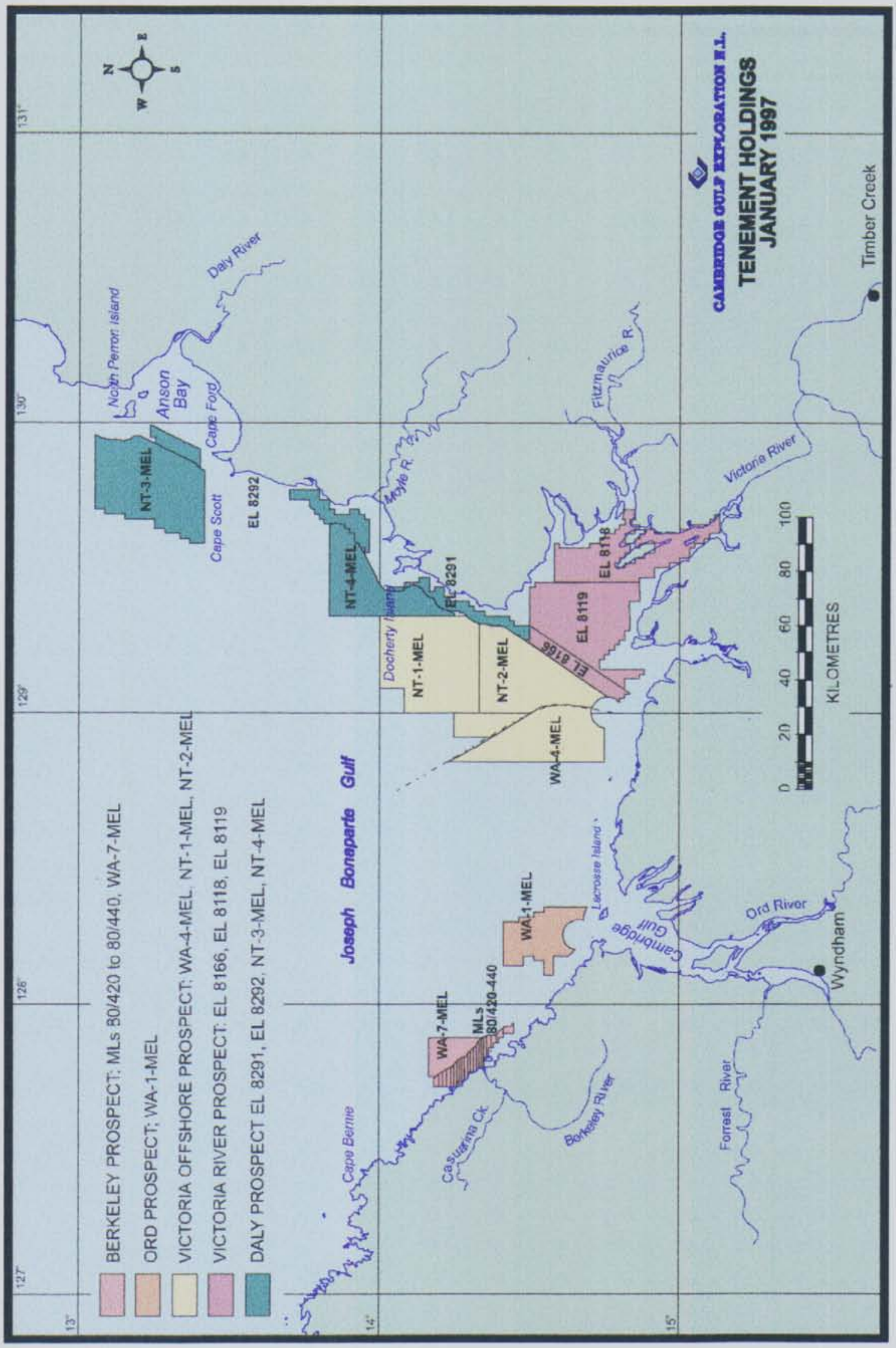

Figure 2-2 Cambridge Gulf Exploration NL - Tenement Holdings (June 1997).

3. TENEMENT SITUATION

Mineral Exploration Licences NT-3-MEL and NT-4-MEL were granted on the 16th of May 1995. The licences comprises 375 blocks (graticules) and 235 blocks respectively and, together with EL8291 and EL8292, form part of the Daly Prospect (Figure 2-2).

NT-3-MEL and NT-4-MEL are 100% owned by:

Cambridge Gulf Exploration NL
ACN 059 458 374
Level 4, Southshore Piazza
81-83 The Esplanade
P.O. Box 740
South Perth WA 6151

4. REGIONAL BASELINE ENVIRONMENTAL STUDY

4.1 Introduction

A regional environmental sampling survey was completed between 1 November and 9 November, 1995. This involved sampling at six locations in NT-3-MEL and five locations in NT-4-MEL (Figure 4-1). At each site an attempt was made to obtain the following samples, recordings and observations:

- a surficial sediment sample using a grab sampler;
- a benthic sample using a grab sampler;
- water quality samples at various depths using a bottle sampler;
- water clarity readings using a secchi disk;
- tide and current recordings.

In addition, at two sites - DP001, and DP003 - drop (gravity) cores were obtained. All samples were logged, together with site information, sample numbers and the details of the tide and current conditions at the time of sampling.

The samples were subjected to a variety of analyses: To date, the completed analyses comprise:

surficial sediments	particle size distribution
	72 element analysis
water	volume of suspended solids
	72 element analysis
biological samples	sorting and identification
	shell free, dry weight biomass

4.2 Acquisition

Sixty sites were sampled throughout CGE's tenements in the Joseph Bonaparte Gulf in November 1995. The various samples were collected using a Van Veen grab sampler, Niskin water bottle, and a drop (gravity) corer. Oceanographic observations were logged and water clarity measured using a secchi disk. The methodology and logs kept during acquisition were reported in detail in the *Combined Mineral Exploration Report Mineral Exploration Licences NT-3 and NT-4 for the period 16 May*

1995 to 15 May 1996. The survey was undertaken on board the Miclyn Achiever with the assistance of the ship's crew and staff from Racal Survey Australia Ltd.

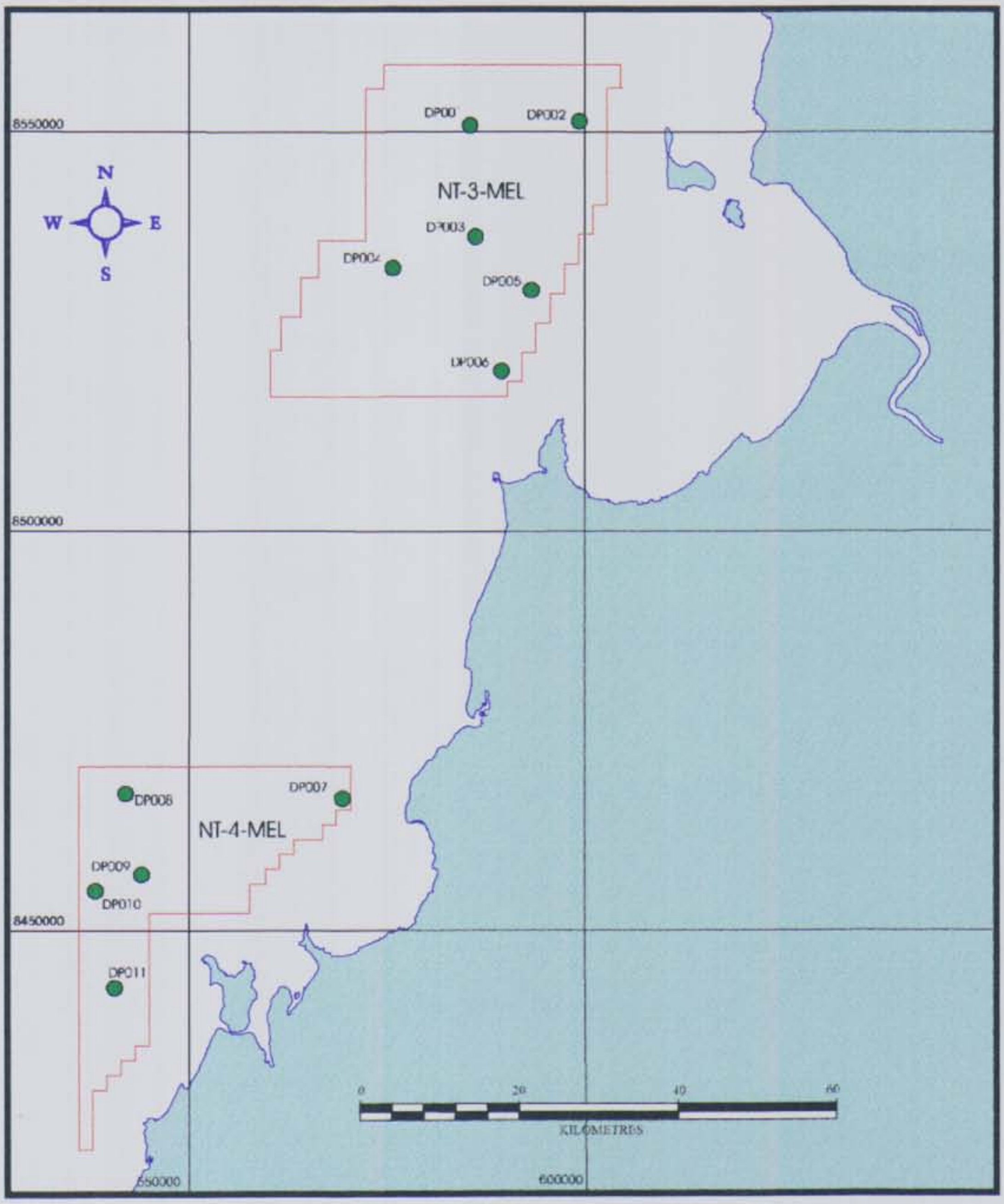

Figure 4-1 The sample locations in NT-3-MEL and NT-4-MEL.

4.2.1 Sample Locations

Each location has a sampling "area" within which all samples and recordings were taken (Figure 4-2). Table 4-1 provides a geographical summary of the most central sampling site in each sampling location. Locations were selected so that as representative a range of environments were sampled as

Table 4-1 Summary of the co-ordinates of the sample locations.

Location Number	Co-ordinates	
	Easting	Northing
E1-DP001	585384	8550663
E1-DP002	599179	8551095
E1-DP003	583256	8536538
E1-DP004	575731	8532788
E1-DP005	593130	8529906
E1-DP006	590071	8519286
E1-DP007	569168	8466546
E1-DP008	541835	8467199
E1-DP009	543808	8457096
E1-DP010	538145	8455032
E1-DP011	540407	8442888

possible. Thus, a range of depths, distances from the coast and sea-bed character were sampled during the survey.

4.3 Analytical Methodology

4.3.1 Sediment Samples

A sediment description was logged at the time of sampling and the sediment samples were sealed in plastic bags to preserve the (drained) field moisture. Once the samples were returned to Perth two small representative samples were taken. One sample was sent to a laboratory for 72 element analysis and the other was retained in case further analysis was required in the future. A representative one to two litres of sediment was put aside for particle size distribution, and the remainder was re-sealed in bags and stored.

