



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Marine Survey Data Management Handbook

BGS Specifications

Marine Coastal & Hydrocarbons Programme

Internal Report IR/08/024



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BRITISH GEOLOGICAL SURVEY

MARINE COASTAL & HYDROCARBONS PROGRAMME

INTERNAL REPORT IR/08/024

Marine Survey Data Management Handbook BGS Specifications

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Foreword

This handbook describes the management of BGS marine survey data. Experience shows that the cost of managing such data to a high standard at the time it is acquired has little impact on the overall cost of the survey. In comparison, the retrospective indexing, sorting and QC of data (sometimes many years after completion of the survey) can have significant cost implications, and even then, data can be missing, unusable, or of uncertain reliability. This can be due to:

- crucial pieces of information not being recorded at the time of its acquisition and processing;
- information becoming separated or missing during or immediately after the survey;
- data being held in proprietary formats that are no longer supported or documented;
- data being held on media that are no longer readable due to deterioration of the media;
- data being held on media than cannot be read due to device or driver requirements not supported by the current generation of hardware.

This handbook provides guidance for BGS survey data management activities to ensure that the transfer of data from a survey to the Coastal and Marine Data Management System for long-term archive is a relatively straightforward procedure involving the minimum of effort and cost.

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Summary

This handbook describes the management of BGS marine survey data. The data types discussed in this handbook are geophysical and geological (groundtruth) data with associated data types (for example, navigation and calibration data). Geophysical data includes echo-sounder, multibeam, side-scan sonar, sub-bottom profiler, gravity and magnetics. Geological data include sea-bed samples, cores, photographs and video.

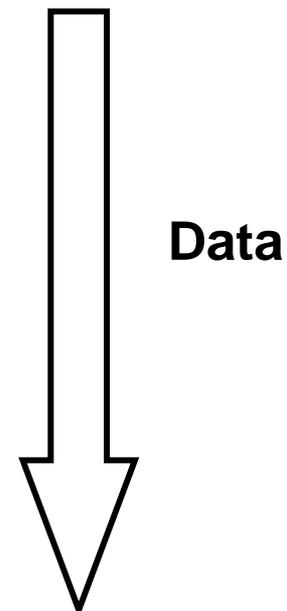
The handbook is divided into four sections:

- Guidelines (general guidelines for data management of survey data);
- Specifications (specifications for managing each type of data);
- Templates (Log sheets for recording information and report layouts);
- Enclosures (Procedures and quick reference crib sheets for specific aspects of survey data collection and management).

The process of managing data is essentially a workflow, which can be divided into phases (see below). The initial phase of the workflow is the preparation phase, before data are acquired. The final phase is the archive phase, which lasts for the foreseeable future. Each phase may have different data management requirements and procedures.

Data workflow

- Preparation phase
- Acquisition phase
- Processing phase
- Interpretation phase
- Delivery phase
- Completion phase
- Archive phase



Depending on survey requirements and on-board resources, partial or full processing and interpretation of the acquired data may occur during the survey.

It is essential that the survey data are well managed during, and immediately after the survey, as this is the crucial time in determining:

- the resources required to manage the data during subsequent phases in the workflow;
- the usefulness of the data to the project which commissioned the survey;
- the longer-term usefulness of the data to subsequent projects.

For BGS surveys, all digital data should be copied to a pre-defined folder structure, which is downloaded onto a hard disk prior to the survey. A configured hard disk should be requested when a BGS Survey ID is obtained from the Coastal and Marine Data Manager. It is the responsibility of the assigned Survey Data Manager to ensure that the data are copied to the hard disk by the end of the survey and that the disk is returned to the Coastal and Marine Data Manager.

Throughout the remainder of this handbook, the generic terms ‘client’ and ‘contractor’ are used to refer to the organisation commissioning the survey and the organisation conducting the survey respectively. For in-house conducted surveys, BGS can be both the client and contractor. In such cases the client and contractor terms used in the following sections are still relevant, the difference being that it is applied intra-organisation rather than inter-organisation.

The term ‘data’ is also used throughout this document. This can have two meanings depending on the context:

- ‘actual’ data (for example, measurement datasets);
- ‘generic’ data (implying both the ‘actual data’ and the associated metadata that describe the ‘actual data’).

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1 Guidelines

This section contains guidelines for the management of marine survey data. The topics are arranged alphabetically.

1.1 ACQUISITION REPORT

The acquisition (cruise) report is a key survey-level document, and is a component of the long-term, survey-level metadata that are archived along with the data.

For large complex surveys there may be a number of reports, as responsibility for data acquisition may be split between contractors. There may also be separate QC reports compiled by ‘observers’ acting on behalf of the client. Contractors may have ‘in-house’ report templates. BGS has an acquisition report template which should be used for all BGS surveys where the contractor is BGS. If the report is being compiled by an external contractor, it should contain information equivalent to that listed in the BGS report template.

