

National Centre for Instrumentation
& Marine Surveillance

**NATIONAL BASELINE SURVEY
MARINE MANUAL**

Report NC/MAR/006
Revision 1.0
11th April 1995

ENVIRONMENT AGENCY



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NRA

*National Centre
for
Instrumentation
and
Marine Surveillance*

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**National Rivers Authority
National Centre for Instrumentation
& Marine Surveillance**

Report Number NC/MAR/006:
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**National Baseline Survey
Marine Manual**

1.0 SAFETY

1.1 Policy

All vessels and staff must comply with NRA policy;

Health and Safety Manual.

Code of Practice - Marine Activities Part I and II.

1.2 COSHH

Each vessel is responsible for producing a series of assessment documents relating to all chemicals and substances used on the vessel during the execution of a Baseline Survey. These documents will be stored visibly on the vessel and made available to all staff concerned. (Any problems associated with the production of these documents should be directed to the National Centre in the first instance)

All personnel using or coming into contact with chemicals, of any nature, must have read, and understood, the relevant COSHH document.

1.3 Protective clothing

All personnel will wear suitable protective clothing relative to conditions and working environment e.g lifejackets, hard hats, waterproof clothing, disposable gloves etc. in accordance with NRA guidelines.

1.4 Manning levels

Vessels performing surveys will have a minimum of three staff on-board whilst underway. Small boats used to perform calibration runs will contain a minimum of two persons in accordance with NRA practice.

1.5 Training

Staff will be trained in specific aspects of working in the Marine Environment eg Survival at sea. NRA courses are available, see National Centre for details.

1.6 General vessel safety procedures

All personnel joining a survey vessel, performing work for the National Centre, will be given a full briefing by the Survey Officer to include all aspects of EMERGENCY PROCEDURE with respect to that vessel prior to sailing. Any defects in vessel emergency equipment must be reported immediately to the Master and Regional Line Manager.

2.0 THE NATIONAL BASELINE SURVEY

2.1 Introduction

The NRA has a duty, under the 1991 Water Resources Act, to monitor controlled waters. Controlled waters include estuarine and coastal waters to the 3 nautical mile limit.

A Coastal Baseline Survey was started in 1992 as a means of meeting the above objective. The survey has since been developed and refined and is described in further detail throughout this Manual.

The National Baseline Survey is carried out by both boat and aircraft. The boats are based in and run by four of the NRA Regions; Anglian ("Sea Vigil"), North West ("Coastal Guardian"), Northumbria & Yorkshire ("Water Guardian") and South Western ("Vigilance"). The aircraft and remote sensing equipment are hired and based at Coventry airport, enabling rapid access to any part of the coastline as required. The surveys are planned and co-ordinated by the National Centre for Instrumentation and Marine Surveillance, based at Bath, Avon.

Four surveys are run each year; in January, May, July and September. The survey dates are intended to reflect seasonal changes in water quality, with the January survey marking the expected low nutrient content of the year. Three of the surveys involve the use of the aircraft. Low light and poor light angles in January rule out the possibility of aerial surveillance for this survey.

3.0 SAMPLING METHOD

3.1 Preparation of the sample container

The sampling container, a three litre HDPE narrow necked bottle, is rinsed at the start of each working day or once every 12 hours, with about 100ml of 20% Nitric Acid. This is made by diluting "Analar" concentrated Nitric acid 1:5 with good quality distilled or deionized water. This procedure should be carried out by qualified persons and care should be taken - ALWAYS ADD ACID TO WATER! The acid is returned to the stock bottle and the sampling container should then be rinsed with seawater at the first site. At all sample sites the plastic sampling container is first rinsed with sample and emptied to reduce cross contamination between sites. This procedure is not used for sampling of organics where a new container, which has been solvent cleaned at a laboratory, is used at each site.

3.2 TOTAL METALS (except mercury)

3.2.1 Apparatus

- Acid washed HDPE sampling container (20% Nitric Acid rinse at least once per day)

3.2.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water
- Water is removed from the sample site, using an acid washed HDPE sampling container and poured directly into a PET 250 ml bottle without allowing the suspended solids to settle

3.3 TOTAL MERCURY

3.3.1 Apparatus

- Acid washed HDPE sampling container (20% Nitric Acid Rinse at least once per day)

3.3.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water
- Water is removed from the sample site, using an acid washed HDPE sampling container and poured directly into a glass bottle containing a few ml of chromic acid as preservative. Do not allow the suspended solids to settle. (Care should be taken to avoid chromic acid touching skin as it is highly corrosive)

3.4 DISSOLVED METALS

3.4.1 Apparatus

- 60ml HDPE type syringe
- 0.45 μ sealed cartridge type filter (Whatman as supplied by laboratory)
- Acid washed HDPE sampling container (20% Nitric Acid rinse at least once per day)

3.4.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water
- The syringe is filled with water and washed well and the water run to waste
- Fill the syringe and attach a new filter and run approximately 20ml of sample to waste

About 250ml of water is filtered into a PET bottle, the syringe is refilled as necessary and the bottle capped.

Only one filter may be used for each sample; a smaller sample should be submitted to the lab in waters with very high suspended solids

3.5 DISSOLVED METALS - BLANK

3.5.1 Apparatus

- 60ml HDPE type syringe
- 0.45 μ sealed cartridge type filter (Whatman as supplied by laboratory)

3.5.2 Method

- The syringe is filled with distilled or deionized water supplied by the analysing laboratory and washed well and the water run to waste
- Fill the syringe and attach a new filter and run 20ml of sample to waste
- About 250ml of water is filtered into a PET bottle, the syringe is refilled as necessary and the bottle capped
- Only one filter may be used for each sample
- A blank determination should be carried out no less frequently than once per day or twelve hour period of survey. The blank should be identified by Date, Time and Reference Number:

	<i>Blank</i>
	Calibration Sample
Boat	Ref. Number
Vigilance	60899700
Sea Vigil	60399800
Water Guardian	60199900
Coastal Guardian	60799600

- All blanks from any one boat will have an identical reference number, and will be identified by date and time

3.6 ORGANICS

3.6.1 Apparatus

- A solvent washed glass bottle usually one or two litres with glass stopper

3.6.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water
- The sample should, if possible, be sampled directly from the sea into a glass bottle without using a separate sampling container
- An air space roughly level with the neck of the bottle is normally required in the bottle to allow addition of extraction solvent at the laboratory
- The bottles usually contain traces of solvent (acetone or hexane) prior to the addition of the sample so it should not be rinsed with sample

3.7 SUSPENDED SOLIDS

3.7.1 Apparatus

- Acid washed HDPE sampling container (20% Nitric Acid rinse at least once per day)

3.7.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water
- The bottle should be filled directly from the HDPE sampling container, without allowing the particles to settle, and capped
- The bottle should be stored in a cool place

3.8 NUTRIENTS

3.8.1 Apparatus

- Acid washed HDPE sampling container (20% Nitric Acid rinse at least once per day)
- 60ml HDPE type syringe
- 0.45µ sealed cartridge type filter (Whatman as supplied by laboratory)

3.8.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water
- The syringe is filled with water and washed well and the water run to waste
- Fill the syringe and attach a new filter and run 20ml of sample to waste
- About 250ml of water is filtered into a bottle, the syringe is refilled as necessary and the bottle capped
- The filtered sample should be frozen immediately and transferred to the laboratory as quickly as possible still frozen. [N.B. This is by no means a perfect method for the analysis of nutrients but is the best method available at present].

3.9 CHLOROPHYLL

3.9.1 Apparatus

- Acid washed HDPE sampling container (20% Nitric Acid rinse at least once per day)
- A filter system capable of supporting a GF/C filter membrane.

3.9.2 Method

- Sample should be collected from a point well forward of the zinc anodes and the engine cooling water.
- A measured volume of sample approximately one litre is filtered through a 4.7 or 7.0cm diameter GF/C filter paper preferably at atmospheric pressure. If pressure must be used to speed up the filtration then it must be negative and about 10psi. Pressure applied above the filter paper may cause cell rupture and subsequent loss of chlorophyll
- Once the filter paper is reasonably dry but not desiccated it should be removed with tweezers, folded together to trap the residue and wrapped in a small piece of foil. The foil package should be placed in a labelled polythene bag and frozen immediately and transferred to the laboratory as quickly as possible still frozen.

THE SAMPLES SHOULD BE COURIERED, FROZEN, IN A GOOD QUALITY COOL BOX AND ARRANGEMENTS MADE FOR THEM TO BE MET AT THE LABORATORY ON ARRIVAL.

4.0 ANALYTICAL QUALITY CONTROL AND CALIBRATION

4.1 Introduction

Good quality instrumentation which is regularly calibrated and checked with quality control standards is absolutely essential to the Baseline survey. Without confidence in the results produced, by each piece of instrumentation, it would be hard, if not impossible, to prove changes in the water quality around the coast. To this end a rigid AQC policy must be employed if the results are to be of worth.

4.2 Qubit pH

4.2.1 Interval-

The pH should be calibrated at least every 12 hours. If on a long survey it may be necessary to suspend the data collection to recalibrate.

4.2.2 Reagents-

The pH should be calibrated using standardized buffers

pH	4	Fisons J/2825/15
pH	7	Fisons J/2855/15
pH	10	Fisons J/2885/15

(product numbers are only given as a guide and any reputable ready made pH buffer will suffice)

Low ionic strength pH 7 check buffer (supplied by the National Centre)

4.2.3 Method-

Each buffer is tested in turn and the previous calibration value noted on the calibration sheet before altering the value. This will give details about the drift associated with the equipment since the last calibration. The new Qubit values for each buffer should be noted.

Finally a fourth standard of low ionic strength is tested with the probe and the value is noted on the calibration sheet. The low ionic nature of this buffer will highlight slow response times which may well have gone unnoticed in the usual pH buffers and in seawater.

4.3 Qubit Temperature

4.3.1 Interval-

The temperature should be checked at least every day. It is essential that all temperature probes are calibrated at least annually, probably by the manufacturer.

4.3.2 Method-

The temperature probe should be cross-checked with all other temperature measuring devices on board. All devices are lowered into an area of water at the rear of the vessel and after a short period the various readings noted. This will ensure that any drift, or mechanical damage, associated with individual instruments will be detected.

4.4 Dissolved Oxygen

4.4.1 Interval-

The DO should be calibrated at least every 12 hours. If on a long survey it may be necessary to suspend the data collection to recalibrate.