Physical Analysis

The field moist sediment samples were wet sieved through a 4.00ϕ sieve (63 μm) to remove the mud fraction (clay and silt size particles). The mud was washed into a bucket and allowed to settle. Following settlement of approximately 72 hours, the excess water was siphoned off and the mud slurry left to dry. When the mud was completely dry it was weighed and bagged. The bulk of the sediment (that retained on the 4.00ϕ sieve) was dried then sieved through a stack of seven sieves (from -2.00ϕ to 4.00ϕ at 1.00ϕ intervals) for five minutes on a sieve shaker. The sediment retained on each sieve was weighed and logged and the cumulative weight calculated; all fractions were retained for future mineralogical analysis. The mud from the wet sieving was added to the under 4.00ϕ for a total weight. The analysis was completed using

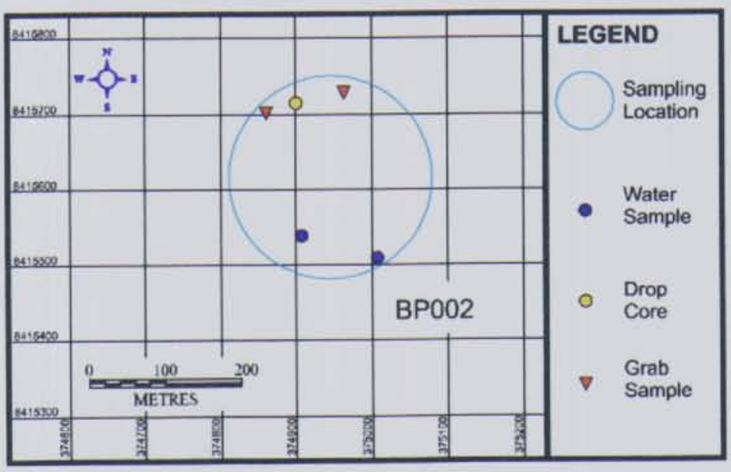

Figure 4-2 An example of the sampling area within which all samples and recordings at a sample location were taken.

the manual data entry RSA (Rapid Sediment Analysis) programme. A summary of the particle size analysis is provided in Appendix 1.

Rapid Sediment Analysis (RSA) Programme

The RSA programme gives percent results for gravel, sand, silt and clay size particles. The results for silt and clay were combined and are reported as mud in this study. The printout provides moment and graphically calculated grain size parameters for the mean, sorting, skewness and kurtosis. A verbal description of the sample is also given.

Sorting gives an indication of the spread of the grainsizes about the mean (Dyer, 1986). This is given by the standard deviation and is measure of the uniformity in the sample. This uniformity is a result of sediment transport processes. Poorly sorted samples have a wide range of grain sizes represented in the sample and well sorted samples have a narrow range of grain sizes.

The symmetry of the sample about the mean is referred to as skewness. In a normal distribution the skewness is zero; that is, a symmetrical curve and the mean, mode and median coincide (Dyer, 1986). In positively skewed samples the grain size curve is asymmetrical towards the coarse side of the graph, while negatively skewed samples are asymmetrical with a dominance of fine sediment. While sorting is given as a phi value, skewness is expressed as a positive or negative value about the symmetrical value of zero (Leeder, 1982).

Although values for kurtosis were given in the RSA results these are not presented in this study. Kurtosis is a "measure of the ratio of sorting in the central portion of a grain size curve to sorting in the tails" (Davies-Colley, 1976). Baker (1968) suggests that real kurtosis trends may be hard to detect owing to sensitivity to "random fluctuations", and some researchers have concluded that kurtosis parameters are of little value in describing the textural characteristics of some sediments.

Chemical Analysis

Representative samples of sediment, approximately 120 ml in field moist condition, were submitted to Genalysis Laboratory Services Pty Ltd in Gosnells, Western Australia. Water soluble analysis for 72 elements (listed in Table 4-2) was undertaken on all the samples. Each sample was mixed with double de-ionised water at a sediment to water ratio of 1:5 by weight. The sample weights ranged from 83 to

200 grams. The samples were placed in tumblers for one hour and continuously rotated. The water extract was then subjected to one of two analytical methods: inductively coupled plasma optical (atomic) emission spectrometry (OES) or inductively coupled plasma mass spectrometry (MS).

Table 4-2 The elements for which the sediment samples were analysed and the method of analysis used for each.

Element	Method	Element	Method	Element	Method
Silver (Ag)	MS	Mercury (Hg)	MS	Rhodium (Rh)	MS
Aluminium (Al)	OES	Holmium (Ho)	MS	Ruthenium (Ru)	MS
Arsenic (As)	MS	Iodine (I)	MS	Sulphur (S)	OES
Gold (Au)	MS	Indium (In)	MS	Antimony (Sb)	MS
Boron (B)	OES	Iridium (Ir)	MS	Scandium (Sc)	OES
Barium (Ba)	MS	Potassium (K)	OES	Selenium (Se)	MS
Beryllium (Be)	MS	Lanthanum (La)	MS	Silicon (Si)	OES
Bismuth (Bi)	MS	Lithium (Li)	MS	Samarium (Sm)	MS
Bromine (Br)	MS	Lutetium (Lu)	MS	Tin (Sn)	MS
Calcium (Ca)	OES	Magnesium (Mg)	OES	Strontium (Sr)	MS
Cadmium (Cd)	MS	Manganese (Mn)	OES	Tantalum (Ta)	MS
Cerium (Ce)	MS	Molybdenum (Mo)	MS	Terbium (Tb)	MS
Cobalt (Co)	MS	Sodium (Na)	OES	Tellurium (Te)	MS
Chromium (Cr)	OES	Niobium (Nb)	MS	Thorium (Th)	MS
Cesium (Cs)	MS	Neodymium (Nd)	MS	Titanium (Ti)	OES
Copper (Cu)	MS	Nickel (Ni)	OES	Thallium (Tl)	MS
Dysprosium (Dy)	MS	Osmium (Os)	MS	Thulium (Tm)	MS
Erbium (Er)	MS	Phosphorous (P)	OES	Uranium (U)	MS
Europium (Eu)	MS	Lead (Pb)	MS	Vanadium (V)	OES
Iron (Fe)	OES	Palladium (Pd)	MS	Tungsten (W)	MS
Gallium (Ga)	MS	Praseodymium (Pr)	MS	Yttrium (Y)	MS
Gadolinium (Gd)	MS	Platinum (Pt)	MS	Ytterbium (Yb)	MS
Germanium (Ge)	MS	Rubidium (Rb)	MS	Zinc (Zn)	OES
Hafnium (Hf)	MS	Rhenium (Re)	MS	Zirconium (Zr)	MS

This method of sample preparation and extraction was chosen because, of all the methods considered, it most closely mimics the conditions under which contaminants within the sediment might become available to the environment during drilling, dredging or disposal of sediment. International research shows that there is no relationship between the concentration of inorganic toxicants, such as heavy metals, in sediments and the potential impact of the contaminants associated with the sediments on water quality. Lee and Jones (1992) state that "typically, the concentration of a contaminant in **water** shows an increasing impact with increasing concentration. A concentration of contaminants in **sediments**, however, does not always show this pattern." The impact potential of contaminated sediments may be affected by the chemical form of metals, and environmental variables such as dissolved oxygen, salinity and temperature.

The elutriate test was developed in the US by the USEPA and the CE to assess the potential effects of sediment contaminants during dredging and open water disposal. In the elutriate test sediment is mixed with site water for 30 minutes, and allowed to settle before the filtrate is analysed for elements of interest. While the method used in this study and described above does not constitute the exact nature of the elutriate test in that site water was not used, it does represent the mechanical process involved in contaminant release to the water. This is a far more appropriate measure of the potential impact of sediment resuspension upon water quality than crushing or pulverising of the sediment before analysis.

The limits of detection are provided for each of the elements together for the results for each sample in Appendix 2. Where the level detected in a sample equals the detection limit the accuracy is ± 100%. That the analysis returned a result for a sample for any given element indicates that the element is present in the sample, but the result can only be determined with a limited accuracy; for example if lead is present in a sample at 0.005 mg/kg the result will be recorded at 0.1 mg/kg, that is, the limit of detection and the accuracy is up to ± 0.1 mg/kg.

4.3.2 Water Samples

Sealed bottles containing the water samples (approximately one litre) were submitted to Genalysis Laboratory Services Pty Ltd in Gosnells, Western Australia, for the determination of suspended solids and presence of 72 elements. Bottom samples (i.e. one metre above seabed) from all sites, and surface samples (i.e. one metre below the sea surface) from selected sites, were submitted for analysis. The remainder of the surface samples were retained in case there was a need to undertake further analysis such as for organic toxicants. The bottom samples are the samples in which there is the greatest interest as it is the lower part of the water column that carries the bulk of the suspended sediment, and therefore likely to suffer the greatest potential reduction in water quality. Sufficient surface samples (over the entire 60 locations in the Joseph Bonaparte Gulf) were analysed to gain an understanding of the relationship between the water quality in surface and bottom waters.

At the time of collection the sea conditions were logged including the state of the tide (flood, ebb or slack), height above LAT, and the current speed and direction. These parameters influence the water quality and particularly the volume of suspended solids in the water column. The current speed and direction were taken from visual observations and not measured with sophisticated equipment; however, when considered with the water quality data obtained in subsequent analyses some indication of the impact of seastate on ambient water quality may be obtained.

Chemical Analysis

The water samples were analysed for 72 elements as for the sediment samples, using one of two methods: MS or OES. In all but two cases the method used was the same as for the sediment analysis (refer to Table 4-2); copper and strontium were determined using OES for the water samples.

Suspended Solids

The suspended solids were determined in conjunction with the chemical analysis. The water samples were filtered through a 0.7μm Wattman glass fibre filter. The sediment collected was dried and weighed, and the suspended solids calculated in milligrams per litre.

Water Clarity

The optical quality of water, that is, its colour and clarity, is determined by the attenuation of light by suspended particulate matter and dissolved matter (ANZECC, 1992). Light can be attenuated by two main processes - absorption and backscatttering - and light attenuation impacts upon visual clarity, light penetration and colour.

A simple, qualitative measure of clarity can be gained with a secchi disk. The disk is lowered into the water and is used to measure the distance at which objects can be viewed through the water column. The colour of the water, while dependent on a number of factors (including the angle and intensity of sunlight and cloud cover, water depth and surface conditions) can be useful in gaining a further qualitative measure of the water quality.

An easy to use numerical classification system for observed water quality was devised for this survey; it is based on the secchi disk values and observed water colour and clarity. Table 4-3 provides the classification and the range of measurements and observations in each class. A classification of one infers high visual or optical water quality and five low quality.

Table 4-3 Classification for observed water quality

CLASSIFICATION	SECCHI MEASUREMENTS	WATER QUALITY DESCRIPTION
1	> 3.00 m	Very clear, blue/green
2	1.50 - 3.00 m	Clear, blue green
3	0.50 - 1.50 m	Cloudy, bluish but milky
4	0.30 - 0.5 m	Muddy, pale brown
5	<0.30 m	Turbid, very brown

Davies-Colley and Close (1992, cited in ANZECC, 1992) found that the lack of visual clarity was closely correlated with turbidity which is a measure of the suspended solids. However, there may not be a linear relationship between decreasing clarity and increasing turbidity as the visual clarity is dependent on a number of factors, as discussed above. This was borne out when the results of the suspended solids analysis were compared with the secchi disk and visual clarity and colour recordings. While there was a distinct trend of increasing turbidity with decreasing clarity there was some overlap of suspended solids values (in mg per litre) in each of the five classes as well as when compared to the secchi disk values. Consequently, the suspended solids values could not be incorporated into the classification table. The classification devised provides a broad means of comparison of lateral and temporal water quality for the study area. However, the classification should not be used as a categorical assessment of water quality; a great deal more research needs to be undertaken in order to assess the value of visual measurements when gauging optical water quality in the Joseph Bonaparte Gulf. Nor should the classification be used for comparisons with, or assessment of, water quality outside the study area.