It is essential that the acquisition report is completed as soon as possible after completion of the sea-going activities. Ideally the acquisition report should be a work in progress during the cruise, and should be largely completed, if not complete, by the end of the cruise. An agreed schedule for delivery of the report should be included in contracts with external contractors. For reports generated by BGS, the time and cost should be included in the project plan, with a completion date indicated in the project schedule.

For data management purposes, a digital PDF format copy of the report should be delivered along with the required number of hardcopy reports.

1.2 DATA BACK-UP

A key component of data management during a survey is ensuring that all data are backed-up regularly. The methods, media and responsibilities for back-up processes must be agreed before the survey begins, and documented in the data management plan. The integrity of the back-ups should be checked at regular intervals throughout the survey.

1.3 DATA FORMATS

For all BGS surveys, there are standard data formats for acquisition and processing. Any non-standard formats to be used must be agreed prior to the survey and documented in the data management plan along with justification for their use.

Data acquisition, processing and interpretation techniques can be very sophisticated, which require sophisticated applications. Typically these applications are equipment, technique or vendor specific (or a combination) and often utilise proprietary file formats and data structures.

While these can be excellent project-level tools, they can cause problems for longer-term management of data unless it is possible to export data in a common exchange format. Whenever possible, data should be exported from applications in appropriate exchange formats (for example, XTF, ASCII) to ensure the continued usefulness of the data in the future. A text file should accompany sets of proprietary format files to explain the data format and what software is required to read the data.

When collecting data, it is important to consider the usefulness of the data in terms of both the project requirements, and the possible future re-use of the data.

1.4 DATA INTERPRETATION REPORT

If data interpretation is conducted during the survey, the interpretation report is a key survey-level document, and is a component of the long-term, survey-level metadata and data that are archived.

For large complex surveys there may be a number of reports, as responsibility for data interpretation may be split between specialists working for contractors, or the client. BGS has an interpretation report template which should be used for all BGS surveys where the contractor is BGS. If the report is being compiled by an external contractor, it should contain information equivalent to that listed in the BGS report template.

For less-complex surveys, or where only a preliminary interpretation has been done, the interpretation report may form part of the acquisition report.

It is essential that the interpretation report is completed as soon as possible after completion of the sea-going activities. An agreed schedule for delivery of the report should be included in contracts with external contractors. For reports generated by BGS, the time and cost should be included in the project plan, with a completion date indicated in the project schedule.

For data management purposes, a digital PDF format copy of the report should be delivered along with the required number of hardcopy reports.

1.5 DATA MANAGER

A key role in a survey is that of Survey Data Manager. For a large complex survey, this may be a full-time job. If it is a part-time job, sufficient time and priority needs to be allocated to the task relative to other assigned tasks. If data management is being done by an external contractor, then this needs to be stipulated and costed in the contract.

The role of data manager begins during the preparation phase with the development of the survey data management plan. The role continues throughout the survey and may extend for a period of time after the survey. Depending on the length of the transit back to port on completion of the survey, and the volume and complexity of the data, 'survey' data management tasks may continue after the demobilisation of the survey vessel. Time should be allowed for this eventuality in costing the survey. The survey cannot be termed 'complete' until all the marine survey data management tasks have been completed, and the data have been transferred successfully to the Coastal and Marine Data Management System.

The role of the Survey Data Manager is to:

- develop and maintain the data management plan;
- ensure that the data management plan is being implemented;
- co-ordinate and oversee all data management activities during the survey;
- ensure that all data, metadata and documentation are complete at the end of the survey;
- ensure that all data, metadata and documentation from the survey are transferred successfully (and backed-up);
- confirm 'completeness' of the survey in terms of the data.

1.6 DATA MANAGEMENT PLAN

The purpose (and significant cost) of a survey is to acquire data. It is typically a complex process involving multiple acquisition activities, possibly multiple contractors, the client, and the individual scientists that make use of the data.

It is important that all parties and individuals involved with the survey understand the data management processes, procedures, standards and responsibilities. These are documented in a Data Management Plan (Template B). The initial version of the plan is compiled during the

preparation phase of the survey and may inform tender specifications, costings and contract negotiations for the work. The 'final' version of the plan will be completed shortly before the start of the survey, once all the details of the survey are known. It is used during the survey as a reference document on the management of the data. The plan can be updated during the survey to reflect changes in operational and data management processes as they occur.

The data management plan is a key, survey-level document, and a component of the long-term, survey-level metadata that are archived along with the data.

1.7 DATA MEDIA

On completion of the survey all digital data will be transferred to the Coastal and Marine Data Management System using one or more hard disks.

If there is a survey requirement for other media outputs for example, tapes, the media should be clearly labelled and accompanied by a media catalogue listing the numbers, types and contents of the media. Consideration should be given to the volume of data being transferred relative to the media used and resources required to write and read the media.

During the survey all data should be stored centrally on the vessel's / contractor's server(s), rather than locally on individual scientists PCs.