4.4.2 Reagents-

The DO should be calibrated using

A saturated solution of Sodium Sulphite
Moist Air

4.4.3 Method-

The DO probe is held in a bucket containing a water soaked tissue in the bottom. This helps to keep the probe moist and prevents noise occasionally experienced by air movement and drying. The previous value is noted for 100% saturation before inserting the calibration value. This will give details about the drift associated with the equipment since the last calibration.

The probe is placed in a beaker containing a saturated solution of sodium sulphite and allowed to stand for about five minutes to allow full removal of dissolved oxygen. The previous value is noted for 0% saturation before inserting the calibration value. This will give details about the drift associated with the equipment since the last calibration.

The DO probe should be cross-checked with all other DO measuring devices on board. All devices are lowered into an area of water at the rear of the vessel and after a short period the various readings noted. This will ensure that any drift, or mechanical damage, associated with individual instruments will be detected.

4.5 Salinity

4.5.1 Interval-

The salinity should be checked at least every day and calibrated on a weekly basis.

4.5.2 Reagents-

The salinity should be calibrated using

p-series salinity standard (35)
Ocean Scientific £72 for 5 x 200 ml ampoule.

The salinity should be checked using Atlantic Seawater Checked against the p-series standard.
Ocean Scientific £55 for 4 x 5 litres

4.5.3 Method-

The p-series standard is tested and the previous calibration value noted on the calibration sheet. This will give details about the drift associated with the equipment since the last calibration. The Atlantic seawater can then be cross referenced to the p-series standard and used on a daily basis to check the probe. The salinity can also be checked using a resistance loop on a daily basis.

The Salinity probe should be cross-checked with all other salinity measuring devices on board. All devices are lowered into an area of water at the rear of the vessel and after a short period the various readings noted. This will ensure that any drift, or mechanical damage, associated with individual instruments will be detected.

4.6 Transmission

4.6.1 Interval-

The transmission should be checked at least every week.

4.6.2 Method-

Transmission values for 0% and 100% can be recorded and the raw values recorded to give details about the drift associated with the equipment since the last check.

4.6 Chlorophyll

4.6.1 Interval-

The fluorescence chlorophyll should be checked at least every week and calibrated by the manufacturer at least annually.

4.6.2 Reagents-

Chlorophyll standards appear to be so unstable that it is not recommended that they are employed.

4.6.3 Method-

The chlorophyll measuring devices should be cross-checked with any others available on board. All devices are lowered into an area of water at the rear of the vessel, or allowed to examine water removed from that vicinity, and after a short period the various readings noted. This should ensure that any drift, or mechanical damage, associated with individual instruments will be detected.

5.0 MICROBIOLOGY

5.1 Total Coliform Bacteria in Marine Water

- 5.1.1 Introduction** Coliform Bacteria, such as *Escherichia coli*, are the most commonly used micro-organisms as primary indicators of faecal pollution, indicating the presence of intestinal pathogens. *E. coli* are present in large numbers in faecal material (10^9 *E. coli* per gram of fresh faeces) and can be detected in numbers as low as one organism in 100ml of water. This is currently the most sensitive method of indicating this type of pollution.
- 5.1.2 L O D** One organism in the largest volume of sample that can be filtered.
- 5.1.3 Interferences** High numbers of competing organisms may affect the growth of the test organisms. High turbidity waters may leave residues on the membrane which will interfere with recognition of colonies.
- 5.1.4 Principle** Measured volumes of sample are filtered through a 0.45μ membrane filter which is transferred to a culture medium. Incubation encourages the growth of the coliforms while growth of other organisms are suppressed by the selective agent in the medium. Presumptive coliforms are recognized by their yellow colour, which results from the fermentation of lactose to produce acid, in the presence of a pH indicator. From knowledge of the volume of sample filtered and the number of colonies counted the concentration of coliform bacteria in the original sample can be calculated.
- 5.1.5 Hazards** As with any microbiology technique a high standard of hygiene must be exercised at all times. Coliform organisms are not thought to be pathogenic to humans although certain strains can cause gastroenteric disorders.
- 5.1.6 Media** Media should be acquired from an accredited laboratory source (any difficulties contact R G Davison).
- 5.1.7 Sampling** Samples should be gathered in accordance with the sample protocol. (section 3.0) The sample should be transferred to a sterile container and kept in a cool box prior to analysis. Analysis must commence within six hours of sampling.

5.1.8 Apparatus

Incubator, thermostatically controlled at 30°C +/- 1°C
Incubator, thermostatically controlled at 37°C +/- 0.5°C
Ultra-violet sterilization unit (boiling water bath not recommended)
Filtration manifold
Membrane filters 0.45µ
Vacuum unit with safety trap suitable for microbiological analysis
Petri dish or aluminium plates previously filled with nutrient media and stored in a fridge at 4°C
Sterile disposable 1 and 10ml pipettes
Sterile 100ml sample bottles
Hot air burner for sterilization (bunsen burners not recommended)

5.1.9 Procedure

Disinfect the work area
Sterilize the filter units and tweezers in the UV sterilizer and assemble
Filter the sample, or a dilution of it, through a 0.45µ sterile membrane filter
Place the filter onto the culture media ensuring that any air bubbles are removed from beneath the membrane
Incubate the plates for 4 hours at 30°C followed by 14 hours at 37°C

5.1.10 Results

For each sample of water results are expressed as number of colony forming units per 100ml of sample

5.1.11 QC / AQC

All equipment should be monitored to ensure correct operation
Sterile blank samples are included in each batch to ensure aseptic conditions
With every batch of analysis, at least one sample is carried out in duplicate. These results can be used as an on going precision test for the analysis and charts of differences recorded.

5.2 Faecal Coliform Bacteria in Marine Water

- 5.2.1 Introduction** Coliform Bacteria, such as *Escherichia coli*, are the most commonly used micro-organisms as primary indicators of faecal pollution, indicating the presence of intestinal pathogens. *E. coli* are present in large numbers in faecal material (10^9 *E. coli* per gram of fresh faeces) and can be detected in numbers as low as one organism in 100ml of water. They are currently the most sensitive method of indicating this type of pollution.
- 5.2.2 L O D** One organism in the largest volume of sample that can be filtered.
- 5.2.3 Interferences** High numbers of competing organisms may affect the growth of the test organisms. High turbidity waters may leave residues on the membrane which will interfere with recognition of colonies.
- 5.2.4 Principle** Measured volumes of sample are filtered through a 0.45μ membrane filter which is transferred to a culture medium. Incubation encourages the growth of the Faecal Coliforms while growth of other organisms are suppressed by the selective agent in the medium. Presumptive coliforms are recognized by their yellow colour, which results from the fermentation of lactose to produce acid, in the presence of a pH indicator. From knowledge of the volume of sample filtered and the number of colonies counted the concentration of coliform bacteria in the original sample can be calculated.
- 5.2.5 Hazards** As with any microbiology technique a high standard of hygiene must be exercised at all times. Coliform organisms are not thought to be pathogenic to humans although certain strains can cause gastroenteric disorders.
- 5.2.6 Media** Media should be acquired from an accredited laboratory source (any difficulties contact R G Davison).
- 5.2.7 Sampling** Samples should be gathered in accordance with the sample protocol. (section 3.0) The sample should be transferred to a sterile container and kept in a cool box prior to analysis. Analysis must commence within 6 hours of sample being taken.

5.2.8 Apparatus

Incubator, thermostatically controlled at 30°C +/- 1°C
Incubator, thermostatically controlled at 44°C +/- 0.5°C
Ultra-violet sterilization unit (Boiling water bath not recommended)
Filtration manifold
Membrane filters 0.45µ
Vacuum unit with safety trap suitable for microbiological analysis
Petri dish or aluminium plates previously filled with nutrient media and stored in a fridge at 4°C
Sterile disposable 1 and 10ml pipettes
Sterile 100ml sample bottles
Hot air burner for sterilization (bunsen burners not recommended)

5.2.9 Procedure

Disinfect the work area
Sterilize the filter units and tweezers in the UV sterilizer and assemble
Filter the sample, or a dilution of it, through a 0.45µ sterile membrane filter
Place the filter onto the culture media ensuring that any air bubbles are removed from beneath the membrane
Incubate the plates for 4 hours at 30°C followed by 14 hours at 37°C.
After incubation all plates are counted with the minimum of delay and minimum exposure to daylight
All yellow colonies are counted as presumptive coliform bacteria

5.2.10 Results

For each sample of water results are expressed as number of colony forming units per 100ml of sample

5.2.11 QC / AQC

All equipment is monitored to ensure correct operation
Sterile blank samples are included in each batch to ensure aseptic conditions
With every batch of analysis at least one sample is carried out in duplicate. These results can be used as an on going precision test for the analysis and charts of differences recorded
After incubation all plates are counted with the minimum of delay and minimum exposure to daylight.
All yellow colonies are counted as presumptive coliform bacteria.

6.0 WATER QUALITY PROFILING

6.1 Introduction

At Baseline sites a profile is required of the water column down to and including 15 metres from the surface, where depth allows. Information must be recorded from depth, temperature, salinity and dissolved oxygen with additional data from turbidity and chlorophyll a, if available. This data will be used to assess stratification and detect different bodies of water.

6.2 Method

A water quality probe such as the Chelsea Aquapak is suspended in the water from a frame well away from the engine discharges. The unit is held at various depths and the readings allowed to stabilize prior to recording. When adverse weather conditions do not permit the near surface measurements to be recorded accurately, due to swell, only the deeper values are needed.

6.3 Depths

Values for probe should be recorded at:

- Surface - Allow the probe to settle just below the surface
- 0.5m
- 1m
- 2m
- 5m
- 10m
- 15m

6.4 Recording

Data from the profiles must be logged in two ways. At the baseline site the Qubit line should be halted and a new line name entered. The line is then started to record data as the profiler is lowered through the water column. At each depth the stable values for temperature, salinity and dissolved oxygen should be recorded into the profiler data sheet (see attached copy). At the end of the profile the Qubit line should be stopped and the next Baseline point and line selected. Data logged onto paper must be entered into spreadsheet format for supply to the National Centre by the required dates (a spreadsheet template is supplied where necessary, for the supply of profile results).

7.0 SKALAR OPERATION

7.1 Skalar Analytical Methods

A full method document for each nutrient will be prepared in the future to cover a standard procedure. This section will limit itself at present to a general routine of operation for the analysis of the five nutrients.

7.2 Precision Testing

All nutrient analysers used for National Centre Baseline work must be tested in accordance with the WRC Technical Report TR 66 or the update NS 30. This will provide information about limits of detection and measurement errors. The National Centre requires output from this test and can perform the data analysis on the raw data produced for this test if that is required.