4.3.3 Biological Samples

Post-sampling Processing

The sieved and bagged benthic samples were stored in drums containing 10% formalin until they were ready to be processed. The samples were drained and rinsed several times in fresh water while remaining in the calico bags. Immediately after washing with fresh water the drums of samples were supplied to Dr Fred Wells at the Western Australian Museum. On receipt of the samples the Museum staff filled the drums with 70% alcohol for storage prior to processing.

Sorting and Identification

During sorting the samples were transferred to water and examined under a Maggi magnification lamp. All animals which were alive when the sample was collected were removed and placed in one of five vials according to the major groups (molluscs, crustaceans, echinoderms, worms and others). Once sample sorting had been completed each vial was sorted to class then species. Identifications were made to the lowest possible taxonomic level. Very little is known about the benthic organisms of the Joseph Bonaparte Gulf and as a result identification was seldom possible at a species level.

Once the identification of the specimens had been made the individuals were counted and the dry weight, shell free biomass was determined. Specimens with shells were placed in dilute hydrochloric acid to dissolve the shell, then washed in fresh water. They were then placed in an oven for 24 hours at 60° C, or, for larger specimens, until a constant weight was obtained. Specimens were weighed with an electronic balance to 1 mg. An arbitrary value of 1 mg was assigned to individuals less than 1 mg in weight.

Because small invertebrate fauna in the Joseph Bonaparte Gulf are so poorly known, many species are potentially new to science, or are the first records for either Australia or Western Australia. In order to preserve these potentially valuable specimens, dry weights were estimated using two regression equations developed for comparing wet weight and dry weight for polychaetes and crustaceans. In some cases, weights of specimens of similar size from related taxa were used.

Crustaceans were sent to Dr G. Poore of the Museum of Victoria for identification. All other groups were identified by staff from the Western Australian Museum.

4.4 Results of Analysis

Eleven sites were sampled in NT-3-MEL and NT-4-MEL. Sediment samples were obtained from ten sites; at DP009 a small amount of coral was recovered but no sediment. It is believed that the surficial sediment comprises coarse coral remnants, or that the coral wedged in the jaws of the grab sample allowing the finer sediment to washed out during ascent. Benthic samples were obtained from all eleven sites. Water samples were obtained from one metre below the water surface and one metre above the sea floor at all sites (refer to Section 4.3.2).

4.4.1 Surficial Sediments

Particle Size Distribution

The majority of surficial sediment (9 out of 11 sites or 82%) was slightly muddy and/or slight gravelly sand. At DP008 the sediment was a muddy, sandy gravel while at DP009 only coral fragments were recovered. The gravel fraction (where present) generally comprised shells and shell fragments, although there was a small amount of carbonate gravel at sites DP008, DP010 and DP011. Most samples were poorly or very poorly sorted, however, one sample with a high percentage of sand (DP011 with 98.06 % sand) was moderately well sorted.

The mean grain size varied from 2.68ϕ (fine sand) to -0.08ϕ (very coarse sand). Most samples had a modal grainsize class of medium or fine sand (four sites each); one site (DP008) had a modal grainsize class of gravel), and DP007 was bimodal with fine to medium sand and mud.

The low density of samples over a large area makes it difficult to determine any trends based on water depth, seabed morphology and proximity to the coast, or trends over the length of the Prospect. A table of results is provided in Appendix 1.

72 Element Analysis

The results from the 72 element analysis of the surficial sediments revealed that 52 elements were not detected in a water extraction. The eighteen elements that cause the greatest concern, with regard to the potential impact on water quality, are listed in Table 4-4. The full table of results is provided in Appendix 2.

Only six of the eighteen elements considered potentially harmful (Table 4-4) were detected in samples from NT-3-MEL and NT-4-MEL. One of these was sulphur, which was detected in all samples (see Page 17); the other five and the levels of detection of each are provided in Table 4-5. None of the eighteen elements were detected in samples from DP003, DP005, DP008 and DP011.

In seven out of the ten instances where a potentially harmful element was detected the accuracy is plus or minus the weight of the element detected or 100% (e.g. arsenic in sample DP004 was 0.1 mg/k ± 0.1 mg/kg). With such low accuracy no significance can be attributed to these results.

Table 4-4 The elements considered to be of concern with respect to the potential impact upon water quality by the resuspension of sediment.

Element	Source
Aluminium (Al)	[1]ANZECC (1992b)
Antimony (Sb)	[2]ANZECC (1992a), ANZECC (1992b)
Arsenic (As)	ANZECC (1992a), ANZECC (1992b), [3]DMRP, [4]EIA studies, [5]ANZECC (1996)
Beryllium (Be)	ANZECC (1992b)
Cadmium (Cd)	ANZECC (1992a), ANZECC (1992b), DMRP, EIA studies, ANZECC (1996)
Chromium (Cr)	ANZECC (1992a), ANZECC (1992b), EIA studies, ANZECC (1996)
Copper (Cu)	ANZECC (1992a), ANZECC (1992b), DMRP, EIA studies, ANZECC (1996)
Iron (Fe)	ANZECC (1992b), DMRP, EIA studies
Lead (Pb)	ANZECC (1992a), ANZECC (1992b), DMRP, EIA studies, ANZECC (1996)
Manganese (Mn)	ANZECC (1992a), DMRP, EIA studies
Mercury (Hg)	ANZECC (1992a), ANZECC (1992b), DMRP, EIA studies, ANZECC (1996)
Nickel (Ni)	ANZECC (1992a), ANZECC (1992b), DMRP, ANZECC (1996)
Selenium (Se)	ANZECC (1992b), DMRP, EIA studies
Silver (Ag)	ANZECC (1992b), DMRP, EIA studies, ANZECC (1996)
Sulphur (S)	ANZECC (1992a)**, ANZECC (1992b)*, EIA studies
Thallium (Tl)	ANZECC (1992b)
Tin (Sn)	ANZECC (1992a), ANZECC (1992b)#, EIA studies##
Zinc (Zn)	ANZECC (1992a), ANZECC (1992b), DMRP, EIA studies, ANZECC (1996)

* lists sulfide (a compound of sulphur); ** lists sulphate; # specifies tributyltin, ## generally tributyltin
1 Australian and New Zealand Guidelines Water Quality Guidelines to Fresh and Marine Waters (ANZECC, 1992b)
2 Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC, 1992a)
3 Dredged Material Research Program (US Army Corp of Engineers - a variety of studies published in several reports)
4 A variety of studies carried out in Australia and New Zealand including Alan Tingay and Associates (1994 and 1995), Corkery (1993), Power *et al.* (1991), Jeffery (1994).
5 Environmental Assessment of the Sea Disposal of Dredged and Excavated Material (ANZECC, 1996)

Table 4-5 A summary of the levels of manganese, iron, copper, arsenic and aluminium found in sediment samples from NT-3-MEL and NT-4-MEL.

	Manganese ±0.01 mg/kg	**Iron** ±0.2 mg/kg	**Copper** ± 0.5 mg/kg	**Arsenic** ± 0.1 mg/kg	**Aluminium** ± 0.1 mg/kg
DP001	X	0.2 mg/kg	X	0.1 mg/kg	0.2 mg/kg
DP002	X	0.2 mg/kg	X	X	X
DP004	X	X	X	0.1 mg/kg	X
DP006	X	X	X	X	0.2 mg/kg
DP007	X	0.2 mg/kg	X	X	X
DP010	0.2 mg/kg	0.2 mg/kg	0.5 mg/k	X	X

It is difficult to make any assessment on the potential toxicity of the remaining results as comparison with the acceptable levels in the three major guidelines (ANZECC, 1992a and 1992b, and ANZECC 1996) is difficult, partly as a result of different analytical methods being used in the case of bulk sediment analysis (ANZECC, 1992a and ANZECC, 1996) and as a result of the very low density and lack of replicate samples at each location. If the water quality guidelines (ANZECC, 1992b) are to be used to assess the toxicity levels of the elements listed in Table 4-5 the following points are noted:

- there are currently no recommended maximum levels for aluminium and iron;
- manganese is not listed in the water quality guidelines (ANZECC, 1992b) but is listed in the contaminated sites guidelines (ANZECC, 1992a) where the level allowed is considerably higher than that detected in the sample from DP010.
- the results of the elutriate test or similar water extraction analyses will greatly over estimate water quality impacts as dilution in the open ocean is expected to be in the order of hundreds of times greater than the dilution in the analysis (ANZECC, 1996).

In the absence of any urbanisation or industrial development in the hinterland it is probable that any elevated levels of heavy metals represent natural levels as a result of weathering, erosion and transportation processes. The only conclusion that can be drawn for the Daly Prospect sediments, based on the current data, is that it is unlikely that there will be a threat to water quality should the sediments be resuspended in a drilling or dredging operation.

Sulphur

Sulphur was detected in all 11 samples at levels ranging from 240 mg/kg in DP011 to 1800 mg/kg in DP010. As well as being a common rock forming mineral, sulphur is also an important component of sea water, naturally occurring in quantities of approximately 885 mg/l of sea water. Sulphur is also formed during the breakdown of organic matter that might be trapped in fine sediment. The sediment samples were in a field moist state when analysed and a proportion of the sulphur is most likely to be from the site water in the samples. Sulphur appears to be potentially harmful only when it forms compounds with one or more other elements to produce sulphides (e.g. H_2S). Without further analysis it is impossible to determine what form the sulphur takes in these samples or the potential impact that its reactivation may have on the environment.

4.4.2 Water Quality

Optical Water Quality and Clarity

The visual water quality was very good with clear or very clear, blue water observed at all sites. The majority of sites were in class one (64%) and the suspended solids ranged from 5 mg/l to 15 mg/l (± 5 mg/l). The optical water quality in NT-3-MEL and NT-4-MEL is significantly higher than at other sites in the Company's tenements in the Joseph Bonaparte Gulf. This is probably partly a function of distance from the Victoria River mouth and Cambridge Gulf which discharge extreme volumes of sediment; in the case of the Victoria, Keep and Fitzmaurice rivers some 65 million tonnes per year (Lees, 1992). Secondly the predominant sediment transport direction, observable from the air and satellite images, and confirmed by sea floor bedforms, is to the north-west and much of the sediment dicharged by these rivers into the Gulf is transported away from the north-eastern coastal regions (Docherty Island to Anson Bay).

72 Element Analysis

Fourteen water samples were submitted for 72 element analysis; bottom samples from all sites and three surface samples. Fifty-six elements were either not present or below the limits of detection, including most of the usual constituents of sea water (most of these are normally present in amounts between 0.6×10^{-15} to 1×10^{-2} and are below the limits of detection for this type of analysis). Of the eighteen elements which cause concern (Table 4-4) sulphur was detected in all samples (refer to Page 17) and four other elements in some samples (Table 4-6). It is interesting to note that, while manganese, nickel and arsenic were detected in the surface sample from DP007, none of these elements were detected in the near bottom sample from the same site. Similarly, the surface sample (DP007-01) contained more suspended sediment than the near bottom sample (DP007-16) - 10mg/l compared to 5mg/l. This is the opposite of the expected trend of increasing sediment with depth and a concomitant increase in the likelihood of associated heavy metals.