1.8 DATA PROCESSING REPORT

If data processing is conducted during the survey, the processing report is a key survey-level document, and is a component of the long-term, survey-level metadata that are archived along with the data.

For large complex surveys there may be a number of reports, as responsibility for data processing may be split between contractors. There may also be QC reports compiled by 'observers' acting on behalf of the client. BGS has a processing report template which should be used for all BGS surveys where the contractor is BGS. If the report is being compiled by an external contractor, it should contain information equivalent to that listed in the BGS report template.

For less-complex surveys the processing report may form part of the acquisition report.

It is essential that the processing report is completed as soon as possible after completion of the sea-going activities. An agreed schedule for delivery of the report should be included in contracts with external contractors. For reports generated by BGS, the time and cost should be included in the project plan, with a completion date indicated in the project schedule.

For data management purposes, a digital PDF format copy of the report should be delivered along with the required number of hardcopy reports.

1.9 DATA TRANSFER

On completion of the survey, all data and metadata resulting from the survey will be transferred to the Coastal and Marine Data Management System. This is a very important step in the data management process.

For BGS surveys, the transfer process employs one or more hard disks. The data are transferred from onboard systems into a pre-defined folder structure, which is downloaded onto hard disk(s) prior to the survey. This hard disk is used to transfer the data to the BGS corporate data storage system (SAN) on completion of the survey. The hard disk is obtained from the Coastal and Marine Data Manager prior to the survey and returned afterwards.

It is the responsibility of the Survey Data Manager to ensure that all the data listed in the data management plan are complete, that the associated metadata are complete, that all documentation is complete, that all survey information is transferred to the hard disk by the end of the survey, and that the disk is returned to the Coastal and Marine Data Manager on completion of the survey. Once the data have been loaded to the corporate storage area network, the indexing and QC of the data is complete and a back-up copy of the survey data has been archived corporately, the survey is deemed to be complete.

1.10 EVENT LOGS

Logs must be kept at survey level and at individual data set acquisition and processing levels. The logs will describe start and end date and time of activities, filenames, media, issues influencing the quality of the data, problems with equipment, gaps in the data, statistics etc. An event log can be a hand-written notebook, a pro-forma paper document or a spreadsheet-type digital file. In some cases the log may be written on paper and later transferred to a digital file in full or abridged form. Different activities will require different log formats. BGS has template logs which are downloaded on the hard disc as part of the pre-defined folder structure.

Logs are key documents and are components of the long-term metadata that are archived along with the data. In many circumstances subsequent processing, reformatting and assessment of data quality depends on having access to the logs. A log can also be deemed a legal document in some circumstances.

The data manager should ensure that all logs are transferred at the end of the survey. If a log consists of handwritten sheets or a notebook, and the digital version is abridged, the pages should be scanned to the recommended image format described in Section B for Survey Logs. This makes it possible to store the log data with the digital data and also secures the log for long-term archive.

1.11 LONG-TERM ARCHIVE

Project leaders should be aware of the need for long-term archiving of their project data. Archiving the data ensures the long-term management and availability of the data beyond the life (and funding) of the project.

The archiving processing is done by Coastal and Marine Data Management staff using documented procedures.

The data should be archived in the Coastal and Marine Data Management System as soon after the survey as possible. Data can be held confidentially in the system for an agreed period of time. Confidentiality and the time period can be applied to the entire survey or to elements of the survey data and can be variable for each element. The metadata and data can have different restrictions to access and use.

Advantages of this approach are:

- it provides an additional QC check of the data on completion of the survey;
- if missing information or discrepancies are identified during the archive process, there is a chance that the information can be sought from the client or contractor while the collective memory of the survey team is still available, and before data storage systems are wiped clean or cannot be located;
- if additional processed or interpreted project data are archived subsequently with BGS, they can be linked to the survey data and made available to the public very quickly.

1.12 METADATA

Metadata are data that describe data. Examples of metadata are:

- description of a dataset;
- the method used to acquire a dataset;
- when, where and how a dataset was acquired;
- the quality of dataset;
- the QC checks applied to dataset;
- ownership of a dataset;
- access and use constraints applied to dataset.

It is essential to record appropriate metadata at all levels of the survey.

The recording of metadata is a fundamental requirement, both for the immediate processing and use of the data within the project that funded the survey, and for the subsequent re-use of the data by other projects. Once a survey is completed, there is often a rapid loss and dilution of the collective memory relating to the data. It is important that:

- the metadata are recorded as soon as possible after events and activities throughout the survey;
- the recording is done consistently in a structured (formatted) manner;
- there are procedures for ensuring that metadata records are complete;
- all datasets are accompanied by the associated metadata, particularly when data are being transferred at the end of a survey or subsequently between organisations.

In the context of marine survey data there are two basic types of metadata:

- discovery metadata;
- technical metadata.