7.3 Continuous Analysis

The Skalar must be run in semi continuous mode with samples being taken at two minute intervals.

The sample must be removed from the sea using a peristaltic pump sampling water from a depth of one metre well away from any discharges, preferably the bottom of the hull. The positive pressure side of the pump will feed to a 0.4 μ exclusion filter preferably a Whatman Gamma 20 (Part No. 1915 004) with a large proportion of the flow to waste, presenting a representative sample to the flow cell. The output from the filter will feed a flow cell from which the sampler can remove samples at two minute intervals. The delay between the uptake of the water sample and entering the flow cell must not be greater than 90 seconds; steps to increase the peristaltic pump must be taken to achieve this. The exact time delay should be calculated, in dirty water conditions, and used to adjust the sample time.

The clock on the sampler must be checked and adjusted to ensure that all sampling intervals are two minutes, irrespective of the value on the dial.

Approximate times are	Sample	80 seconds
	Wash	40 seconds

7.4 Reagents

Reagent shelf lives should be examined and adhered to.

7.5 Calibration Curves

All standards, drifts and AQC samples will be diluted in low nutrient seawater (Ocean Scientific - tel 01428 685245). A six point, multi-nutrient, calibration curve, including blank, should be analysed every six hours with a drift sample (the middle standard) being analysed every 20th sample. Tables can be edited retrospectively if a dummy field is set up at the start of the run.

7.6 Run Length

Each Skalar run should consist of no more than 100 determinations, including standards, drifts and AQC samples.

7.7 AQC Samples

Two AQC samples, one high and one low concentration, will be analysed during each run of 100 determinations. These AQC standards will be supplied in concentrated form, by the National Centre, to be diluted in low nutrient seawater.

7.8 Sample Logging

It is imperative that the sample can be traced to a geographical position when the data is being analysed so to this end there are a number of ways to achieve this.

- 7.8.1 The sampler can be connected to the auto-fix facility of the Qubit, using a micro-switch on the sampling arm.
- 7.8.2 The sampler micro-switch can act on an electronic counter e.g. Newport, to produce a unique number which logs to the Qubit with date and time either with an analogue or digital signal.
- 7.8.3 The exact start time of the autosampler start should be noted from the Qubit and within a spreadsheet successive sample times can be calculated. These data can then be merged with the Qubit positional outputs using an in-house software available from the National Centre. For this to work and produce an accurate result the timings of the autosampler have to be checked and adjusted to ensure repeatability.

The best solution is 7.8.2 (details of a suitable counter available from the National Centre).

7.9 Data Returns

The Skalar data should be edited, exported into a spreadsheet and where no timer was used a series of times included (details of how to achieve this are available from the National Centre).

Skalar data, on floppy disk, in spreadsheet format should be supplied to the National Centre within two weeks of the completion of the survey, for the attention of Diana Milner.

Also required- Log sheets (sample format supplied) AQC information.

8.0 QUBIT FORMAT

8.1 Format

The format of the Qubit header (that is, the names associated with each measurement or "depth") for all data within one survey must remain constant.

8.2 Name

The name of each measurement type should contain the source, the determinand and the instrument name well as the variable being recorded. The possible sources are FISH, PROF and POOL for towfish, profiler and moon pool. Please use common sense where other sources are involved (eg ECHO). Naming of variables and instruments is left up to the operator, but a short name is preferred. For example, to define a measurement of chlorophyll from a Chelsea Instruments' profiler, the following is sufficient: PRO_CHELS_CHL, whereas PROFILER_CHELSEA_CHLOROPHYLL_A is over verbose and causes problems at the further data processing stages. Note that the use of CH in this case is not sensible as it could denote Chelsea or chlorophyll.

8.3 Depth

The depth that each instrument is operating at must be logged, preferably within the datastream that the instrument is writing.

Example qubit ASCII header file

The following shows an example of how to set out a qubit ascii file. The header information includes the determinand (eg TRANS), the platform (eg FISH) and the manufacturer of the instrument (eg CLS for Chelsea).

```
Projection details from JOB CONFIG file: TRACS ver 0
Spheroid:      AIRY.1830 (OSGB)
Projection:    TRANSVERSE MERCATOR
Origin:        N 49 00.000 , W 2 00.000
False EASTING: 400000.00, False NORTHING: -100000.00
LISTING OF QPF FILE QA156.2 120 RECORDS. DATA IS FROM LINE:DATA 79
FILE CONTAINS TEMP'FISH'CLS,TRANS'FISH'CHL,SAL'FISH'CLS,DOF'FISH'CLS,CHLO'FISH'CLS
                DEPTH'FISH'CLS,TEMP'PROF'CLS,SAL'PROF'CLS,DOF'PROF'CLS,DEPTH'SINRAD
POSITION SOURCE IS VESSEL REF
TRACK HAS NOT BEEN EDITED. DATA SELECTION IS OUTSTANDING.
----- 2 Aug 1994 -----
RECORD   1  14:47:30  N 52 54.711  W 4 33.347  TIDE 0.00
DEPTHS: 81.76, 14.27, 34.32, 113.53, 8.26, 2.87, -11.343.45, 107.05, 34.30,
RECORD   2  14:47:40  N 52 54.691  W 4 33.377  TIDE 0.00
DEPTHS: 81.64, 14.29, 34.32, 113.44, 8.26, 2.33, -11.343.55, 107.01, 34.36,
RECORD   3  14:47:50  N 52 54.681  W 4 33.405  TIDE 0.00
DEPTHS: 80.90, 14.29, 34.32, 113.44, 8.26, 2.18, -11.343.65, 107.05, 34.35,
RECORD   4  14:48:00  FIX 1448  N 52 54.661  W 4 33.435  TIDE 0.00
DEPTHS: 81.79, 14.30, 34.32, 113.40, 8.26, 2.41, -11.343.75, 107.01, 34.12,
RECORD   5  14:48:07  FIX 1448  N 52 54.651  W 4 33.467  TIDE 0.00
DEPTHS: 81.54, 14.34, 34.29, 113.13, 8.26, 2.19, -11.343.85, 107.05, 34.37,
RECORD   6  14:48:10  N 52 54.651  W 4 33.497  TIDE 0.00
DEPTHS: 81.54, 14.33, 34.30, 113.28, 8.26, 2.20, -11.343.95, 107.05, 34.38,
```

9.0 PRE-SURVEY ROUTINE

9.1 Sample Sites

The definitive list of sites, with list of determinands to be sampled at each site for the National Baseline Survey, will be agreed and finalized by each vessel and the National Centre, prior to the survey.

9.2 Survey Dates

Dates of flexibility, around the allocated survey period, should be notified to the National Centre as soon as possible.

9.3 Sample Runs

Each vessel will liaise with the laboratory contact to ensure that they have sufficient log sheets, bottle labels, consumables and bottles for the allocated sample sites, calibration runs and blanks determinands.

9.4 Qubit Database

Each vessel will check that their Qubit sample site database contains all the correct positions for the survey. They should also ensure that the Data Format is set up in accordance with instructions.

9.5 Skalar Nutrient Analyser

The Skalar must be fully precision tested prior to the start of the survey. This will need to be repeated after any major changes to method and annually thereafter. Sufficient reagents must be acquired or prepared for the duration of the relevant survey section. Ensure that sufficient filters and consumables are available.

9.6 Couriers

It is essential to ensure that a courier will be available for transporting water samples to the laboratory as soon after the end of the survey as possible. Any lengthy breaks during the survey may necessitate the transport of completed samples to the Laboratory part way through the Survey. Certain samples must be transported in a specialist manner i.e. refrigerated van or ice box.

It is essential to ensure that nutrient and chlorophyll a samples arrive at the Laboratory in a frozen state.

9.7 AQC and Calibration Standards

The Survey Officer must ensure that there are sufficient supplies of standards and calibration solutions to maintain the performance of all equipment used during a Baseline Survey.

10.0 DAILY PROCEDURES

During the baseline surveys, each vessel is responsible for carrying out the daily procedures as given below.

10.1 Communication with the National Centre

The vessel should make contact with the National Centre before 0900 hrs where possible. If out of telephone range, contact should be made as soon telephone connection occurs. When the National Centre is closed, a Duty Officer will be nominated to co-ordinate the surveys out of hours. Communication will then be as arranged with the Duty Officer.

10.2 Calibration check of instruments

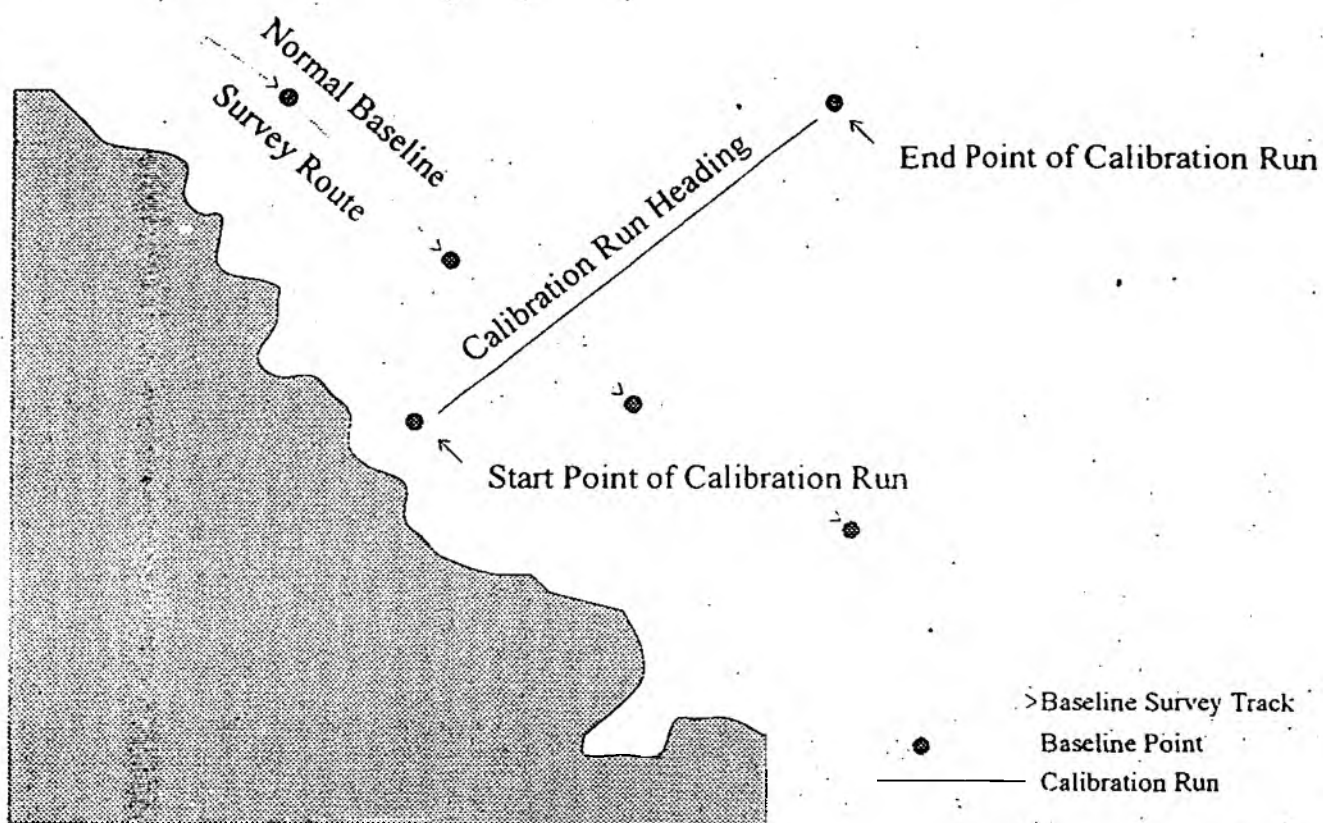
Details of calibration methods and frequency of calibration should be submitted to the National Centre with the survey data.