Table 4-6 Summary of the manganese, nickel, arsenic and lead detected in water samples from NT-3-MEL and NT-4-MEL.

	Manganese ±0.01 mg/kg	Nickel ± 0.1 mg/kg	Arsenic ± 0.1 mg/kg	Lead ± 0.5 mg/kg
DP007-01	0.1 mg/kg	0.1 mg/kg	0.2 mg/kg	X
DP009-30	X	0.1 mg/kg	X	X
DP010-16	X	X	X	0.5 mg/kg

4.4.3 Benthic Organisms

Benthic organisms are represented in the NT-3-MEL and NT-4-MEL samples by 26 species of polychaete worms (Annelida), 24 species of crustaceans, 11 molluscans, five echinoderms, three species each of ascideans, sipunculids, poriferans and hydrozoans, and one species of nematode; a total of 192 individuals in 79 species. The tables of results are provided in Appendix 4 and are summarised in Table 4-7 and Table 4-8.

Table 4-7 Diversity, density and biomass in the four benthic samples collected in NT-3-MEL and NT-4-MEL on the basis of higher level taxa.

	Number of Species	Number of Individuals	Dry Weight (mg)
Polychaeta	26	69	261
Crustacea	24	61	99
Mollusca	11	26	382
Echinodermata	5	8	34
Porifera	3	5	3680
Sipuncula	3	15	34
Ascidacea	3	4	4951
Hydrozoa	3	3	726
Nematoda	1	1	1
Total	**79**	**192**	**10168**

Table 4-8 Diversity, density and biomass of the benthic samples collected in NT-3-MEL and NT-4-MEL on a sample by sample basis.

	Number of Species	Number of Individuals	Dry Weight (mg)
DP001	18	24	1086
DP002	3	5	57
DP003	10	12	351
DP004	21	40	5010
DP005	6	12	10
DP006	19	39	91
DP007	10	14	29
DP008	1	1	1
DP009	10	17	156
DP010	14	28	3377
DP011	0	0	0
Total	**79***	**192**	**10168**

* The actual total is less than the sum of the figures in the column as some species were found in two samples.

Density and Diversity

Diversity was dominated by polychaete worms (26 species of Annelid) and crustaceans (24 species) with comparatively lower diversity among the remaining taxa. The number of species per sample ranged from zero (DP011) to 21 in DP004, with a mean of 10.2 per sample. The total number of individuals was low with only 192 individuals collected over the 11 sites. These were dominated again by polychaetes (69 individuals) and crustaceans (61). A mean of 17.5 individuals were collected per sample. DP004 and DP006 yielded the greatest number of animals with 40 and 39 individuals respectively (20 % of the total each). These two sites also showed the greatest diversity with 21 and 19 species respectively.

The most obvious characteristic of the samples was the low number of individuals for the number of species with a mean of only 2.4 individuals collected per species. Over half the species (52%) were represented by a single individual and only 28% of species were represented by three or more individuals.

Biomass

The total shell free, dry weight biomass of all the individuals from the 11 samples was 10 168 mg (10.2 grams) with an average of 924 mg per sample. The biomass was dominated by ascidians with 49 % of the total (4 951 mg) and poriferans with 36 % of the total (3 680 mg). A single poriferan found in the sample from DP010 accounted for 32% of the total (3 274 mg). Three samples (DP001, DP004 and DP010) dominated the biomass with a combined total of 9 473 mg or 93 % of the total.

Discussion

The results of the identification and analysis of the benthic samples from 11 sites disclosed three related features: the high diversity of species collected, the low numbers of individuals and the generally small size of individuals.

Many of the species collected were represented by a single individual. The most numerous species were two polychaetes (*Isolda puchella* [11 individuals] and *Euclymere* sp 2 [12 individuals]) and a crustacean (Maerella [10 individuals]). These three species had a total of 33 individuals, or 41.7 % of the total.

The total number of individuals was low, with a mean of 7.2 individuals per sample. Three possible reason for the low density can be considered:

1. One possibility is that many small species were missed in sorting animals from the sediment samples. However, the sorters were instructed to retain the shells of small molluscs. In many cases the shell must be later broken open to determine whether or not the animal was alive or dead when collected. Hundreds of shells were retained by the sorters but subsequent examination showed only a very small proportion, and in some samples none, were alive when collected. This indicates that the initial sort was not the cause of the low numbers of individuals. This is supported by similar low numbers of individuals from a set of samples collected in the Joseph Bonaparte Gulf by another company and also sorted, identified and analysed Dr Wells.
2. The grab did not fill completely during each sampling, reducing the volume of material to be sorted and inducing an artificially variable amount of material available for different samples. The smaller sample taken during some grabs clearly reduced the number of animals collected. However, while this phenomena was apparent at some locations, and was logged at the time, this was not often the case. In many samples the predominantly fine grained mud washed through the 1 mm sieve leaving very small samples. In fact, many of the samples with low numbers of individuals were obtained from consistently successful and voluminous grabs.
3. The last possibility is that there is a naturally low density of benthic invertebrates in the sediment of the Joseph Bonaparte Gulf. This suggests that the low density might be a very real phenomenon. Since very little is known about invertebrate densities in sedimentary environments in northwestern Australia, Dr Wells cautions against prematurely stating that this is part of the reason for the low numbers of individuals in the samples. However, the results in this study are consistent with the only other known work in the Gulf and, over a period of time the examination of samples from a number of surveys will provide greater information.

In contrast to the density, the dry weight biomass of the samples was moderate, with an average of 9.24 g per sample. Biomass was dominated by sponges and ascidians, with six individuals totalling

85% of the total biomass of all species from all samples. Biomass was clumped, with three samples (DP001, DP004, and DP010) totalling 93 % of all biomass.

In comparison with the rest of the samples taken in the Joseph Bonaparte Gulf at the same time (another 41 sites were sampled), these 11 samples contained similar populations, an increased diversity of species and a lower biomass. These six sites represented 21 % of the samples and contained 38 % of the species identified, 20 % of the individuals and only 6.8 % of the total dry weight biomass.

5. WIND AND WAVE HINDCASTING STUDY

5.1 Introduction

In mid 1996, the Special Services Unit (SSU) of the Bureau of Meteorology was commissioned by CGE to undertake a detailed meteorological and related oceanographic study of the coastal regions of the Joseph Bonaparte Gulf. In the absence of the direct collection of meteorological and oceanographic data in the Gulf, this study represents the best means by which reasonably reliable wind and wave data can be obtained, and will be used in the assessment of the operational and environmental viability of the Company's exploration activities.

Wind data were extracted and analysed to provide monthly wind direction and speed frequencies. Six hourly estimates of wind speed were produced for the Joseph Bonaparte Gulf; a statistical analysis of these speeds resulted in frequency analysis of the highest wind speed experienced per day. Wind data were subsequently entered into a one-dimensional wave model to produce a wave climatology.

In addition, the Bureau's comprehensive tropical cyclone database was analysed to produce an overview of the likely incidence of cyclone activity in the region.

5.2 Wind Climatology

5.2.1 Methodology

Observational data in the region is very limited and sources of data include automatic weather stations (AWS) at Troughton Island to the southwest of the Joseph Bonaparte Gulf, and at Port Keats, a land based station near the coast on the eastern side of the Gulf. In addition there are occasional ship reports. The Port Keats AWS is considered unreliable and unrepresentative of winds in the Gulf.

The Bureau of Meteorology routinely produces weather charts for the West Australian region (several times a day) on which all observations of wind, pressure, temperature and weather are plotted and analysed. These include the construction of isobaric analyses which allow general flow over the region to be determined.

In the study it was initially intended that each of these analysis charts should be examined with winds over the Joseph Bonaparte Gulf derived manually for each of four times: 0900, 1500, 2100 and 0300

Western Standard Time (WST), each day. Once this process had commenced it became apparent that, particularly for the significant east to southeasterly wind episodes, the pressure gradient and available surface wind observations were not representative of either the conditions reported by CGE during operations in 1995 or the experience of SSU forecasters.

It was found that a more representative wind in such events could be derived from the upper wind soundings taken at Darwin and Halls Creek. These soundings are taken from balloon flights made three to four times daily. Because the soundings provide data on the flow in the region between 300 and 500 metres above the surface, the presence and strength of the low level jet can be readily established. There appears to be a good correlation between the average of low level winds from two stations and the winds experienced over the Gulf region. It must be stated, however, that this correlation cannot be accurately quantified because of the absence of a long period of representative surface observations. Nevertheless, it was apparent that there was a strong signature in the data for the more significant easterly events.

The nature of the correlation between the upper winds and the expected surface winds was such that the extraction of a longer period of wind estimates could be readily automated. While the use of the upper winds at Darwin and Halls Creek appeared to work well for the dry season 'easterly' regime it was not considered representative for either the wet season monsoon wind regime or the light winds during the dry. Accordingly, it was decided that the winds in these periods would generally be better represented by the surface wind observations at Troughton Island.

It is noted that the approach adopted should reasonably identify the more significant wind events (exceeding 15 knots). It is expected that in lighter wind situations, local effects such as sea breezes will cause marked variations in wind directions.

5.2.2 Results

Notwithstanding the limitations discussed in Section 5.2.1, the SSU believe that the results provided in this section give a reasonable indication of the wind climate of the region. Further refinement will be possible following the collection of more direct observational data from the region.

The study found that, based on a threshold of 20 knots, February is the worst month for winds, with more than 12% of observations exceeding the threshold. During the dry season August is the worst month with more than 7% of the observations exceeding the threshold. The results show that the transition season months from September through November tend to be relatively calm compared to the wet and dry months. Similarly there is a slight reduction in average winds through the autumn transition, though this is of shorter duration and less marked than in spring.

The study then selected the strongest wind for the day for analysis. This was done in order to identify the relative number of days on which disruption to exploration activities might occur. The analysis produced an increase in the relative occurrence rates of "above threshold events" with more than 20% of August days affected. There was a large difference between the results for all winds and the results for the strongest winds in August, and this reflects the diurnal nature of the winds where the strongest winds do not necessarily persist through the whole day in the dry season months. Monsoon events tend to exhibit relatively less diurnal variability and the increase in February, while notable, is not as marked as for August.

5.3 Tropical Cyclones

The cyclone season is usually considered to be between November and April however, exceptions do occur. The latest recorded cyclone was in mid May in 1988. Table 5-1 summarises cyclone occurrences for the periods 1908 to 1996 and 1961 to 1996 and for three distance ranges (based on a point near Lacrosse Island). Data prior to 1960 is almost certainly less reliable, whereas the introduction of satellite observations in the early 1960s significantly improved the quality of the storm database.

Table 5-1 Cyclone frequency versus proximity in the Joseph Bonaparte Gulf.

DISTANCE	Within 150 km	Within 300 km	Within 600 km
1908 to 1996	36	61	102
1961 to 1996	24	39	66

The post 1961 data suggest that a storm will pass within 300 kilometres at a rate of about once per year, and within 150 kilometres twice every three years. A distance of 150 kilometres typically represents the region of gales (winds 34 knots or greater) associated with a tropical cyclone.

The relative monthly frequency is clearly bi-modal with peak frequency in January and March.

5.4 Wave Climatology

There are very few representative wave observations in the region. To derive a wave climatology in the absence of reliable oceanographic data a one dimensional wave model was used, driven by the winds from the wind analysis discussed in Section 5.2. Wave estimates were made for a location west of Anson Bay in NT-3-MEL, and some 20 kilometres northwest of Cape Ford.