Discovery metadata is the information that describes the nature and content of the data. This falls into broad categories to answer the what, why, when, who, where and how questions. Discovery metadata is used to search for data and to assess the usefulness of 'discovered' items for a particular purpose.

Technical metadata is more detailed, and more item specific. It is required for using data or for managing data. For example, it describes parameters associated with the acquisition and processing of data, or lists the survey lines and records acquired for a sub-bottom profiler. There are few officially agreed standards for this category of metadata, although some 'de facto' industry standards exist (for example, the positioning metadata described within the UKOOA navigation data exchange standards file headers). BGS has in-house requirements for content metadata.

Spreadsheets for capturing the discovery and technical metadata are available on the hard disk which is provided by the Coastal and Marine Data Manager prior to the survey.

1.13 OWNERSHIP, ACCESS AND USE

It is important to identify ownership of the data and to describe access and use constraints to both the data and the metadata, including any time constraints on access. This can be done either at survey level or at individual dataset level. Ownership and use of data may be complicated by the fact that the funding of the survey was done by more than one organisation. Ownership, access and use of the data should be established during the preparation phase of the survey and should be documented for future reference.

1.14 PAPER RECORDS

Although many datasets are collected, processed and interpreted digitally, there are circumstances where it is necessary to generate paper records. The types of records and reason(s) for generating the records should be agreed prior to the survey and documented in the data management plan, and may vary from project to project. It may be that the records are a primary data source used for interpretation, or are part of the QC procedures for assessing the quality of the data that are being acquired.

It can be the case that special processing has been applied to generate the paper records and that the actual digital data being recorded is unprocessed, so the paper record is an important item of data that should not be discarded.

Records that are not merely a facsimile of the digital data should be converted to a digital image. This is to ensure the long-term security of the record, as paper records degrade with use and age. It also makes the data easier to access in the future. Scanning of paper records during the archive phase is a significant cost; yet is likely to be a relatively insignificant additional cost to the survey budget if done at the time. Some survey equipment systems have the facility to generate images of the records, for example, uncompressed TIFF format, as a print option. If this option is not available then the records should be scanned.

Records are key items of data and should be transferred to the Coastal and Marine Data Manager at the end of the survey along with a listing of the records.

1.15 PHOTOGRAPHS AND VIDEO

Camera and video surveys are important tools for making and recording visual observations. However, there are no clear standards for the acquisition and processing of marine digital photographic images (still photographs and video). Often there is no real consideration of the long-term value and possible future use of the data beyond the immediate project requirements.

Ideally, the output from still cameras should be:

- Raw format files for archive, as these contain the highest resolution of information without any processing having been applied. Issues with this approach are that the files can be very large and raw file formats are proprietary to the make of camera, although exchange formats are now being introduced.
- Uncompressed TIFF of the output 'processed' image at the highest resolution available.

Often, the camera equipment and lighting used during a survey is described, as well as the how the images are used scientifically. There is usually nothing recorded about the processing or compression that has been applied to the images between capture of the image by the pixels in the camera and the final image stored on a hard disk or DVD.

Surveys should aim to record as much information as possible concerning the acquisition and processing of still and video images, as is done for every other survey instrument. Most digital cameras are capable of recording camera settings plus data and time (and possibly position if there is a navigation feed). This information is tagged to the image, which means that metadata capture can be automated. It is important to ensure that the camera settings are correct (for example, the date and time are accurate).

1.16 PHYSICAL SAMPLE MATERIAL

During sampling surveys it is essential that the correct core curation procedures are followed and samples are labelled accordingly. Samples should be collected and stored in appropriate containers or boxes. Plastic bottles or bags are adequate for non-core samples. Core samples

should be stored in 1m length boxes. BGS has a specific procedure for core curation and labelling samples (see Enclosure 1).

Often, recording the relevant metadata is given low priority when collecting samples. It is imperative that relevant metadata is recorded both for immediate use and for long-term archiving of the material. Without sufficient metadata, the material effectively becomes useless. It is also important to consider the long-term use and archive of the physical sample material.

BGS has two main storage facilities for marine core; Gilmerton and Loanhead. The core store on Gilmerton Road, Edinburgh is the national archive for core and cutting samples from hydrocarbon wells from the UK Continental Shelf. The Loanhead core store houses all non-hydrocarbon material from the UK Continental Shelf. In addition there is a Cold Store in Murchison House used for storing delicate materials to reduce bacterial decay or evaporation leading to desiccation.

1.17 PROJECTS

A marine survey is not an isolated activity. It occurs within the context of a project that commissioned the survey (for example, a mapping project).

The recording of the relationship between project and survey in the metadata is important, especially beyond the life of the project. It is the key to being able to drill down from project outputs (for example, scientific literature) to the source data collected by the survey.

A project may be associated with one or more surveys, and a survey may be associated with one or more projects.