10.3 Beginning/End of survey

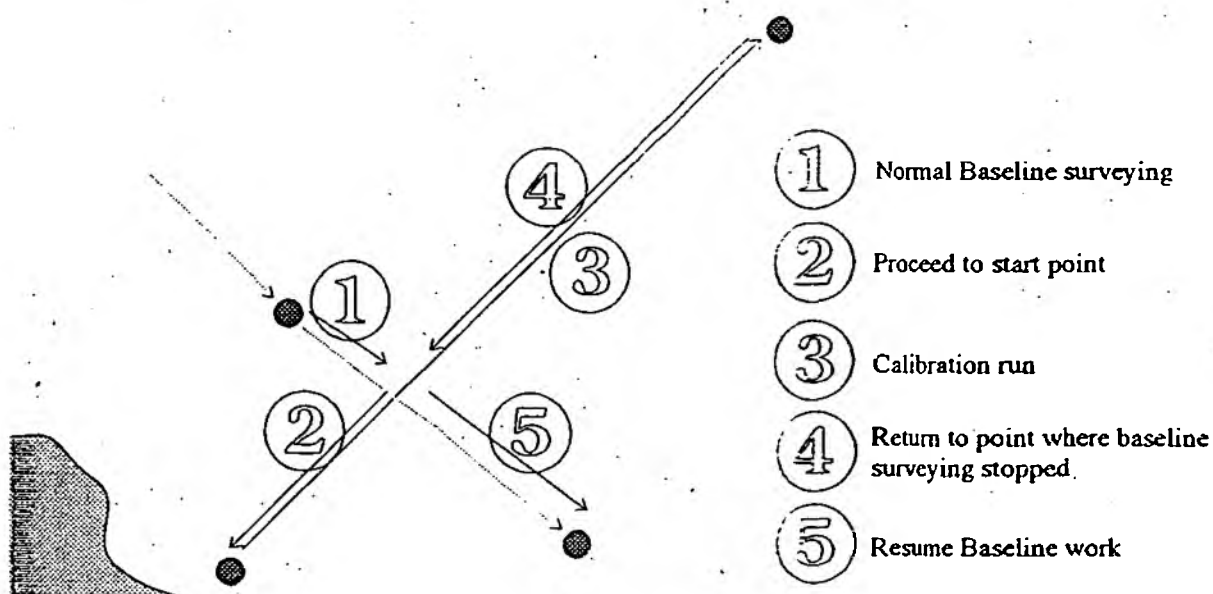
Where two vessels overlap in survey areas, a communal site should be sampled for Group 1 determinands by both vessels. It is the responsibility of the Survey Officer to ensure that all log sheets and data discs are sent to the National Centre within the timescales given in the Manual, labelled for the attention of **Diana Milner**.

11.0 ARRANGEMENTS FOR OVERFLIGHTS

- 11.1 The vessel will be contacted by the National Centre prior to and on the day of the proposed overflight, to notify the vessel of the intention to proceed. A working channel (not channel 16) for marine VHF communication will be decided upon by the master of the vessel prior to the departure of the aircraft. Any emergency alterations to overflight arrangements after aircraft departure can be made by message on the aircraft pager. (See contacts list)
- 11.2 When the aircraft is 45 minutes away from the vessel, the aircraft will contact the boat. Working channels will be moved if necessary. It is possible to page the aircraft (see contact list), but the only method of communication with the aircraft in flight is marine VHF radio. A flight line map is included to allow the vessel to give the aircraft a quick approximate location on the basis of the flightlines they are using as this is how they navigate around the coastline.
- 11.3 A note of the position of the boat must be made. The boat will log Qubit and Skalar data and follow the procedure below: (see diagram)
 - 11.3.1 Select a course from their present position that is as much off-shore as possible.
 - 11.3.2 Take the reciprocal course TOWARDS SHORE until the vessel is a minimum of HALF A NAUTICAL MILE FROM SHORE.
 - 11.3.3 TURN to the original offshore course and note the position of the vessel. This is the first sample point of the calibration run.
 - 11.3.4 Communicate the position of this point and the heading of the offshore course to the aircraft immediately.
 - 11.3.5 Proceed along this course at normal baseline sampling speeds and take 10 spot samples as close to the surface as possible at 6 minute intervals (approx 1 hour).
 - 11.3.6 At the last sampling point, a note of the position must be made, and communicated to the aircraft (if the aircraft has not completed the run)
 - 11.3.7 The vessel must then return to point of departure from the original baseline route at best possible speed and resume normal baseline operations.
- 11.4 The vessel will contact the National Centre to report the position of the calibration run and the success of the above procedure.



Overview of the Calibration Run Method



Detail of the sections of the calibration run

- 11.5 At each calibration site a water sample is taken, in accordance with the sampling protocol, and prepared for laboratory suspended solids and chlorophyll analysis. The samples are labelled with date and time and the calibration reference number.

Boat	Calibration Overflight Run Number	Calibration Sample Ref. Number
Vigilance	1	60898900 <i>X</i>
	2	60898800
	3	60898700
Sea Vigil	1	60399200 <i>X</i>
	2	60399100
	3	60399000
Water Guardian	1	60199500 <i>X</i>
	2	60199400
	3	60199300
Coastal Guardian	1	60798600 <i>X</i>
	2	60798500
	3	60798400

where *X* = 1-5

Samples are sent to the laboratories in the usual manner.

- 11.7 The QUBIT line for that period will be large, but will include the calibration data. No special procedures are necessary for the handling of the data, except a note of the file number that contains the calibration data should be made in the relevant logsheet.

12. DATA RETURNS / TIMESCALES

12.1 The following data must have arrived at the National Centre (for the attention of Diana Milner) within 2 weeks of the baseline survey being completed:

- a) Log sheets for the survey (templates supplied)
- b) Qubit data on optical disk or floppies
- c) Profile data on paper and in Lotus spreadsheet format (template supplied)
- d) Edited Skalar data
- e) Calibration sheets and AQC data

VIGILANCE. National baseline survey sites.

BASE 132 BURRY PORT	*	*	*			
BASE 133 CARMARTHEN	*					
BASE 134 CALSEY IS.	*	*	*			
BASE 135A OLD CASTLE HD(IN	*					
BASE 135B OLD CASTLE HD (O	*					
BASE 136A ST. GOVANS	*					
BASE 136B ST. GOVANS (OFF)	*					
BASE 137 TURBOT BANK	*	*	*			
BASE 138 ST. ANNS	*					

VIGILANCE. National baseline survey sites.

BASE 89 DODMANS POINT	*					
BASE 90 ST.ANTONY HEAD	*					
BASE 91 FALMOUTH	*	*	*			
BASE 92 BLACKHEAD	*					
BASE 93 LIZARD	*					
BASE 94 MULLION	*					
BASE 95 PENZANCE	*					
BASE 96 RUNNEL STONE	*					
BASE 97 CAPE CORNWALL	*	*	*			
BASE 98 THE CARRACKS	*					
BASE 99 GODREVY IS.	*					
BASE 100 ST AGNES	*					
BASE 101 NEWQUAY	*					
BASE 102 TREVOSE	*					
BASE 103 PADSTOW	*	*	*			
BASE 104 PORT ISAAC	*					
BASE 105 BOSCASTLE	*					
BASE 106 BUDE	*					
BASE 107 MOREWENSTON	*					
BASE 108 HARTLAND	*					
BASE 109 BIDEFORD	*	*	*			
BASE 110 BULL POINT	*					
BASE 111 COMBE MARTIN	*					
BASE 112 FORELAND	*					
BASE 113 PORLOCK	*					
BASE 114 MINEHEAD	*					
BASE 115 BRIDGWATER BAR	*	*	*			
BASE 116 WESTON S MARE	*					
BASE 117 CLEVEDON	*					
BASE 118 AVONMOUTH	*					
BASE 119 NO. 1 BEACON	*	*	*			
BASE 120 NEWPORT DEEP	*	*	*			
BASE 121 CARDIFF ROAD	*					
BASE 122 LAVERNOCK	*					
BASE 123 ABERTHAW	*	*	*			
BASE 124 NAST POINT	*					
BASE 125 PORTHCAWL	*	*	*			
BASE 126 KENFIG	*	*	*			
BASE 127 PORT TALBOT	*					
BASE 128 MUMBLES	*					
BASE 129 OXWICH	*					
BASE 130 WORMS HEAD	*	*	*			
BASE 131 LLANELLI	*					

VIGILANCE. National baseline survey sites.