5.4.1 Methodology

Aside from the wind, the wind wave characteristics are dependent on the water depth, bottom friction and associated wave energy dissipation. Computation of the wave properties requires the estimation of:

- the mean surface wind speed and direction;
- a fetch limit over which the wind is assumed to be reasonably constant in speed and direction;
- wind duration over the fetch;
- an average depth over the fetch.

The Sverdrup-Munk-Bretschneider (SMB) technique was used to compute the fully developed wave field based on the parameters listed above. This allowed the application of an empirical wave growth curve limited by fetch and/or duration. When the surface wind decreases in intensity or changes direction the particular wave spectrum will begin to decay. In such cases, any residual wave energy is allowed to dissipate as swell. To facilitate the application of the wave model, the region around the selected location (refer to Section 5.4) was broken into twelve fetch zones, each of 30 degrees. A fetch length and mean depth was assigned to each of these directions (refer to Table 5-2) and wave spectra were allowed to grow and decay according to the appropriate directional "bin" as determined by the wind direction.

Table 5-2 Wave model fetch specifications.

Directional bounds (degrees)	000 030	030 060	060 090	090 120	120 150	150 180	180 210	210 240	240 270	270 300	300 330	330 360
Fetch (km)	<5	<5	10	10	10	10	5	50	180	250	250	250
Mean depth (m)	<5	<5	10	20	15	15	20	22	40	50	50	50

5.4.2 Results

There is a slight seasonality in the significant wave height results reflecting the results of the wind analysis and the fetch lengths. The wave heights are comparitively higher during the 'wet season' reflecting the high exposure of the Daly Prospect to the monsoon westerlies. While winter south-easterlies produce a commensurate increase in wave heights elsewhere in the Joseph Bonaparte Gulf, the Daly Prospect is somewhat protected by the coast on its eastern edge and there is a slightly lower wave climate during the dry season. The results show that the significant wave heights are considerably lower in the transitional periods between seasons, particularly in the spring, as would be expected based on the wind analysis. Table 5-3 provides the percentage breakdown of significant waves heights on a seasonal basis.

Table 5-3 Percentage breakdown of significant wave heights for each season.

Significant wave height	December to February	March to May	June to August	September to November
0.0 - 0.5 m	67.1 %	82.0 %	77.8 %	89.9 %
0.5 - 1.0 m	12.3 %	16.5 %	22.0 %	6.1 %
1.0 - 1.5 m	11.8 %	1.2 %	0.2 %	3.3 %
> 1.5 m	8.8 %	0.3 %	0.0 %	0.7 %

6. MOBILISATION FOR EXPLORATION DRILLING

6.1 Introduction

Following three drilling programmes (in 1993, 1994 and 1995) in CGE's tenements in Western Australian waters, all of which met with varied results and little success, a complete review of the exploration data and sampling methodology was undertaken.

It has been clearly established that large samples are needed to evaluate what is believed to be a low grade alluvial diamond deposit, while small diameter geological core is required to validate the seismic interpretation. The comprehensive internal and external review of the data and methodology, together with independent technical advice, led to the design of a new exploration drilling programme including both small and large diameter drilling.

In early 1996 CGE commenced an international search for suitable drilling equipment to purchase. Once equipment had been located, various suitability studies were required, including motion analysis, in order to determine whether or not the equipment was able to perform in the extreme conditions of the Joseph Bonaparte Gulf. Negotiations for the purchase of a drill barge and drilling equipment were entered into in April 1996. Subsequent to the successful completion of negotiations, transport of the barge to Singapore was arranged. The research involved in finding a suitable vessel, and the negotiations to secure the barge were extremely time consuming, leading to delays in the commencement of the proposed exploration programme.

The Gulf Explorer arrived in Singapore in mid-September, 1996, for re-survey for international certification, removal of surplus equipment and the installation of CGE's processing plant (Figure 6-2). The refurbishment included an upgrade of the anchor system, while CGE's plant included a newly acquired Dense Media Separation (DMS) plant (Figure 6-2). The Gulf Explorer (Figure 6-3) is equipped with an eight anchor system and positioning is achieved using a differential global positioning system.

6.2 Small Diameter Geological and Geotechnical Drilling

The objective of the intended small diameter drilling programme is to collect geological and geotechnical data from the sediment sequence between seabed and bedrock at locations in NT-3-MEL and NT-4-MEL. The detailed *in situ* stratigraphy compiled from the logged drill holes is to be used to

Figure 6-1 Installation of the Dense Media Separation (DMS) plant.

Figure 6-2 Installation of the "triple deck" onto the top of the process plant.

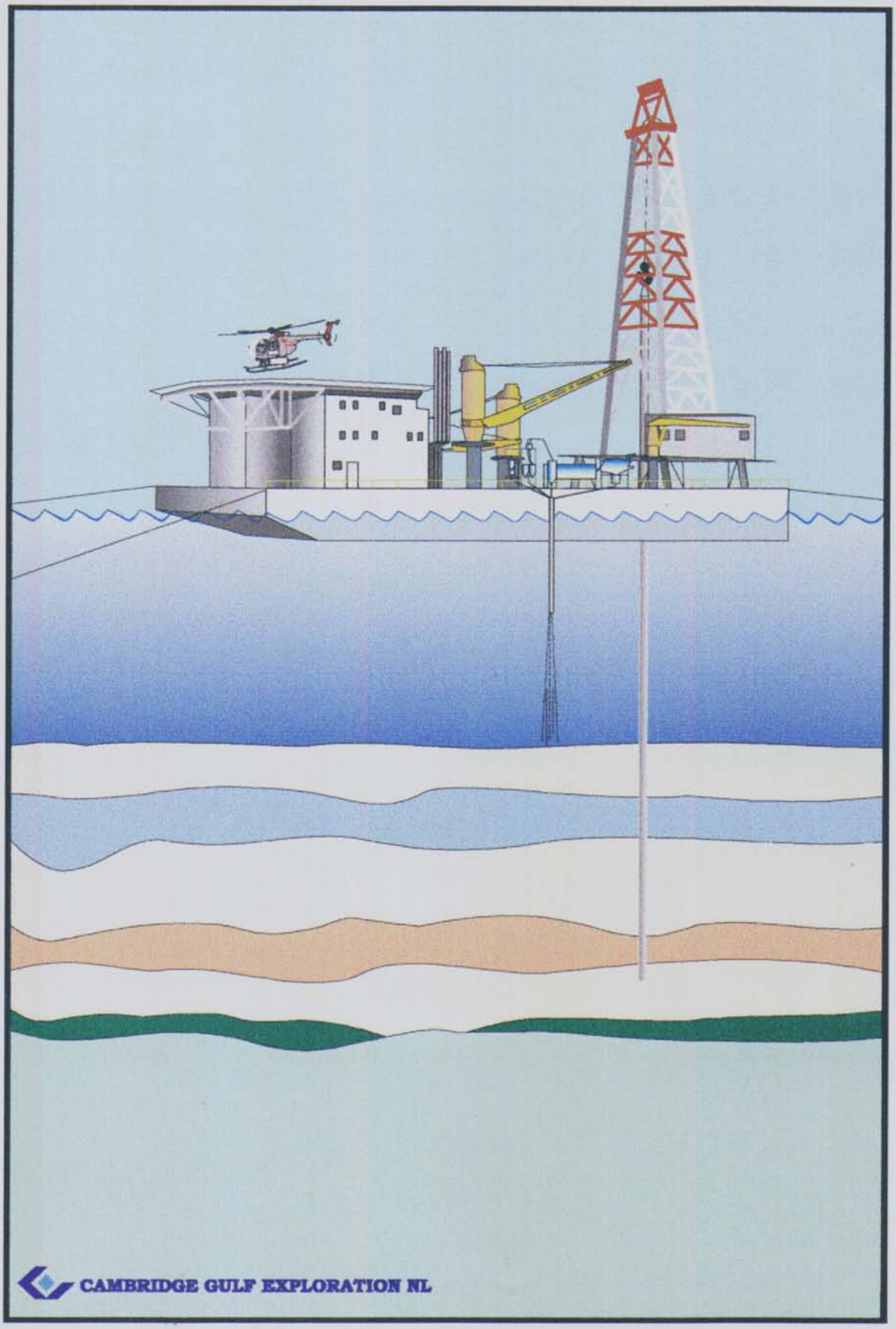

Figure 6-3 Schematic diagram of the drill barge and the geological model to be verified.

"ground truth" and correct the interpreted seismic data, upgrade the geological model and aid in the reconstruction of the evolutionary history of shelf sedimentation for the area.

6.2.1 Methodology

The small diameter drilling entails air core reverse circulation (ARC) drilling of the sediment between the seabed and bedrock. The ARC technique recovers disturbed samples that are collected at metre intervals for logging and analysis. The outer tube will be approximately 5" and the inner tube 2". It is anticipated that either the topdrive on the Gulf Explorer or a portable rig will be used for the drilling. At each site the 40" casing and BHA (refer to Section 6.3.1) will be lowered to the seabed with the 6" returns pipe acting as a casing for the ARC drill string.

6.3 Large Diameter Drilling

The objective of the large diameter drilling is to obtain large, quantifiable samples from all target lithologies between seabed and bedrock at locations within NT-3-MEL and NT-4-MEL. Large samples are required because the *in situ* diamond grade is expected to be low. The data obtained from the drilling programme will be used to determine whether or not there are accumulations of diamonds, and what materials host the diamonds. This data will ultimately be used to design a resource sampling programme.

6.3.1 Methodology

Bulk sampling will be conducted using airlift. A 39¼" drag bit connected to a 20 tonne bottom hole assembly (BHA) and a 6" return pipe will be used inside a 30 tonne, 40" casing. The 34 metre casing is made up of two flanged pieces, one 22 metres, the other 12 metres. The bit is able to drill independently of the casing and the casing can penetrate the substrate under its own weight. If the casing does not penetrate the substrate, the bit will be able to engage the casing and rotate it in. Suitable cross overs and a diverter have been fabricated to enable drilling using either the topdrive or the kelly. Drill pipe can be added to the string without lifting the casing, overcoming the previous problems with hole collapse or loss of the hole that occurs when the casing is lifted out of the seabed. The travelling block has a three metre stroke heave compensator that is used to control the weight on the drill bit. The drill cuttings will be transported to the processing plant via reverse circulation airlift.

6.3.2 Processing Plant

The processing plant is contained entirely on the barge and target material passes directly from the drill pipe to the plant. A flow chart illustrating the path taken by the recovered material is given in Figure 6-4.

The drill cuttings enter a boil box where excess air is removed and the velocity reduced before they enter the processing plant. The 'run of mine' (ROM) is washed over a primary screen removing the particles smaller than 1.5 mm and greater than 15 mm. The material under 1.5 mm is returned to the sea-bed as unwanted sediment via a submerged discharge pipe; the remainder moves into a scrubber together with volumes of sea water. Here the aggregated particles are broken down and the ROM "washed". A trommel removes all particles greater than 15 mm to the discharge pipe. The resulting plant feed (1.5 mm to 15 mm) is pumped to a cyclone where excess sea water is removed. This water flows into the discharge pipe with the unwanted fine particles and oversize.

The plant feed is stored in one of three bins, before being fed to the dense media separation (DMS) plant. All particles with a specific gravity of greater than 3.0 are removed to the Sortex machine while the unwanted sediment is sent to the discharge pipe. The plant feed is run through the sortex and the concentrate sent to the tote box for subsequent hand sorting.