1.18 QUALITY CONTROL

Quality control of data during the acquisition phase is an essential part of the data management process. QC on board the survey vessel ensures that the data transferred at the end of the survey are as complete as possible. The Survey Data Manager is responsible for the QC of all the data collected on a cruise. This includes:

- ensuring the data are complete according to the Data Management Plan;
- ensuring the data are fit for the purpose of the survey / project;
- ensuring the files are labelled correctly.

Any data considered to be 'poor quality' should be flagged as such during the survey. A decision will be made at the end of the survey on the long-term management of such data. It is recommended that such data are not actively managed with the Coastal and Marine Data Management System, as this is a waste of limited resources. If it is deemed useful for the project, it should be stored in the relevant folder with a 'Read me' text file indicating the data is to be transferred to the Project folder on the working drive and not put onto the corporate storage area network (SAN) when the data is transferred to the Coastal and Marine Data Manager.

1.19 SURVEY ACQUISITION PLAN

The acquisition plan lists the names and planned coordinates of survey stations (points), survey lines (start, end, and bend points) and survey polygons, along with the planned activities to be conducted at each location.

The initial plan is compiled during the Preparation Phase of the survey and can be used to inform the tender specification if applicable. The plan may be amended during contract negotiations, and may be further amended during the survey.

The final version of the plan is an important QC document, which is used to check for data completeness. It may also form the basis of the survey plans for future surveys.

The survey acquisition plan is a key, survey-level document, and a component of the long-term, survey-level information that is archived with the survey data.

1.20 SURVEY GIS

A geographic information system (GIS) is a very powerful data integration, processing, interpretation and viewing tool, which can perform many functions within a survey. While it can have an important role in data management, particularly the spatial QC of data during a survey, it should not be regarded as the long-term data management system. BGS experience is that each survey has its own specific GIS with no standard layers, data or metadata (content), and that they almost always do not contain all of the survey data required for subsequent processing, interpretation and archiving. A common problem is that the data files are linked using absolute path names rather than relative path names. This means that when the GIS is moved to another location in the file structure or to another computer, all of the links are broken. It can take time to rebuild links and to disentangle and export data from a project GIS into a corporate system.

The project GIS is a key survey-level item, and is a component of the long-term, survey-level information that is archived along with the data. Although open-source, and common exchange standards are becoming available, there is no guarantee that the full functionality and contents of a survey GIS can be replicated in a future GIS application without active data management (continuous conversion and migration to the current commonly used products and versions). Use of the MESH Data Exchange Format (DEF) for GIS vector files, may be appropriate for some layers.

SECTION B - SPECIFICATIONS

2 Survey-level Information

2.1 DEFINITION

All survey information relevant to the indexing, QC and management of data acquired, processed or interpreted during a survey.

2.2 DELIVERABLES

2.2.1 Survey acquisition plan

The plan should as a minimum include:

- a list of the planned survey stations, survey lines and survey polygons;
- the reference spheroid and projection of the coordinates;
- the equipment to be deployed for each planned activity.

Planned activities should be labelled in such a way that there is no confusion between the identifier of the planned activity and the identifier of the actual activity. For example, within BGS, planned lines are lettered, while actual lines are numbered. In addition the numbering is applied sequentially starting at Line 1 for the first line run on the survey.

The plan should be held as an Excel spreadsheet file, which is maintained and updated until completion of the survey. The file name should include the survey name and the contents of the file. The plan should be stored in the Pre-Cruise Preparation folder in the BGS pre-defined folder structure (Template F).

For an example, see Template A.

2.2.2 Data management plan

The plan should include:

- a brief description of the survey goals;
- what data and associated metadata are being collected and processed;
- responsibilities for the management of the data;
- QC responsibilities and procedures;
- data storage and back-up procedures;
- data formats;
- the transfer process and procedures on completion of the survey.

In addition to the agreed number of paper copies, a digital version should be provided in PDF document format. The file name should include the survey name and the contents of the file.

See Template B for the BGS data management plan format.

2.2.3 Survey acquisition report

The acquisition report should include:

- the purpose and location of the survey;
- a list of the survey contractors and their responsibilities;

- a list of personnel;
- the specification of the survey vessel and an assessment of its performance;
- a technical description of each item of survey equipment, including deployment, use, and assessment of performance and accuracy;
- the time zone used to record times;
- a narrative of the survey operations;
- survey statistics;
- a list of outputs from the survey.

In addition to the agreed number of paper copies, a digital version should be provided in PDF document format. The file name should include the survey name and the contents of the file.

The report should use the BGS template (Template C) which is provided on the hard disk supplied by the Coastal and Marine Data Manager for managing the survey data.

2.2.4 Survey processing report

The processing report should include:

- the methods and purpose of processing data acquired during the survey;
- preparation of the data for processing;
- outputs of the processing;
- a QC assessment of the outputs.

It may be incorporated into the Acquisition Report.

If the report does not form part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

The report should use the BGS template (Template D).