Short name	LIST 1	LIST 2	LIST 3	M-BLANK	DATE	TIME
BASE 51 MEDWAY BUOY	*	*	*			
BASE 52 SHIVERINGSAND BY	*					
BASE 53 EAST MARGATE	*					
BASE 54 EAST BRAKE BUOY	*					
BASE 55 GOODWIN FORK BUO	*				/	
BASE 56 SOUTH FORELAND	*	*	*			
BASE 57 SANGATE BAY	*					
BASE 58 DUNGENESS	*					
BASE 59 RYE BAY	*					
BASE 60 BEXHILL	*					
BASE 61 BEACHY HEAD	*	*	*			
BASE 62 NEWHAVEN	*					
BASE 63 BRIGHTON	*					
BASE 64 WORTHING	*					
BASE 65 MIDDLETON ON SEA	*					
BASE 66 SELSEY BILL	*	*	*			
BASE 67 NAB TOWER	*					
BASE 68A E BRAMBLES	*					
BASE 68B CALSHOT	*	*	*			
BASE 68C DOCKHEAD	*					
BASE 68D W PRINCESS A	*					
BASE 69 ST. CATHERINES	*					
BASE 70 THE NEEDLES	*					
BASE 71 HENGISTBURY	*	*	*			
BASE 72 ANVIL POINT	*	*	*			
BASE 73 ST.ALDHELMS	*					
BASE 74 WEYMOUTH BAY	*					
BASE 75 PORTLAND BILL	*					
BASE 76 CHESIL	*					
BASE 77 BRIDPORT	*					
BASE 78 SEATON	*	*	*			
BASE 79 SIDMOUTH	*					
BASE 80 EXMOUTH	*					
BASE 81 TORBAY	*	*	*			
BASE 82 DARTMOUTH	*					
BASE 83 START POINT	*					
BASE 84 SALCOMBE	*					
BASE 85 BIGBURY BAY	*					
BASE 86 PLYMOUTH	*	*	*			
BASE 87 EAST LOOE	*					
BASE 88 FOWEY	*					

SEA VIGIL. National baseline survey sites.

Short name	LIST 1	LIST 2	LIST 3	M-BLANK	DATE	TIME
BASE 31 HAILE SAND FLAT	*	*	*			
BASE 32 THEDDLETHORPE	*					
BASE 33 CHAPEL-ST-LEONARD	*		*			
BASE 34 OUTER DOGS HEAD	*					
BASE 35 WASH SITE 64	*	*	*			
BASE 36 OVERY, STAITHE	*					
BASE 37 CLEY, LOOKOUT	*	*	*			
BASE 38 SHERINGHAM	*					
BASE 39 MUNDESLEY	*	*	*			
BASE 40 LESSINGHAM	*					
BASE 41 WINTERTON	*	*	*			
BASE 42 GORLESTON	*					
BASE 43 KESSINGLAND	*		*			
BASE 44 DUNWICH CLIFFS	*					
BASE 45 THORPENESS	*	*	*			
BASE 46 SHINGLE STREET	*					
BASE 47 FELIXSTOWE	*	*	*			
BASE 48 WALTON	*					
BASE 49 JAYWICK	*	*	*			
BASE 50 MAPLIN BANK	*					
BASE 51 MEDWAY BUOY	*					

WATER GUARDIAN. National baseline survey sites.

Short name	LIST 1	LIST 2	LIST 3	M-BLANK	DATE	TIME
BASE 1 BERWICK	*		*			
BASE 2 CASTLEHEAD ROCKS	*					
BASE 3 SHERESTON OUTCARS	*	*				
BASE 4 CRASTER	*		*			
BASE 5 WARKWORTH	*					
BASE 6 BRIG HEAD	*	*				
BASE 7 BLYTH	*		*			
BASE 8 TYNE (NORTH)	*					
BASE 9 TYNE (MIDDLE)	*	*	*			
BASE 10 TYNE (SOUTH)	*					
BASE 11 MARSDEN	*					
BASE 12 WEAR (NORTH)	*	*				
BASE 13 WEAR (MIDDLE)	*					
BASE 14 WEAR (SOUTH)	*					
BASE 15 PINCUSHION ROCK	*	*				
BASE 16 BLACKHALL	*					
BASE 17 TEES (NORTH)	*					
BASE 18 TEES (MIDDLE)	*	*	*			
BASE 19 TEES (SOUTH)	*					
BASE 20 SKINNINGROVE	*					
BASE 21 SANDSEND	*	*				
BASE 22 ROBIN HOODS BAY	*					
BASE 23 SCARBOROUGH OUTF	*					
BASE 24 FILEY BRIG	*	*				
BASE 25 FLANBOROUGH (NOR	*		*			
BASE 26 BRIDLINGTON	*					
BASE 27 HORNSEA	*	*				
BASE 28 BEACON HILL	*					
BASE 29 WITHERNSEA	*					
BASE 30 SPURN	*	*	*			
BASE 31 HAILE SAND FLAT	*					

COASTAL GUARDIAN. National baseline survey sites.

BASE 179 WHITEHAVEN	*					
BASE 180 WORKINGTON	*					
BASE 181 SOLWAY BUOY	*					
BASE 182 MIDDLE BUOY	*	*	*			
BASE 183 BALCARRY	*					
BASE 184 ABBEY HEAD	*					
BASE 185 MEGGERLAND	*					
BASE 186 ST NINIANS	*	*	*			

BASE 136.1 ST GOVANS (IN)	*					
BASE 136.2 ST GOVANS (OFF)	*					
BASE 137 TURBOT BANK	*	*	*			
BASE 138 ST ANNS	*					

VIGILANCE National Baseline Survey Sites

BASE 92 BLACKHEAD	*					
BASE 93 LIZARD	*					
BASE 94 MULLION	*					
BASE 95 PENZANCE	*					
BASE 96 RUNNEL STONE	*					
BASE 97 CAPE CORNWALL	*	*	*			
BASE 98 THE CARRACKS	*					
BASE 99 GODREVY ISLAND	*					
BASE 100 ST AGNES	*					
BASE 101 NEWQUAY	*					
BASE 102 TREVOSE	*					
BASE 103 PADSTOW	*	*	*			
BASE 104 PORT ISAAC	*					
BASE 105 BOSCASTLE	*					
BASE 106 BUDE	*					
BASE 107 MOREWENSTONE	*					
BASE 108 HARTLAND	*					
BASE 109 BIDEFORD	*	*	*			
BASE 110 BULL POINT	*					
BASE 111 COMBE MARTIN	*					
BASE 112 FORELAND	*					
BASE 113 PORLOCK	*					
BASE 114 MINEHEAD	*					
BASE 115 BRIDGWATER BAR	*	*	*			
BASE 116 WESTON-S-MARE	*					
BASE 117 CLEVEDON	*					
BASE 118 AVONMOUTH	*					
BASE 119 NO 1 BEACON	*	*	*			
BASE 120 NEWPORT DEEP	*	*	*			
BASE 121 CARDIFF ROAD	*					
BASE 122 LAVERNOCK	*					
BASE 123 ABERTHAW	*	*	*			
BASE 124 NAST POINT	*					
BASE 125 PORTHCAWL	*	*	*			
BASE 126 KENFIG	*	*	*			
BASE 127 PORT TALBOT	*					
BASE 128 MUMBLES	*					
BASE 129 OXWICH	*					
BASE 130 WORMS HEAD	*	*	*			
BASE 131 LLANELLI	*					
BASE 132 BURRY PORT	*	*	*			
BASE 133 CARMARTHEN	*					
BASE 134 CALDEY ISLAND	*	*	*			
BASE 135.1 OLD CAS HD (IN)	*					
BASE 135.2 OLD CAS HD (OFF)	*					

VIGILANCE National Baseline Survey Sites

Short name	LIST 1	LIST 2	LIST 3	M-BLANK	DATE	TIME
BASE 51 MEDWAY BUOY	*	*	*			
BASE 52 SHIVERINGSAND BY	*					
BASE 53 EAST MARGATE	*					
BASE 54 EAST BRAKE BUOY	*					
BASE 55 GOODWIN FORK BUO	*					
BASE 56 SOUTH FORELAND	*	*	*			
BASE 57 SANGATE BAY	*					
BASE 58 DUNGENESS	*					
BASE 59 RYE BAY	*					
BASE 60 BEXHILL	*					
BASE 61 BEACHY HEAD	*	*	*			
BASE 62 NEWHAVEN	*					
BASE 63 BRIGHTON	*					
BASE 64 WORTHING	*					
BASE 65 MIDDLETON ON SEA	*					
BASE 66 SELSEY BILL	*	*	*			
BASE 67 NAB TOWER	*					
BASE 68.1 EAST BRAMBLES	*					
BASE 68.2 CALSHOT	*	*	*			
BASE 68.3 DOCKHEAD	*					
BASE 68.4 WEST PRINCESS A	*					
BASE 69 ST CATHERINES	*					
BASE 70 THE NEEDLES	*					
BASE 71 HENGISTBURY	*	*	*			
BASE 72 ANVIL POINT	*	*	*			
BASE 73 ST ALDHELMS	*					
BASE 74 WEYMOUTH BAY	*					
BASE 75 PORTLAND BILL	*					
BASE 76 CHESIL	*					
BASE 77 BRIDPORT	*					
BASE 78 SEATON	*	*	*			
BASE 79 SIDMOUTH	*					
BASE 80 EXMOUTH	*					
BASE 81 TORBAY	*	*	*			
BASE 82 DARTMOUTH	*					
BASE 83 START POINT	*					
BASE 84 SALCOMBE	*					
BASE 85 BIGBURY BAY	*					
BASE 86 PLYMOUTH	*	*	*			
BASE 87 EAST LOOE	*					
BASE 88 FOWEY	*					
BASE 89 DODMANS POINT	*					
BASE 90 ST ANTONY HEAD	*					
BASE 91 FALMOUTH	*	*	*			