All unwanted sediment and water is returned to the sea via a single discharge pipe, the outlet of which is approximately ten metres below the water line. Geological and geotechnical samples are taken at various stages in the processing. These are contained, logged and sent ashore for subsequent analysis.

6.4 Drill Locations

The drilling locations were selected following a review of the seismic interpretation; each site was chosen for both its prospectivity and the amount geological information that the site would yield. At each drill location a single small diameter geological hole will be drilled. If the results are positive, that is alluvial gravels are encountered, then up to five 40" cased holes will be drilled to recover a statistically valid bulk sample for processing through the plant. If the ARC drill hole is negative the BHA and casing will be lifted into the derrick and the barge moved to the next location.

Reconnaissance drilling has been undertaken in other CGE tenements, however, drilling has yet to be commenced in NT-3-MEL and NT-4-MEL.

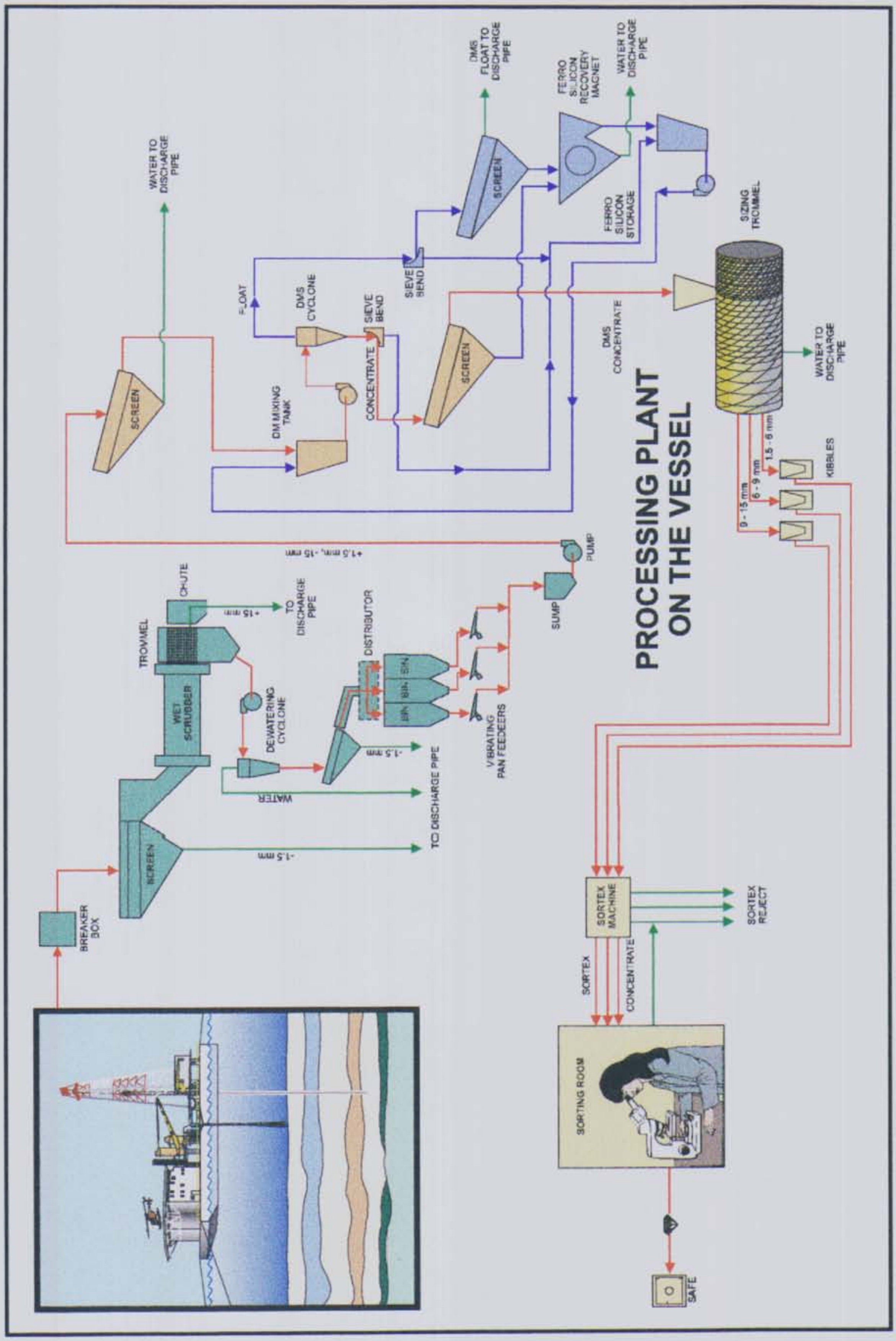

Figure 6-4 Flow chart of the processing plant on the drill barge.

7. PROPOSED ACTIVITIES AND ESTIMATE OF EXPENDITURE FOR THE TWELVE MONTHS TO 15 MAY 1998

7.1 Proposed Activities on NT-3-MEL

During the next twelve months the exploration activities will be:

1. A surficial and shallow subsurface sediment sampling programme incorporating approximately 10 vibrocores and 75 surface sediment samples. The survey will include the collection of baseline environmental samples and data.
2. Analysis of the surficial sediment samples collected during the surficial and shallow subsurface sediment sampling programme.
3. Comprehensive logging of the vibrocores, analysis of sub-samples and interpretation of the results with a view to compiling a depositional history of shallow sedimentation in the Daly Prospect.
4. Analysis and interpretation of the sediment samples and water quality data from the environmental portion of the surficial and shallow subsurface sediment sampling survey.

7.2 Proposed Expenditure on NT-3-MEL

The proposed expenditure on NT-3-MEL for the next twelve months is:

1.	Surficial and shallow subsurface sediment sampling programme	$25 000
2.	Analysis of samples and cores	$5 000
3.	Tenement administration and report compilation	$5 000
4.	Technical personnel salaries	$30 000
	Sub-total	**$65 000**
5.	Office Overheads (20%)	$13 000
	Total	**$78 000**

7.3 Proposed Activities on NT-4-MEL

During the next twelve months the exploration activities will be:

1. A surficial and shallow subsurface sediment sampling programme incorporating approximately 10 vibrocores and 75 surface sediment samples. The survey will include the collection of baseline environmental samples and data.
2. Analysis of the surficial sediment samples collected during the surficial and shallow subsurface sediment sampling programme.
3. Comprehensive logging of the vibrocores, analysis of sub-samples and interpretation of the results with a view to compiling a depositional history of shallow sedimentation in the Daly Prospect.
4. Analysis and interpretation of the sediment samples and water quality data from the environmental portion of the surficial and shallow subsurface sediment sampling survey.

7.4 Proposed Expenditure on NT-4-MEL

The proposed expenditure on NT-4-MEL for the next twelve months is:

1.	Surficial and shallow subsurface sediment sampling programme	$20 000
2.	Analysis of samples and cores	$5 000
3.	Tenement administration and report compilation	$5 000
4.	Technical personnel salaries	$25 000
	Sub-total	**$55 000**
5.	Office Overheads (20%)	$11 000
	Total	**$66 000**

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Appendix 1

Sediment Sample Logs and Results of Physical Analyses

SAMPLE SITE	CO-ORDINATES EASTING	NORTHING	DEPTH (m) U'corr.	RL	SEDIMENT DESCRIPTION	SAMPLE WEIGHT	% GRAIN SIZE CLASS GRAVEL	SAND	MUD	SEDIMENT DESCRIPTION	MEAN	SORTING VALUE	SORTING DESCRIPTION	SKEWNESS
DP001	585419	8550662	30	24.36	Muddy, shelly sand.	479.2 g	7.83	90.82	1.36	Slightly gravelly sand	1.06	1.36	Poorly sorted	Coarse skewed
DP002	599190	8551098	24	17.69	Muddy, shelly sand over thick, grey, sandy, silty mud.	510.1 g	8.43	87.79	3.78	Slightly gravelly sand	1.57	1.48	Poorly sorted	Strongly Coarse Skewed
DP003	586074	8536615	29	24.01	Muddy, shelly sand.	593.9 g	11.21	87.74	1.04	Slightly gravelly sand	1.01	1.47	Poorly sorted	Coarse skewed
DP004	575707	8532779	29	25.41	Shelly sand with mud matrix. large chunks of orange coral.	582.4 g	6.63	80.01	13.36	Slightly gravelly muddy sand	2.68	1.26	Poorly sorted	Near symmetrical
DP005	593118	8529929	26	24.43	Muddy sand with some shell.	702.9 g	20.47	74.22	5.31	Gravelly sand	0.92	2.03	Very poorly sorted	Strongly coarse skewed
DP006	590052	8519285	20	19.43	Muddy sand with some shell.	497.5 g	8.42	86.83	4.74	Slightly gravelly sand	1.22	1.44	Poorly sorted	Coarse skewed
DP007	569168	8466546	18	12.9	Sandy, silty grey mud under a thin layer of muddy terrigenous sand.	375.3 g	4.98	70.93	24.09	Slightly gravelly muddy sand	2.29	1.87	Poorly sorted	Near symmetrical
DP008	541835	8467199	26	19.94	Sandy, silty mud with layer of shell, shell fragments, terrigenous gravel with mud matrix over top.	547.4 g	44.99	43.08	11.93	Muddy sandy gravel	-0.08	2.43	Very poorly sorted	Strongly fine skewed
DP009	543808	8457096	35	29.2	Only small amount of coral retrieved - no real sediment.									
DP010	538006	8455069	20	14.88	Sandy, silty, grey mud with shells and shell fragments and some terrigenous gravel.	348 g	22.59	60.72	16.7	Gravelly muddy sand	1.41	2.51	Very poorly sorted	Coarse skewed
DP011	540395	8442922	16	13.48	Fine terrigenous sand with some shells and shell fragments.	422.3 g	1.7	98.06	0.24	Slightly gravelly sand	1.73	0.59	Moderately well sorted	Fine skewed

Appendix 2

Results of 72 Element Analysis of the Sediment Samples

Element	Au	Li	Be	B	Na	Mg	Al	Si	P	S	K	Ca
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Detection	0.02	0.02	0.01	0.1	5	1	0.1	0.5	1	1	1	1
Method	W/MS	W/MS	W/MS	W/OES	W/OES	W/OES	W/OES	W/OES	W/OES	W/OES	W/OES	W/OES
DP001	X	0.06	X	1.6	3700	370	0.2	3.5	1	330	160	240
DP002	X	0.06	X	1.6	2950	240	X	4	X	260	155	175
DP003	X	0.06	X	1.4	3100	270	X	5	1	275	145	225
DP004	X	0.06	X	2.3	3200	165	X	11.5	1	295	205	114
DP005	X	0.08	X	2.1	3500	245	X	5	X	310	205	160
DP006	X	0.06	X	1.5	2500	175	0.2	6	X	250	145	185
DP007	X	0.08	X	3.2	4200	255	X	7.5	X	450	300	145
DP008	X	0.06	X	2.9	3400	180	X	6	X	280	205	118
DP010	X	0.1	X	7.4	5600	640	X	5.5	1	1800	420	760
DP011	X	0.04	X	1.1	2800	285	X	2.5	1	240	94	170
STD:SOL	5.2	4.6	4.7	5.6	5800	125	12.5	64	6	39	37	98