2.2.5 Survey interpretation report

The interpretation report should include:

- the purpose of the interpretation;
- the methods used;
- the results of the interpretation;
- the outputs of the interpretation.

It may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

There may be more than one specialist interpretation report.

2.2.6 Survey log

The survey log should list:

- daily activities;

- dates, times and places;
- survey activities completed and equipment used;
- weather conditions;
- problems or incidents encountered.

An abridged version of the survey log should be incorporated into the Acquisition Report.

For situations where position fixing is not being done automatically (usually the case for sample stations), there needs to be an agreed definitive position, date, time and water depth assigned to the sampling activity (either assigned by a surveyor or the bridge officer). The survey log should be used to record the definitive set of ship / equipment position information. This information can then be copied into data sheets such as geological logs, drillers log etc.

The full log should be submitted with the data. If the log is digital it must be provided as an Excel spreadsheet or PDF document format file. If the log is a handwritten document or log sheets, the pages should be scanned as a multipage, uncompressed TIFF format image at 300dpi. The file name should include the survey name and the contents of the file.

2.2.7 Analogue survey records

All records should be clearly labelled with sufficient information to identify the record, the content of the record and the survey activity that the record is associated with.

The face of the record should be labelled with timing and scale marks and appropriate notation to describe the application of print delays or any unusual or anomalous features on the record.

Labels should be attached to both ends of rolled or fan-folded records with sufficient information to identify unambiguously the content of the record and any processing parameters applied to the record.

If a survey activity is split between more than one physical record then each label should indicate this (for example, if there are 3 Sparker records for a survey line they should be labelled '1 of 3', '2 of 3' and '3 of 3').

Records should be stored in clearly labelled storage boxes.

If records are not a facsimile of the digital data stored, an uncompressed TIFF format image of each record should also be generated at the time of the survey (by scanning or 'print to file' as uncompressed TIFF format images).

The image resolution should be 300dpi and black/white, greyscale or colour as appropriate.

The image file name should include the survey name, the unique activity identifier, the record type, and the part number (if the record is part of a more continuous data item).

An inventory of records should be kept. The inventory forms part of the Survey Metadata spreadsheet. See Template E.

2.2.8 Analogue observation data sheets

All paper data sheets (for example bedform or geological descriptions) should be clearly labelled with sufficient information to identify the contents and the survey activity that the record is associated with.

The data sheets should be scanned as uncompressed TIFF format images, multipage if appropriate.

The image resolution should be 300dpi and black/white, greyscale or colour as appropriate.

The image file name should include the survey name, the unique activity identifier and the record type.

An inventory of records should be kept, which forms part of the Survey Metadata spreadsheet. See Template E.

2.2.9 Survey metadata

The survey-level discovery metadata should include:

- cruise number;
- area;
- date of cruise;
- vessel name;
- cruise title;
- client;
- contractor;
- data and metadata confidentiality;
- personnel;
- details of equipment used;
- inventory of all records / media produced including the numbers of paper records / media, and all file types.

The BGS Cruise Metadata spreadsheet (Template E) gives details of the information required. The spreadsheet template is on the hard disc provided by the Coastal and Marine Data Manager along with guidelines on how to populate the fields.

Included in the Survey Metadata spreadsheet is a line summary log and quality assessment record. These must be completed at the time of acquisition.

2.2.10 Survey GIS

If a survey GIS exists then its entire folder and data file structure should be submitted as a deliverable from the survey. This will include any separate relational database, or spreadsheet that stores attributes linked to the GIS, and documents and images that are linked to the GIS. The data management role of the GIS should be defined in the data management plan, and its use documented in the acquisition, processing and interpretation reports as appropriate. Use of the MESH Data Exchange Format (DEF) for GIS vector files should be considered if appropriate as an output. The GIS should be set to use relative paths rather than absolute paths, as this maintains the links between files in the data structure.

The name and version number of the GIS application (and associated linked datasets if appropriate) should be documented.

2.2.11 Survey data

Digital data should be backed-up regularly during the survey. The pre-defined folder structure (see Template F), which is downloaded on to a hard disk(s) prior to the survey can be used for this purpose if appropriate. However, the ship or contractor may have its own computing/back-up systems.

The hard disk is used to transfer the data to the BGS corporate data storage system (SAN) on completion of the survey. The hard disk is obtained from the Coastal and Marine Data Manager prior to the survey and returned afterwards.

It is the responsibility of the survey data manager to ensure that all survey information is complete and transferred to the hard disk by the end of the survey. It is their responsibility to ensure the disk is returned to the Coastal and Marine Data Manager on completion of the survey. Once the data have been loaded to the corporate storage area network, the indexing and QC of the data is complete and a back-up copy of the survey data has been archived corporately, the survey is deemed to be complete.

3 Navigation Data

3.1 DEFINITION

Navigation data and related acquisition, processing and QC documents resulting from survey data acquisition and processing activities.