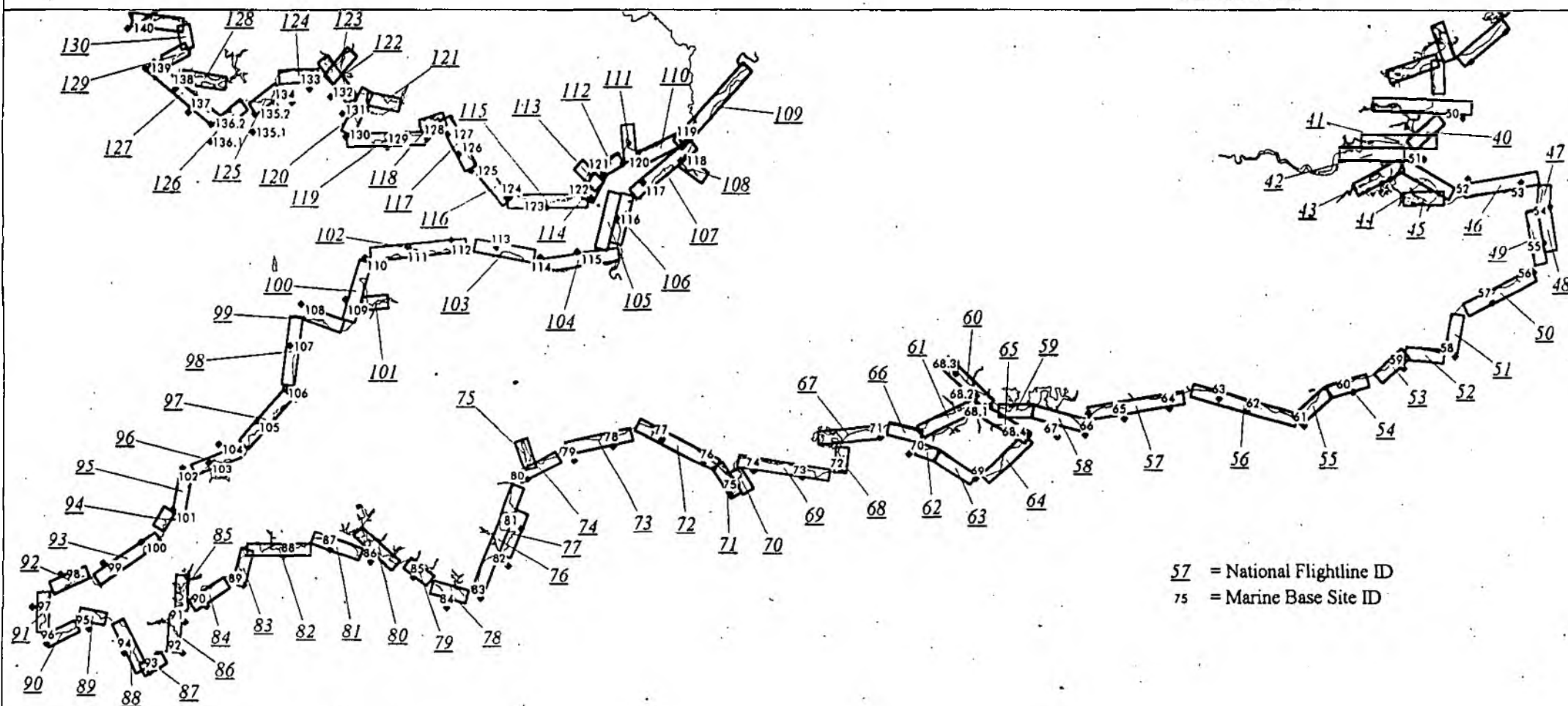
COASTAL GUARDIAN. National baseline survey sites.

Short name	LIST 1	LIST 2	LIST 3	M-BLANK	DATE	TIME
BASE 138 ST. ANNS	*	*	*			
BASE 139 SKOMER	*					
BASE 140 S BISHOP	*					
BASE 141 ABEREIDDY	*	*	*			
BASE 142 STRUMBLE HEAD	*					
BASE 143 FISHGUARD	*	*	*			
BASE 144 PWLL-COCH	*					
BASE 145 CARDIGAN	*	*	*			
BASE 146 PENLY-BADELL	*					
BASE 147 NEWQUAY HEAD	*					
BASE 148 PEN PIGYN	*					
BASE 149 ABERYSTWYTH	*	*	*			
BASE 150 ABERDOVEY	*					
BASE 151 PEN-BWCH POINT	*					
BASE 152 BARMOUTH	*					
BASE 153 SHELL	*					
BASE 154 PWLLHELI	*	*	*			
BASE 155 PORTH CEIRIAD	*					
BASE 156 BARDSEY	*	*	*			
BASE 157 PORTH YSGADEN	*					
BASE 158 DINLLAEN	*	*	*			
BASE 159 DYLAN	*					
BASE 160 ABERFERAW	*					
BASE 161 PENRHOS	*	*	*			
BASE 162 HOLYHEAD	*					
BASE 163 MIDDLE MOUSE	*	*	*			
BASE 164 RED WHARF	*					
BASE 165 ORME	*	*	*			
BASE 166 LLANDDULAS	*					
BASE 167 CHESTER FLAT	*					
BASE 168 WELSH CHANNEL	*	*	*			
BASE 169 HEI	*					
BASE 170 N WIRRAL	*	*	*			
BASE 171 FORMBY POINT	*					
BASE 172 GUT	*	*	*			
BASE 173 BLACKPOOL	*					
BASE 174 KING SCAR	*	*	*			
BASE 175 HILPSFORD	*					
BASE 176 DUDDON	*					
BASE 177 SELKER	*					
BASE 178 CALDER HALL	*	*	*			

Marine Baseline Survey, Lab Site and Flightline ID s, South.



NRA
National Centre for
Instrumentation and
Marine Surveillance



Coastal Baseline Survey Site Details

Base	Site name	Easting	Northing	Boat	Wessex site	Group 1	Group 2	Group 3
1	BERWICK	401443	652107	Water Guardian	60100100	*	*	*
2	CASTLEHEAD ROCKS	413450	644616	Water Guardian	60100200	*		
3	SHORESTON OUTCARS	421779	633985	Water Guardian	60100300	*	*	
4	CRASTER	426513	620379	Water Guardian	60100400	*		*
5	WARKWORTH	427260	606770	Water Guardian	60100500	*		
6	BRIG HEAD	430730	594089	Water Guardian	60100600	*	*	
7	BLYTH	434352	579260	Water Guardian	60100700	*		*
8	TYNE (NORTH)	438454	569686	Water Guardian	60100800	*		
9	TYNE (MIDDLE)	438895	569078	Water Guardian	60100900	*	*	*
10	TYNE (SOUTH)	439317	568451	Water Guardian	60101000	*		
11	MARSDEN	440937	566073	Water Guardian	60101100	*		
12	WEAR (NORTH)	442341	559707	Water Guardian	60101200	*	*	
13	WEAR (MIDDLE)	442402	558854	Water Guardian	60101300	*		*
14	WEAR (SOUTH)	442433	557927	Water Guardian	60101400	*		
15	PINCUSHION ROCK	443338	551556	Water Guardian	60101500	*	*	*
16	BLACKHALL	449679	538324	Water Guardian	60101600	*		
17	TEES (NORTH)	455462	530528	Water Guardian	60101700	*		
18	TEES (MIDDLE)	456231	529147	Water Guardian	60101800	*	*	*
19	TEES (SOUTH)	459667	527892	Water Guardian	60101900	*		
20	SKINNINGROVE	472910	521798	Water Guardian	60102000	*		
21	SANDSEND	486288	515059	Water Guardian	60102100	*	*	
22	ROBIN HOODS BAY	497341	505265	Water Guardian	60102200	*		
23	SCARBOROUGH OUTFALL	504454	492103	Water Guardian	60102300	*		*
24	FILEY BRIGG	514516	481769	Water Guardian	60102400	*	*	
25	FLAMBOROUGH (NORTH)	524552	472901	Water Guardian	60102500	*		*
26	BRIDLINGTON	520418	466428	Water Guardian	60102600	*		
27	HORNSEA	520801	451653	Water Guardian	60102700	*	*	*
28	BEACON HILL	528006	438358	Water Guardian	60102800	*		
29	WITHERNSEA	536920	426310	Water Guardian	60102900	*		
30	SPURN HEAD	546422	414537	Water Guardian	60103000	*	*	*
31	HAILE SAND FLAT	547030	405650	Sea Vigil	60303100	*	*	*
32	THEDDLETHORPE	552061	390130	Sea Vigil	60303200	*		
33	CHAPEL ST LEONARDS	558791	374579	Sea Vigil	60303300	*		*
34	OUTER DOGS HEAD	560595	357290	Sea Vigil	60303400	*		
35	WASH	568866	346069	Sea Vigil	60303500	*	*	*
36	OVERY, STAITHE	585400	349600	Sea Vigil	60303600	*		
37	CLEY, LOOKOUT	605700	347800	Sea Vigil	60303700	*	*	*
38	SHERINGHAM	617400	345300	Sea Vigil	60303800	*		
39	MUNDESLEY	632100	339700	Sea Vigil	60303900	*	*	*
40	LESSINGHAM	642300	331000	Sea Vigil	60304000	*		
41	WINTERTON	652700	319400	Sea Vigil	60304100	*	*	*
42	GORLESTON	656000	303600	Sea Vigil	60304200	*		
43	KESSINGLAND	656200	287300	Sea Vigil	60304300	*		*
44	DUNWICH CLIFFS	651400	271400	Sea Vigil	60304400	*		
45	THORPENESS	649000	257600	Sea Vigil	60304500	*	*	*
46	SHINGLE STREET	638759	242982	Sea Vigil	60304600	*		
47	FELIXSTOWE	630400	231200	Sea Vigil	60304700	*	*	*
48	WALTON	627500	220000	Sea Vigil	60304800	*		
49	JAYWICK	616000	210600	Sea Vigil	60304900	*	*	*
50	MAPLIN BANK	613300	192600	Sea Vigil	60305000	*		
51	MEDWAY BUOY	600023	179518	Sea Vigil	60405100	*	*	*
52	SHIVERING SAND BUOY	614810	173220	Vigilance	60405200	*		
53	EAST MARGATE	632640	172140	Vigilance	60405300	*		
54	EAST BRAKE	642560	164290	Vigilance	60405400	*		
55	GOODWIN FORK BUOY	640780	152520	Vigilance	60405500	*		
56	SOUTH FORELAND	637420	142840	Vigilance	60405600	*	*	*
57	SANDGATE BAY	623350	133160	Vigilance	60405700	*		
58	DUNGENESS	610960	115460	Vigilance	60405800	*		
59	RYE BAY	593690	111730	Vigilance	60405900	*		