Element	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Detection	0.1	0.1	0.1	0.1	0.1	0.2	0.05	0.1	0.5	0.1	0.05	0.05
Method	W/OES	W/OES	W/OES	W/OES	W/OES	W/OES	W/MS	W/OES	W/MS	W/OES	W/MS	W/MS
DP001	X	X	X	X	X	0.2	X	X	X	X	X	X
DP002	X	X	X	X	X	0.2	X	X	X	X	X	X
DP003	X	X	X	X	X	X	X	X	X	X	X	X
DP004	X	X	0.1	X	X	X	X	X	X	X	X	X
DP005	X	X	X	X	X	X	X	X	X	X	X	X
DP006	X	X	X	X	X	X	X	X	X	X	X	X
DP007	X	X	0.1	X	X	0.2	X	X	X	X	X	X
DP008	X	X	X	X	X	X	X	X	X	X	X	X
DP010	X	X	X	X	0.2	0.2	X	X	0.5	X	X	X
DP011	X	X	X	X	X	X	X	X	X	X	X	X
STD:SOL	X	3.1	3.2	3.2	3.6	14	5	3.4	175	3.4	4.9	4.8

Element	As	Se	Br	Rb	Sr	Y	Zr	Nb	Mo	Ru	Rh	Pd
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Detection	0.1	0.5	1	0.01	0.01	0.01	0.05	0.02	0.02	0.02	0.02	0.02
Method	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS
DP001	0.1	X	24	0.05	3.5	X	X	X	X	X	X	X
DP002	X	X	18	0.04	2.65	X	X	X	X	X	X	X
DP003	X	X	19	0.04	3.1	X	X	X	X	X	X	X
DP004	0.1	X	18	0.04	1.35	X	X	X	X	X	X	X
DP005	X	X	20	0.05	2.35	X	X	X	X	X	X	X
DP006	X	X	15	0.04	2.45	X	X	X	X	X	X	X
DP007	X	X	24	0.08	2.05	X	X	X	0.02	X	X	X
DP008	X	X	19	0.04	1.6	X	X	X	X	X	X	X
DP010	X	X	29	0.12	9	X	X	X	0.1	X	X	X
DP011	X	X	16	0.03	2.6	X	X	X	X	X	X	X
STD:SOL	24.5	24.5	50	4.8	4.8	4.9	5	5.2	4.9	4.9	5.2	5

Element	Ag	Cd	In	Sn	Sb	Te	I	Cs	Ba	La	Ce	Pr
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Detection	0.02	0.02	0.1	0.05	0.01	0.02	0.1	0.01	0.05	0.01	0.01	0.01
Method	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS
DP001	X	X	X	X	X	X	1.1	X	X	X	X	X
DP002	X	X	X	X	X	X	0.8	X	X	X	X	X
DP003	X	X	X	X	X	X	0.9	X	X	X	X	X
DP004	X	X	X	X	X	X	0.3	X	X	X	X	X
DP005	X	X	X	X	X	X	0.8	X	X	X	X	X
DP006	X	X	X	X	X	X	0.8	X	X	X	X	X
DP007	X	X	X	X	X	X	0.5	X	X	X	X	X
DP008	X	X	X	X	X	X	0.4	X	X	X	X	X
DP010	X	X	X	X	X	X	0.2	X	X	X	X	X
DP011	X	X	X	X	X	X	0.1	X	X	X	X	X
STD:SOL	4.9	4.7	4.6	4.6	4.7	4.7	5.2	4.7	4.9	5.2	5.2	5.2

Element	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Detection	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Method	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS
DP001	X	X	X	X	X	X	X	X	X	X	X	X
DP002	X	X	X	X	X	X	X	X	X	X	X	X
DP003	X	X	X	X	X	X	X	X	X	X	X	X
DP004	X	X	X	X	X	X	X	X	X	X	X	X
DP005	X	X	X	X	X	X	X	X	X	X	X	X
DP006	X	X	X	X	X	X	X	X	X	X	X	X
DP007	X	X	X	X	X	X	X	X	X	X	X	X
DP008	X	X	X	X	X	X	X	X	X	X	X	X
DP010	X	X	X	X	X	X	X	X	X	X	X	X
DP011	X	X	X	X	X	X	X	X	X	X	X	X
STD:SOL	5.2	4.9	5	5.2	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8

Element	Ta	W	Re	Os	Ir	Pt	Hg	Tl	Pb	Bi	Th	U
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Detection	0.01	0.05	0.01	0.01	0.02	0.02	0.05	0.01	0.1	0.02	0.01	0.01
Method	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS	W/MS
DP001	X	X	X	X	X	X	X	X	X	X	X	X
DP002	X	X	X	X	X	X	X	X	X	X	X	X
DP003	X	X	X	X	X	X	X	X	X	X	X	X
DP004	X	X	X	X	X	X	X	X	X	X	X	X
DP005	X	X	X	X	X	X	X	X	X	X	X	X
DP006	X	X	X	X	X	X	X	X	X	X	X	X
DP007	X	X	X	X	X	X	X	X	X	X	X	X
DP008	X	X	X	X	X	X	X	X	X	X	X	X
DP010	X	X	X	X	X	X	X	X	X	X	X	X
DP011	X	X	X	X	X	X	X	X	X	X	X	X
STD:SOL	5.8	5	4.9	5.2	5.4	5.2	5	4.8	4.8	4.8	4.6	4.7

Appendix 3

Results of 72 Element and Suspended Sediment Analyses of the Water Samples

ELEMENTS	Au	Li	Be	B	Na	Mg	Al	Si	P	S	K	Ca
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DETECTION	0.05	0.01	0.01	0.1	1	1	0.2	0.5	1	1	1	1
METHOD	/MS	/MS	/MS	/OES	/OES	/OES	/OES	/OES	/OES	/OES	/OES	/OES
DP001-01	X	0.12	X	4.9	11400	1500	X	X	X	1060	460	470
DP001-27	X	0.13	X	4.9	11400	1500	X	X	X	1060	460	480
DP002-23	X	0.11	X	4.8	11200	1500	X	X	X	1060	460	460
DP003-26	X	0.13	X	4.9	11200	1500	X	0.5	X	1060	460	470
DP004-26	X	0.12	X	4.9	11400	1500	X	X	X	1040	450	470
DP005-23	X	0.12	X	4.8	11200	1500	X	X	X	1040	450	470
DP006-17	X	0.12	X	4.7	11200	1500	X	X	X	1040	450	460
DP007-01	X	0.13	X	5.2	11400	1550	X	X	X	1100	470	490
DP007-16	X	0.12	X	5.2	11400	1600	X	X	X	1100	480	500
DP008-01	X	0.13	X	5	11200	1550	X	X	X	1080	460	490
DP008-23	X	0.12	X	5	11200	1550	X	X	X	1080	470	480
DP009-30	X	0.12	X	5	11200	1550	X	X	X	1080	470	480
DP010-16	X	0.13	X	5	11200	1550	X	X	X	1080	470	490
DP011-12	X	0.12	X	5	11200	1550	X	X	X	1060	460	490
STD:SOLN	2.3	0.72	0.66	470	98	4500	900	600	920	4600	4400	4600

ELEMENTS	Sc	Ti	V	Cr	Mn	Fe-Sol	Co	Ni	Cu	Zn	Ga	Ge
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DETECTION	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.05
METHOD	/OES	/OES	/OES	/OES	/OES	/OES	/MS	/OES	/OES	/OES	/MS	/MS
DP001-01	X	X	X	X	X	X	X	X	X	X	X	X
DP001-27	X	X	X	X	X	X	X	X	X	X	X	X
DP002-23	X	X	X	X	X	X	X	X	X	X	X	X
DP003-26	X	X	X	X	X	X	X	X	X	X	X	X
DP004-26	X	X	X	X	X	X	X	X	X	X	X	X
DP005-23	X	X	X	X	X	X	X	X	X	X	X	X
DP006-17	X	X	X	X	X	X	X	X	X	X	X	X
DP007-01	X	X	X	X	0.1	X	X	0.1	X	X	X	X
DP007-16	X	X	X	X	X	X	X	X	X	X	X	X
DP008-01	X	X	X	X	X	X	X	X	X	X	X	X
DP008-23	X	X	X	X	X	X	X	X	X	X	X	X
DP009-30	X	X	X	X	X	X	X	0.1	X	X	X	X
DP010-16	X	X	X	X	X	X	X	X	X	X	X	X
DP011-12	X	X	X	X	X	X	X	X	X	X	X	X
STD:SOLN	46	920	920	920	940	940	1	940	940	980	0.9	1

ELEMENTS	As	Se	Br	Rb	Sr	Y	Zr	Nb	Mo	Ru	Rh	Pd
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DETECTION	0.2	1	2	0.02	0.1	0.01	0.1	0.05	0.05	0.05	0.05	0.05
METHOD	/MS	/MS	/MS	/MS	/OES	/MS	/MS	/MS	/MS	/MS	/MS	/MS
DP001-01	X	X	66	0.12	9	X	X	X	X	X	X	X
DP001-27	X	X	66	0.12	9	X	X	X	X	X	X	X
DP002-23	X	X	66	0.12	8.8	X	X	X	X	X	X	X
DP003-26	X	X	66	0.14	8.8	X	X	X	X	X	X	X
DP004-26	X	X	66	0.12	8.8	X	X	X	X	X	X	X
DP005-23	X	X	64	0.12	8.8	X	X	X	X	X	X	X
DP006-17	X	X	66	0.12	8.8	X	X	X	X	X	X	X
DP007-01	0.2	X	66	0.12	9.4	X	X	X	X	X	X	X
DP007-16	X	X	68	0.12	9.4	X	X	X	X	X	X	X
DP008-01	X	X	66	0.12	9.2	X	X	X	X	X	X	X
DP008-23	X	X	66	0.12	9	X	X	X	X	X	X	X
DP009-30	X	X	66	0.12	9	X	X	X	X	X	X	X
DP010-16	X	X	66	0.12	9.2	X	X	X	X	X	X	X
DP011-12	X	X	66	0.12	9.2	X	X	X	X	X	X	X
STD:SOLN	5	5	10	1		1	0.9	1.25	1.05	1.1	X	1

ELEMENTS	Ag	Cd	In	Sn	Sb	Te	I	Cs	Ba	La	Ce	Pr
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DETECTION	0.05	0.05	0.01	0.1	0.02	0.05	0.2	0.02	0.1	0.01	0.01	0.01
METHOD	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS
DP001-01	X	X	X	X	X	X	X	X	X	X	X	X
DP001-27	X	X	X	X	X	X	X	X	X	X	X	X
DP002-23	X	X	X	X	X	X	X	X	X	X	X	X
DP003-26	X	X	X	X	X	X	X	X	X	X	X	X
DP004-26	X	X	X	X	X	X	X	X	X	X	X	X
DP005-23	X	X	X	X	X	X	X	X	X	X	X	X
DP006-17	X	X	X	X	X	X	X	X	X	X	X	X
DP007-01	X	X	X	X	X	X	X	X	X	X	X	X
DP007-16	X	X	X	X	X	X	X	X	X	X	X	X
DP008-01	X	X	X	X	X	X	X	X	X	X	X	X
DP008-23	X	X	X	X	X	X	X	X	X	X	X	X
DP009-30	X	X	X	X	X	X	X	X	X	X	X	X
DP010-16	X	X	X	X	X	X	X	X	X	X	X	X
DP011-12	X	X	X	X	X	X	X	X	X	X	X	X
STD:SOLN	1.05	1	1	1	0.96	0.95	1	1.04	0.8	0.98	0.98	0.94