3.2 DELIVERABLES

3.2.1 Navigation documentation

The acquisition, processing and QC reports should:

- describe the methods used for acquiring, logging and processing the navigation data;
- provide a technical description of each item of navigation equipment, including name, model, deployment, use, and assessment of performance;
- a description of calibrations, filtering and corrections applied to the raw data;
- a statement on the positional accuracy for each navigation dataset output from the survey;
- a narrative describing navigation operations during the survey;
- a legible lay-back diagram of all survey equipment relative to the ship's central reference point;
- reference spheroid and projection information;
- vertical datum;
- the time zone used to record time stamps;
- a list of the navigation files output from the survey.

The reports may be incorporated into the Acquisition report.

If they are produced as separate reports, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

BGS provides a template lay-back diagram which can be edited to suit the needs of the survey (Template G). This template is included on the hard disk provided by the Offshore Data Manager.

3.2.2 Navigation observer's log

- a record of navigation acquisition and processing activities;
- significant events related to survey activities (for example, start of line and end of line);
- tide and weather conditions;
- problems encountered.

This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file.

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name / unique survey identifier.

3.2.3 Raw and processed navigation data

At minimum there should be a file containing the processed survey navigation data for the ship's central reference point. Additional files containing the calculated layback navigation positions of each equipment type should be provided if these have been calculated.

Where navigation data are incorporated into equipment data files, for example, in seismic trace headers, it should be stated in the Navigation Documentation if the layback has been applied to the coordinates.

The content and layout of stand-alone navigation data file(s) will vary, depending on the type and complexity of the survey. In addition to any binary, proprietary formats that may be required for specific on-board processing systems, data must also be provided in ASCII format files. The essential requirements are:

- the files are standard ASCII, csv or tab delimited;
- file formats are documented in the data management plan;
- the reference spheroid and projection of the coordinate data in each file is documented in the navigation report and navigation metadata;
- the reference point of the coordinates in each file is documented in the Navigation Report and navigation metadata;
- the time zone used to record times is documented in the Navigation Report and navigation metadata;
- each coordinate is output as a pair of real numbers, x coordinate, then y coordinate;
- for latitude and longitude real numbers, a negative number represents south of the equator and west of the Greenwich meridian respectively;
- each coordinate has an associated date and time stamp “YYYY-MM-DD HH:MM:SS”;
- each coordinate has an associated unique activity identifier (line, station), and fix/ping identifier if appropriate;
- the data files should include as much ancillary information as necessary to assist in the subsequent processing and re-use of data, for example, vessel motion, speed and heading, water depth;
- the file name should include the survey name and the reference point.

All navigation data should be stored in the relevant sub-folders within the Navigation folder of the pre-defined folder structure (Template F).

3.2.4 Track plots

If track plots are printed, the original digital plot files should be retained as part of the survey data. The plot file format should be a commonly used format that can be opened by standard graphics or GIS applications, for example, uncompressed TIFF format, DXF, ESRI shapefile.

Track plots should be included as appendices in the Acquisition Report.

3.2.5 Navigation metadata

Appropriate, structured, navigation technical (content) metadata should be entered into the predefined spreadsheet. See Template H.

4 Singlebeam Echo-sounder Data

4.1 DEFINITION

Singlebeam echo-sounder data, echo-sounder records, and associated documentation acquired during the survey.

4.2 DELIVERABLES

4.2.1 Singlebeam echo-sounder documentation

The acquisition, processing and QC reports should:

- describe the method(s) used for acquiring, processing and interpreting the echo-sounder data;
- provide a technical description of each item of sounding equipment, including name, model, deployment, use, and assessment of performance;
- a description of calibrations, filtering and corrections applied to the raw data;
- a statement on the accuracy of the data;
- describe calibration procedures and when these were performed;
- state the sound velocity used to calculate depths;
- state any corrections applied to the data including datum shifts and motion compensation.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

4.2.2 Singlebeam echo-sounder observer's log

A record of calibration, acquisition and processing activities, significant events and, problems encountered etc should be logged.

This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file. The echo-sounder log should be stored in the relevant sub-folder in the Echo-sounder equipment folder within the MultibeamAndSinglebeam folder of the pre-defined folder structure (Template F).

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and content of the file.