Coastal Baseline Survey Site Details

Base	Site name	Easting	Northing	Boat	Wessex site	Group 1	Group 2	Group 3
60	BEXHILL	576710	103760	Vigilance	60406000	*		
61	BEACHY HEAD	560440	92640	Vigilance	60406100	*	*	*
62	NEWHAVEN	541170	97470	Vigilance	60406200	*		
63	BRIGHTON	531560	101530	Vigilance	60406300	*		
64	WORTHING	514840	98340	Vigilance	60406400	*		
65	MIDDLETON-ON-SEA	499850	95140	Vigilance	60406500	*		
66	SELSEY BILL	486600	89740	Vigilance	60406600	*	*	*
67	NAB TOWER	477220	89080	Vigilance	60406700	*		
68.1	EAST BRAMBLES	454500	99090	Vigilance	60406801	*		
68.2	CALSHOT	449950	102320	Vigilance	60406802	*	*	*
68.3	DOCKHEAD	442954	109622	Vigilance	60406803	*		
68.4	WEST PRINCESSA	467490	89410	Vigilance	60406804	*		
69	ST CATHERINES	449780	74450	Vigilance	60406900	*		
70	THE NEEDLES	427320	83450	Vigilance	60407000	*		
71	HENGISTBURY HEAD	417670	88880	Vigilance	60407100	*	*	*
72	ANVIL POINT	404752	77529	Vigilance	60507200	*	*	*
73	ST ALDMELMS	391444	74806	Vigilance	60507300	*		
74	WEYMOUTH BAY	374897	77068	Vigilance	60507400	*		
75	PORTLAND BILL	366887	68905	Vigilance	60507500	*		
76	CHESIL	357708	80056	Vigilance	60507600	*		
77	BRIDPORT	344060	88033	Vigilance	60507700	*		
78	SEATON	327371	85782	Vigilance	60607800	*	*	*
79	SIDMOUTH	314357	81023	Vigilance	60607900	*		
80	EXMOUTH	298768	73910	Vigilance	60608000	*		
81	TORBAY	296654	57937	Vigilance	60608100	*	*	*
82	DARTMOUTH	292251	45010	Vigilance	60608200	*		
83	START POINT	282855	34413	Vigilance	60608300	*		
84	SALCOMBE	271484	31174	Vigilance	60608400	*		
85	BIGBURY BAY	260244	41176	Vigilance	60608500	*		
86	PLYMOUTH	246016	46192	Vigilance	60608600	*	*	*
87	EAST LOOE	232461	50530	Vigilance	60608700	*		
88	FOWEY	216744	48055	Vigilance	60608800	*		
89	DODMAN POINT	203301	38283	Vigilance	60608900	*		
90	ST ANTONY HEAD	191045	31497	Vigilance	60609000	*		
91	FALMOUTH	183960	26360	Vigilance	60609100	*	*	*
92	BLACK HEAD	183110	15940	Vigilance	60609200	*		
93	LIZARD	171990	9880	Vigilance	60609300	*		
94	MULLION	163430	15910	Vigilance	60609400	*		
95	PENZANCE	151330	23980	Vigilance	60609500	*		
96	RUNNEL STONE	137160	18980	Vigilance	60609600	*		
97	CAPE CORNWALL	132110	31440	Vigilance	60609700	*	*	*
98	THE CARRACKS	141640	42920	Vigilance	60609800	*		
99	GODREVY ISLAND	156000	45800	Vigilance	60609900	*		
100	ST AGNES	168780	52800	Vigilance	60610000	*		
101	NEWQUAY	179500	63850	Vigilance	60610100	*		
102	TREVOSE	182760	77920	Vigilance	60610200	*		
103	PADSTOW	191671	79737	Vigilance	60610300	*	*	*
104	PORT ISAAC	194930	86330	Vigilance	60610400	*		
105	BOSCASTLE	207848	93942	Vigilance	60610500	*		
106	BUDE	217387	104811	Vigilance	60610600	*		
107	MOREWENSTOWE	218976	118706	Vigilance	60610700	*		
108	HARTLAND POINT	222623	132318	Vigilance	60610800	*		
109	BIDEFORD	237456	133833	Vigilance	60610900	*	*	*
110	BULL POINT	244082	147356	Vigilance	60611000	*		
111	COMBE MARTIN	258542	150774	Vigilance	60611100	*		
112	FORELAND	272883	153182	Vigilance	60611200	*		
113	PORLOCK	287856	150676	Vigilance	60511300	*		
114	MINEHEAD	302829	147589	Vigilance	60511400	*		
115	BRIDGWATER BAR	315221	149213	Vigilance	60511500	*	*	*

Coastal Baseline Survey Site Details

Base	Site name	Easting	Northing	Boat	Wessex site	Group 1	Group 2	Group 3
116	WESTON-SUPER-MARE	328422	160435	Vigilance	60511600	*		
117	CLEVEDON	337342	171688	Vigilance	60511700	*		
118	AVONMOUTH	350046	178825	Vigilance	60511800	*		
119	NO. 1 BEACON	351230	184940	Vigilance	60511900	*	*	*
120	NEWPORT DEEP	330560	178100	Vigilance	60812000	*	*	*
121	CARDIFF ROAD	323990	174200	Vigilance	60812100	*		
122	LAVERNOCK	319740	166990	Vigilance	60812200	*		
123	ABERTHAW	304980	163990	Vigilance	60812300	*	*	*
124	NASH POINT	291470	167040	Vigilance	60812400	*		
125	PORTHCAWL	279540	175580	Vigilance	60812500	*	*	*
126	KENFIG	275210	180890	Vigilance	60812600	*	*	*
127	PORT TALBOT	271670	187250	Vigilance	60812700	*		
128	MUMBLES	264920	185970	Vigilance	60812800	*		
129	OXWICH	251470	183060	Vigilance	60812900	*		
130	WORMS HEAD	237680	186370	Vigilance	60813000	*	*	*
131	LLANELLI	236580	193880	Vigilance	60813100	*		
132	BURRY PORT	232570	199170	Vigilance	60813200	*	*	*
133	CARMARTHEN	225390	201800	Vigilance	60813300	*		
134	CALDEY ISLAND	219540	197440	Vigilance	60813400	*	*	*
135.1	OLD CASTLE HEAD (INNER)	206575	187970	Vigilance	60813501	*		
135.2	OLD CASTLE HEAD (OFF)	207020	193620	Vigilance	60813502	*		
136.1	ST GOVANS (INNER)	192260	184790	Vigilance	60813601	*		
136.2	ST GOVANS (OFF)	192490	190400	Vigilance	60813602	*		
137	TURBOT BANK	184870	194230	Vigilance	60813700	*	*	*
138	ST ANNS	180565	201679	Coastal Guardian	60713800	*	*	*
139	SKOMER	170162	208214	Coastal Guardian	60713900	*		
140	SOUTH BISHOP	164072	220936	Coastal Guardian	60714000	*		
141	ABEREIDY	176570	235494	Coastal Guardian	60714100	*	*	*
142	STRUMBLE HEAD	189368	242641	Coastal Guardian	60714200	*		
143	FISHGUARD	197672	241368	Coastal Guardian	60714300	*	*	*
144	PWLL-COCH	205900	246887	Coastal Guardian	60714400	*		
145	CARDIGAN ISLAND	214591	252771	Coastal Guardian	60714500	*	*	*
146	PENY-BADELL	229134	257723	Coastal Guardian	60714600	*		
147	NEWQUAY HEAD	238369	261216	Coastal Guardian	60714700	*		
148	PEN PIGYN	252332	270982	Coastal Guardian	60714800	*		
149	ABERYSTWYTH	256604	281058	Coastal Guardian	60714900	*	*	*
150	ABERDOVEY	258140	294925	Coastal Guardian	60715000	*		
151	PEN-BWCH POINT	253277	302489	Coastal Guardian	60715100	*		
152	BARMOUTH	259294	315297	Coastal Guardian	60715200	*		
153	SHELL ISLAND	253581	327524	Coastal Guardian	60715300	*		
154	PWLLHELI	240180	333514	Coastal Guardian	60715400	*	*	*
155	PORTH CEIRIAD	232708	323561	Coastal Guardian	60715500	*		
156	BARDSEY	214489	322368	Coastal Guardian	60715600	*	*	*
157	PORTH YSGADEN	220695	337909	Coastal Guardian	60715700	*		
158	DINLLAEN	227616	343224	Coastal Guardian	60715800	*	*	*
159	DYLAN	241352	352029	Coastal Guardian	60715900	*		
160	ABERFFRAW	232901	366233	Coastal Guardian	60716000	*		
161	PENRHOS	222588	376813	Coastal Guardian	60716100	*	*	*
162	HOLYHEAD	225804	385602	Coastal Guardian	60716200	*		
163	MIDDLE MOUSE	239518	396995	Coastal Guardian	60716300	*	*	*
164	RED WHARF	255740	384043	Coastal Guardian	60716400	*		
165	ORME	275785	386259	Coastal Guardian	60716500	*	*	*
166	LLANDDULAS	289027	383149	Coastal Guardian	60716600	*		
167	CHESTER FLAT	302955	385626	Coastal Guardian	60716700	*		
168	WELSH CHANNEL	311290	386391	Coastal Guardian	60716800	*	*	*
169	HE 1 BUOY	319146	391814	Coastal Guardian	60716900	*		
170	NORTH WIRRAL	321644	395462	Coastal Guardian	60717000	*	*	*
171	FORMBY POINT	323261	408435	Coastal Guardian	60717100	*		
172	GUT	325516	423234	Coastal Guardian	60717200	*	*	*

Coastal Baseline Survey Site Details

Base	Site name	Easting	Northing	Boat	Wessex site	Group 1	Group 2	Group 3
173	BLACKPOOL	327725	438035	Coastal Guardian	60717300	*		
174	KING SCAR	329673	450801	Coastal Guardian	60717400	*	*	*
175	HILPSFORD	317047	460468	Coastal Guardian	60717500	*		
176	DUDDON	311551	471698	Coastal Guardian	60717600	*		
177	SELKER	304434	486678	Coastal Guardian	60717700	*		
178	CALDER HALL	297170	501675	Coastal Guardian	60717800	*	*	*
179	WHITEHAVEN	292652	516620	Coastal Guardian	60717900	*		
180	WORKINGTON	297151	531356	Coastal Guardian	60718000	*		
181	SOLWAY BUOY	303426	543740	Coastal Guardian	60718100	*	*	*
182	MIDDLE BUOY	298653	546533	Coastal Guardian	60718200	*		
183	BALCARRY	283026	546912	Coastal Guardian	60718300	*		
184	ABBAY HEAD	271290	541294	Coastal Guardian	60718400	*		
185	MEGGERLAND	258289	545024	Coastal Guardian	60718500	*		
186	ST NINIANS	250301	536374	Coastal Guardian	60718600	*	*	*

NATIONAL BASELINE SCHEDULE, MAY 1995

Vessel	May 1 - 7	May 8 - 14	May 15 - 21	May 22 - 28
Coastal Guardian		>>>>>>>>>	>>>>>>>>>	
Sea Vigil				>>>>>>>>>
Vigilance		>>>>>>>>>	>>>>>>>>>	>>>>>>>>>
Water Guardian			>>>>>>>>>	

NATIONAL BASELINE SCHEDULE, JULY 1995

Vessel	July 3 - 9	July 10 - 16	July 17 - 23	July 24 - 30
Coastal Guardian			>>>>>>>>>	>>>>>>>>>
Sea Vigil				>>>>>>>>>
Vigilance	>>>>>>>>>	>>>>>>>>>	>>>>>>>>>	
Water Guardian		>>>>>>>>>		

NATIONAL BASELINE SCHEDULE, SEPTEMBER 1995

Vessel	Sept 4 - 10	Sept 11 - 17	Sept 18 - 24	Sept 25 - 30
Coastal Guardian		>>>>>>>>>	>>>>>>>>>	
Sea Vigil		>>>>>>>>>		
Vigilance	>>>>>>>>>	>>>>>>>>>	>>>>>>>>>	
Water Guardian	>>>>>>>>>			

Group 3 - Organics. Measured at one third of all baseline sites (see site list).