ELEMENTS	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DETECTION	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05
METHOD	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS
DP001-01	X	X	X	X	X	X	X	X	X	X	X	X
DP001-27	X	X	X	X	X	X	X	X	X	X	X	X
DP002-23	X	X	X	X	X	X	X	X	X	X	X	X
DP003-26	0.01	X	X	X	X	X	X	X	X	X	X	X
DP004-26	X	X	X	X	X	X	X	X	X	X	X	X
DP005-23	X	X	X	X	X	X	X	X	X	X	X	X
DP006-17	X	X	X	X	X	X	X	X	X	X	X	X
DP007-01	X	X	X	X	X	X	X	X	X	X	X	X
DP007-16	X	X	X	X	X	X	X	X	X	X	X	X
DP008-01	X	X	X	X	X	X	X	X	X	X	X	X
DP008-23	X	X	X	X	X	X	X	X	X	X	X	X
DP009-30	X	X	X	X	X	X	X	X	X	X	X	X
DP010-16	X	X	X	X	X	X	X	X	X	X	X	X
DP011-12	X	X	X	X	X	X	X	X	X	X	X	X
STD:SOLN	0.94	0.9	0.92	0.96	0.94	0.94	0.94	0.94	0.94	0.98	0.92	0.95

ELEMENTS	Ta	W	Re	Ir	Pt	Hg	Tl	Pb	Bi	Th	U	SSolid
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DETECTION	0.02	0.1	0.02	0.05	0.05	0.2	0.02	0.5	0.05	0.01	0.01	5
METHOD	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/MS	/GRAV
DP001-01	X	X	X	X	X	X	X	X	X	X	X	5
DP001-27	X	X	X	X	X	X	X	X	X	X	X	5
DP002-23	X	X	X	X	X	X	X	X	X	X	X	5
DP003-26	X	X	X	X	X	X	X	X	X	X	X	10
DP004-26	X	X	X	X	X	X	X	X	X	X	X	5
DP005-23	X	X	X	X	X	X	X	X	X	X	X	10
DP006-17	X	X	X	X	X	X	X	X	X	X	X	10
DP007-01	X	X	X	X	X	X	X	X	X	X	X	10
DP007-16	X	X	X	X	X	X	X	X	X	X	X	5
DP008-01	X	X	X	X	X	X	X	X	X	X	X	5
DP008-23	X	X	X	X	X	X	X	X	X	X	X	5
DP009-30	X	X	X	X	X	X	X	X	X	X	X	5
DP010-16	X	X	X	X	X	X	X	0.5	X	X	X	10
DP011-12	X	X	X	X	X	X	X	X	X	X	X	15
STD:SOLN	0.98	1.1	0.94	X	1.05	0.8	0.9	0.5	0.9	0.9	0.9	

Appendix 4

Results of Sorting and Identification of Benthic Samples

ANNELIDA

SAMPLE SITE	*Isolda puchella*	dry weight (mg)	*Amphorete sp*	dry weight (mg)	*Amphertid sp*	dry weight (mg)	*Dasybranchus sp*	dry weight (mg)	*Mediomastus sp*	dry weight (mg)	*Eunice sp1*	dry weight (mg)	*Nematonereis sp*	dry weight (mg)	*Flabelligeridae sp*	dry weight (mg)	*Hesonid sp*	dry weight (mg)	*Magelona sp*	dry weight (mg)	*Euclymere sp*	dry weight (mg)	*Euclymere sp 2*	dry weight (mg)	*Maldanid sp 1*	dry weight (mg)
DP001													1	1			1	1					2	1		
DP002																										
DP003			2	2	1	2															1	1	2	2		
DP004											2	1									1	1				
DP005																										
DP006	7	7					1	1	1	1									1	10	1	1	3	3	2	21
DP007	2	5													1	1							1	1		
DP008																										
DP009	2	5							4	103													2	2		
DP010			2	6									1	1									2	15		
DP011																										
	11	17	4	8	1	2	1	1	5	104	2	1	2	2	1	1	1	1	1	10	3	3	12	24	2	21

SAMPLE SITE	*Phyllodicidae sp1*	dry weight (mg)	*Lepidonotus sp 3*	dry weight (mg)	*Sabellaria sp*	dry weight (mg)	*Hyboscole sp*	dry weight (mg)	*Euleanaria sp*	dry weight (mg)	*Prionspio sp 1*	dry weight (mg)	*Prionspio sp 3*	dry weight (mg)	*Polydora sp*	dry weight (mg)	*Eupolymnia ? sp*	dry weight (mg)	*Species 40*	dry weight (mg)	*Species 42*	dry weight (mg)	*Species 74*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001											2	3											1	1	7	7
DP002																									0	0
DP003							1	1	1	6									1	32					9	46
DP004																									3	2
DP005			2	2																					2	2
DP006					1	1	1	1					1	1			2	2							21	49
DP007																									4	7
DP008																									0	0
DP009	2	2									1	1													11	113
DP010											1	2			1	1	3	8			2	2			12	35
DP011																									0	0
	2	2	2	2	1	1	2	2	1	6	4	6	1	1	1	1	5	10	1	32	2	2	1	1	69	261

CRUSTACEA

SAMPLE SITE	*Axiopsis*	dry weight (mg)	*Galathea sp*	dry weight (mg)	*Upogenia*	dry weight (mg)	*Alpheus*	dry weight (mg)	*Synalpheus sp 1*	dry weight (mg)	*Palaemonidae sp*	dry weight (mg)	*Ceratopia*	dry weight (mg)	*Xanthidae sp 2*	dry weight (mg)	*Tanadaicea*	dry weight (mg)	*Byblis*	dry weight (mg)	*Porcellanidae*	dry weight (mg)	*Protomedia*	dry weight (mg)
DP001	1	1	1	1					1	3	1	2									1	2		
DP002																								
DP003																								
DP004			5	11							2	2			4	4								
DP005																								
DP006					1	5							1	4										
DP007							1	5	1	1							2	1	1	1			2	5
DP008																	1	1						
DP009																								
DP010																								
DP011																								
	1	1	6	12	1	5	1	5	2	4	3	4	1	4	4	4	3	2	1	1	1	2	2	5

SAMPLE SITE	*Gemmaropsis*	dry weight (mg)	*Limnoporeia*	dry weight (mg)	*Birubius*	dry weight (mg)	*Leucothoe*	dry weight (mg)	*Leptochela*	dry weight (mg)	*Mallacoota*	dry weight (mg)	*Maera*	dry weight (mg)	*Maerella*	dry weight (mg)	*Elasmopus*	dry weight (mg)	*Lysianassidae genus 1*	dry weight (mg)	*Pilumnus sp 1*	dry weight (mg)	*Retrolisthes*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001					1	1	1	1													2	20			9	31
DP002															2	2									2	2
DP003																									0	0
DP004			1	1					1	1	2	2	2	2	6	4	2	1	1	1			1	1	27	30
DP005													2	2	2	2	3	1							7	5
DP006							1	1															2	1	5	11
DP007	1	4																							8	17
DP008																									1	1
DP009	2	2																							2	2
DP010																									0	0
DP011																									0	0
	3	6	1	1	1	1	2	2	1	1	2	2	4	4	10	8	5	2	1	1	2	20	3	2	61	99

NEMATODE

SAMPLE SITE	*Nematode sp*	dry weight (mg)
DP001		
DP002		
DP003	1	1
DP004		
DP005		
DP006		
DP007		
DP008		
DP009		
DP010		
DP011		
	1	1

HYDROZOA

SAMPLE SITE	*Athecata*	dry weight (mg)	*Synthecidae*	dry weight (mg)	*Alcyonacean sp 2*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001							0	0
DP002							0	0
DP003							0	0
DP004	1	1	1	1	1	724	3	726
DP005							0	0
DP006							0	0
DP007							0	0
DP008							0	0
DP009							0	0
DP010							0	0
DP011							0	0
	1	1	1	1	1	724	3	726

SIPUNCULOIDEA

SAMPLE SITE	*Sipunculid sp 4*	dry weight (mg)	*Sipunculid sp 54*	dry weight (mg)	*Sp 1*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001							0	0
DP002							0	0
DP003							0	0
DP004							0	0
DP005							0	0
DP006	4	18	4	4			8	22
DP007							0	0
DP008							0	0
DP009							0	0
DP010	3	8	3	3	1	1	7	12
DP011							0	0
	7	26	7	7	1	1	15	34

PORIFERA

SAMPLE SITE	*Hadromerida sp 2*	dry weight (mg)	*Astrophorid sp 2*	dry weight (mg)	*Unidentifiable porifera*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001					1	9	1	9
DP002							0	0
DP003			1	289			1	289
DP004					2	108	2	108
DP005							0	0
DP006							0	0
DP007							0	0
DP008							0	0
DP009							0	0
DP010	1	3274					1	3274
DP011							0	0
	1	3274	1	289	3	117	5	3680

ASCIDACEA

SAMPLE SITE	*Sp 2*	dry weight (mg)	*Sp 3*	dry weight (mg)	*Sp 9*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001					2	810	2	810
DP002							0	0
DP003							0	0
DP004	1	1820	1	2321			2	4141
DP005							0	0
DP006							0	0
DP007							0	0
DP008							0	0
DP009							0	0
DP010							0	0
DP011							0	0
	1	1820	1	2321	2	810	4	4951

MOLLUSCA

SAMPLE SITE	*Sinum sp*	dry weight (mg)	*Oliva sp*	dry weight (mg)	*Arcid sp 1*	dry weight (mg)	*Mytilid sp*	dry weight (mg)	*Spondylus sp*	dry weight (mg)	*Crassostrea sp*	dry weight (mg)	*Chama sp*	dry weight (mg)	*Corbula sp*	dry weight (mg)	*Cardiid sp*	dry weight (mg)	*Dosinia sp*	dry weight (mg)	*Dentalium sp*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001											1	100					1	100					2	200
DP002			1	5															2	50			3	55
DP003	1	15																					1	15
DP004																							0	0
DP005									1	1									2	2			3	3
DP006															4	4					1	5	5	9
DP007															2	5							2	5
DP008																							0	0
DP009					1	20	1	10					1	10									3	40
DP010					5	5									2	50							7	55
DP011																							0	0
	1	15	1	5	6	25	1	10	1	1	1	100	1	10	8	59	1	100	4	52	1	5	26	382

ECHINODERMATA

SAMPLE SITE	*Amphiura sp*	dry weight (mg)	*Ophiactis luteomaculata*	dry weight (mg)	*Ophiactis savignyi*	dry weight (mg)	*Ophiuroid sp*	dry weight (mg)	*Holothuroidea*	dry weight (mg)	Sub-total Individuals	Sub-total dry weight (mg)
DP001			2	2					1	27	3	29
DP002											0	0
DP003											0	0
DP004					2	2	1	1			3	3
DP005											0	0
DP006											0	0
DP007											0	0
DP008											0	0
DP009	1	1									1	1
DP010	1	1									1	1
DP011											0	0
	2	2	2	2	2	2	1	1	1	27	8	34

SAMPLE SITE	TOTAL INDIVIDUALS	TOTAL DRY WEIGHT (mg)	Total Number Of Species
DP001	24	1086	19
DP002	5	57	3
DP003	12	351	9
DP004	40	5010	21
DP005	12	10	6
DP006	39	91	19
DP007	14	29	10
DP008	1	1	1
DP009	17	156	10
DP010	28	3377	14
DP011	0	0	0
	192	10168	79