Det. code	Determinand	Units	LOD
3081	Isodrin	ug/l	0.005
3082	Hexachloro-benzine	ug/l	0.005
3083	Hexachloro-butadiene	ug/l	0.005
3142	PCB 28	ug/l	0.005
3145	PCB 52	ug/l	0.005
3148	PCB 101	ug/l	0.005
3151	PCB 118	ug/l	0.005
3154	PCB 138	ug/l	0.005
3157	PCB 153	ug/l	0.005
3160	PCB 180	ug/l	0.005
3276	Aldrin	ug/l	0.005
3294	DDE-PP'	ug/l	0.005
3295	DDE-OP'	ug/l	0.005
3296	DDT-OP'	ug/l	0.005
3297	DDT-PP'	ug/l	0.005
3301	Dieldrin	ug/l	.005
3306	Endrin	ug/l	0.01
3310	HCH-Alpha	ug/l	0.005
3311	HCH-Beta	ug/l	0.005
3312	HCH-Delta	ug/l	0.005
3313	HCH-Gamma	ug/l	0.005
3329	TDE-OP'	ug/l	0.005
3330	TDE-PP'	ug/l	0.005

CHEMICAL DETERMINAND LISTS

Group 1 - Inorganics. Measured at every baseline site

Det Code	Determinand	Units	LOD
0105	Mercury Total	ug/l	0.03
0106	Cadmium Dissolved	ug/l	0.25
0135	Suspended Solids 105 C	mg/l	5
0143	Solids non-volatile 500)	mg/l	5
0189	Orthophosphate	ug/l P	5
0729	Chlorophyll-a	ug/l	0.2
3403	Ammonia	ug/l N	6
3404	Nitrite	ug/l N	2
3420	Silicate	mg/l Si	0.025
7213	Copper Dissolved	ug/l	0.5
7230	Lead Dissolved	ug/l	2.5
7243	Zinc Dissolved	ug/l	4
7354	Arsenic Dissolved	ug/l	2.5
7373	Chromium Dissolved	ug/l	1.5
7427	Nickel Dissolved	ug/l	3
9991	Total Oxidised Nitrogen	mg/l N	0.01

Group 2 - Inorganics. (Total metals) measured at one third of all baseline sites (see site selection lists). These samples are taken to cross check internal sampling contaminants

Det. code	Determinand *	Units	LOD
0108	Cadmium dissolved	ug/l	0.25
7215	Copper dissolved	ug/l	0.5
7229	Lead dissolved	ug/l	2.5
7245	Zinc dissolved	ug/l	5
7356	Arsenic dissolved	ug/l	2.5
7375	Chromium dissolved	ug/l	2
7429	Nickel dissolved	ug/l	3

NATIONAL BASELINE SCHEDULE, VIGILANCE, MAY 1995

Action / Date	May 22 - 28	May 29 - June 4	June 5 - 11
Last week of Baseline Survey	>>>>>>>>>>		
Qubit data to National Centre			By June 9*
Skalar data to National Centre			By June 9 *
Profile data to National Centre			By June 9 *

NATIONAL BASELINE SCHEDULE, VIGILANCE, JULY 1995

Action / Date	July 24 - 30	July 30 - Aug 6	Aug 7 - 13
Last week of Baseline Survey	>>>>>>>>>>		
Qubit data to National Centre			By Aug 11 *
Skalar data to National Centre			By Aug 11 *
Profile data to National Centre			By Aug 11 *

NATIONAL BASELINE SCHEDULE, VIGILANCE, SEPT 1995

Action / Date	Sept 11 - 17	Sept 18 - 24	Sept 25 - Oct 1
Last week of Baseline Survey	>>>>>>>>>>		
Qubit data to National Centre			By Sept 29 *
Skalar data to National Centre			By Sept 29 *
Profile data to National Centre			By Sept 29 *

* Data return dates due two weeks after completion of survey.

DATE
OFFICER

INSTRUMENT CALIBRATION SHEET



AQUASHUTTLE

AQUATRACE

DO			DO		
ORIGINAL			ORIGINAL		
CALIBRATED			CALIBRATED		
0%			0%		
100%			100%		
pH			pH		
ORIGINAL			ORIGINAL		
CALIBRATED			CALIBRATED		
4			4		
7			7		
10			10		
SALINITY		STANDARD	SALINITY		STANDARD
RESTISTANCE LOOP			RESTISTANCE LOOP		
TRANSMISSION		ORIGINAL	NOTES		
CALIBRATED					
0%					
100%					

Baseline Survey : Profile Data

Date / /

Depth	Temp.	Sal.	D.O.
Surface			
0.5 m			
1.0 m			
2.0 m			
5.0 m			
10.0 m			
15.0 m			

Site Name
Site Number
Time

Depth	Temp.	Sal.	D.O.
Surface			
0.5 m			
1.0 m			
2.0 m			
5.0 m			
10.0 m			
15.0 m			

Site Name
Site Number
Time

Depth	Temp.	Sal.	D.O.
Surface			
0.5 m			
1.0 m			
2.0 m			
5.0 m			
10.0 m			
15.0 m			

Site Name
Site Number
Time

Depth	Temp.	Sal.	D.O.
Surface			
0.5 m			
1.0 m			
2.0 m			
5.0 m			
10.0 m			
15.0 m			

Site Name
Site Number
Time

Depth	Temp.	Sal.	D.O.
Surface			
0.5 m			
1.0 m			
2.0 m			
5.0 m			
10.0 m			
15.0 m			

Site Name
Site Number
Time

Depth	Temp.	Sal.	D.O.
Surface			
0.5 m			
1.0 m			
2.0 m			
5.0 m			
10.0 m			
15.0 m			

Site Name
Site Number
Time

Skalar Nutrient Analyser Survey Log

Vessel-**Date of Survey-**

Operator-

Start Location-

End Location-[illegible]

Calibration standard originated from-

Brief description of on-board dilution of Calibration standard-

**AQC standard 1 origin-
AQC standard 1 results**

AQC 1 Expected concentration

**AQC standard 2 origin-
AQC standard 2 results**

AQC 2 Expected concentration

NB. A drift sample should be analysed every 20th sample.

A five point calibration curve should be run a least every six hours.

Survey Description

Date _____

Location

Vessel

Region.

Contractor

[illegible]

On Scene Conditions at Baseline Sites

Survey Vessel
Survey Officer

Site Name	
Site Number	
Date	
Time	
Tidal Direction	
Tidal Speed	
Wind Direction	
Aprox Wind Speed	

Site Name	
Site Number	
Date	
Time	
Tidal Direction	
Tidal Speed	
Wind Direction	
Aprox Wind Speed	

Site Name	
Site Number	
Date	
Time	
Tidal Direction	
Tidal Speed	
Wind Direction	
Aprox Wind Speed	

Site Name	
Site Number	
Date	
Time	
Tidal Direction	
Tidal Speed	
Wind Direction	
Aprox Wind Speed	

Site Name	
Site Number	
Date	
Time	
Tidal Direction	
Tidal Speed	
Wind Direction	
Aprox Wind Speed	

Site Name	
Site Number	
Date	
Time	
Tidal Direction	
Tidal Speed	
Wind Direction	
Aprox Wind Speed	

Comments For Discussion Post Survey

Name
Vessel

If any problems occur during the survey, that are of a non urgent nature please note them here. This will allow discussion at the Survey debrief.

[illegible]

USEFUL TELEPHONE NUMBERS

[illegible]

Mobile to NRA office; 9532-390-

Regional GTN (+ Extension no.)

7-50 Anglian

7-23 Southern

7-20 Northumbria

7-24 South Western

7-28 Yorkshire

7-27 Bridgwater

7-21 North West

7-25 Thames

7-22 Severn Trent

7-26 Welsh

CONTACT LIST FOR MARINE BASELINE SURVEYS

If using a mobile phone, remember to use the GTN access number to dial office extensions!
e.g. Coastal Guardian to Andrew Wither; 9532-390-7-21-2662

REGIONAL CONTACTS

Contact	Name	Mobile	Office	Fax
North West Master, Coastl G Survey Officer Survey Officer Marine Scientist	Mike Castle Andrew Wither	0831-889684 0836-233817	01925-653999 7-21-2662	01925 415961
Anglian Master, Sea Vigil Survey Officer Marine Chemist Survey Plan Offic Snr Marine SO Marine Scientist	Peter Sarjeant Tim Rhodes Dave Wright Colin Worrall Chris Ashcroft Derek Sayers	0860-394516 0850-386180	01733-371811 7-50-4436 7-50-4517 7-50-4249 7-50-4436 7-50-4230	01733-231840 0860-394516
Northu/Yorks Washington Lab Master, Water G Survey Officer Marine Chemist Snr Ecologist	Jimmy Flett Claire Buckler Alan Shepherd John Orr	0850-388308	0113-2240191 0191-4171972 7-20-4986 7-20-4601 7-20-2135	0113-2461889 0191-4172794
South Western Master, Vigilance Survey Officer Marine Chemist Marine Chemist Marine Manager	Nigel Davies Nick Collier Paula Atkin Bob Davison Nick Holden	0836-333774 0831-367157 0831-320069 0831-834911	01278-457333 7-27-4224 7-27-4231 7-27-4214 7-27-4219	01225-469939

NATIONAL CENTRE FOR MARINE MONITORING & AERIAL SURVEILLANCE

Contact	Name	Mobile	Office
Survey Planner	Liz Potter	0831-306997	7-27-4220
Marine Manager	Nick Holden	0831-834911	7-27-4219
Data Manager	Richard Saul		7-27-4238
AQC Chemist	Bob Davison	0831-320069	7-27-4214
Data Officer	Diana Milner		7-27-4221
Data Officer	Alastair Duncan		7-27-4203
Image Officer	Paula Atkin		7-27-4231