4.2.3 Singlebeam echo-sounder records

The paper records printed by the echo-sounder that relate to survey activities should be preserved and stored in storage boxes. If the records are not a facsimile of the stored digital data, they should be scanned as uncompressed TIFF format images at 300 dpi, or 'printed to file' as uncompressed TIFF format images. The file names should include the survey name and content of the file

4.2.4 Exchange format dataset

The ability to re-use and re-process echo-sounder data (for example, to generate backscatter data) depends on being able to read the echo-sounder raw and processed data formats. BGS reads echo-sounder data using the CARIS HIPS and SIPS software package. This package supports over 40 industry standard formats including:

- Raw data:
 - Kongsberg Maritime “Merlin” format (.all files)
 - XTF
 - GSF
 - Atlas
 - Elac
 - Geoacoustics
 - Hypak
 - LADS
 - SHOALS
- Processed data:
 - Kongsberg Maritime “Neptune”
 - CARIS HIPS SIPS
 - Fledermaus
 - GSF
 - ASCII

4.2.5 Singlebeam echo-sounder data

- The entire folder structure containing the collection of files that comprise the raw echo-sounder datasets acquired during survey activities in an appropriate exchange format;
- The entire folder structure containing the collection of files that comprise the processed echo-sounder datasets in an appropriate exchange format;
- If employed on the survey, the entire folder structure containing processed backscatter data and interpretations;
- For ASCII format output, the processed soundings and backscatter data should be in csv or tab delimited format. Each sounding should have an associated x,y coordinate, date and time stamp, and associated unique activity identifier (line, station), and fix/ping identifier if appropriate. All calibration data files should be provided also;
- The file names should include the survey name and content of the file;
- All echo-sounder data should be stored in the Echo-sounder equipment folder within the MultibeamAndSinglebeam folder of the pre-defined folder structure (Template F).

4.2.6 Singlebeam echo-sounder metadata

Appropriate, structured, singlebeam echo-sounder technical metadata should be entered into the predefined spreadsheet. See Template I.

5 Multibeam Echo-sounder Data

5.1 DEFINITION

Multibeam echo-sounder data, backscatter data, processed outputs and associated documentation acquired during the survey.

5.2 DELIVERABLES

5.2.1 Multibeam echo-sounder documentation

The acquisition, processing and QC reports should:

- describe the method(s) used for acquiring, logging and processing the multibeam echo-sounder data;
- provide a technical description of each item of sounding equipment, including name, model, deployment, use, and assessment of performance;
- a description of calibrations, filtering and corrections applied to the raw data;
- a statement on the accuracy of the data;
- describe calibration procedures and when these were performed;
- state the sound velocity used to calculate depths;
- state any corrections applied to the data including datum shifts and motion compensation.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

5.2.2 Multibeam echo-sounder observer's log

A record of calibration, acquisition and processing activities, including start and end of line, significant events and, problems encountered etc. Times for start and end of line should be recorded in GMT.

This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file. The digital log is recorded on a form in the Survey Metadata spreadsheet (Template E). A 'Read me' text file should be created in the Log sub-folder of the Multibeam equipment folder within the MultibeamAndSinglebeam folder of the pre-defined folder structure (Template F), indicating the location of the log.

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and the content of the file.

5.2.3 Exchange format dataset

The ability to re-use and re-process echo-sounder data (for example, to generate backscatter data) depends on being able to read the echo-sounder raw and processed data formats. BGS reads

echo-sounder data using the CARIS HIPS and SIPS software package. This package supports over 40 industry standard formats including:

- Raw data:
 - Kongsberg Maritime “Merlin” format (.all files)
 - XTF
 - GSF
 - Atlas
 - Elac
 - Geoacoustics
 - Hypak
 - LADS
 - SHOALS
- Processed data:
 - Kongsberg Maritime “Neptune”
 - CARIS HIPS and SIPS
 - Fledermaus
 - GSF
 - ASCII

BGS collects raw multibeam data in the Kongsberg Maritime “Merlin” format (.all). These files contain all the information required for processing such as navigation data and pitch, roll and heave data etc. Processing is generally carried out using CARIS or Fledermaus. The raw .all files can be imported directly into these programs.

5.2.4 Multibeam echo-sounder data

- The entire folder structure containing the collection of files that comprise the raw echo-sounder datasets in the appropriate exchange format;
- The entire folder structure containing the collection of files that comprise the actual processed echo-sounder datasets in the appropriate exchange format;
- For ASCII format output, the processed soundings should be in csv or tab delimited format. Each sounding should have an associated x,y coordinate, date and time stamp, and associated unique activity identifier (line, station), and fix/ping identifier if appropriate. All calibration data files should be provided also;
- The file names should include the survey name and content of the file;
- All multibeam data should be stored in the Multibeam equipment folder within the MultibeamAndSinglebeam folder of the pre-defined folder structure (Template F).

5.2.5 Multibeam echo-sounder metadata

Appropriate, structured, multibeam echo-sounder technical metadata should be entered into the predefined spreadsheet. See Template J.

5.2.6 Processed multibeam and backscatter grids

Grids of processed data should be provided as ASCII csv or tab-delimited format data files. The processing procedures, and the file formats should be documented. The file names should include the survey name and content of the file.

5.2.7 Processed multibeam and backscatter images

Images of the processed bathymetry and backscatter data should be output as uncompressed TIFF format at 300 dpi. The images should have a grid, scale bar, title and legend. The images should be geo-referenced. The file names should include the survey name and content of the file.

6 Sonar Data

6.1 DEFINITION

Side-scan and interferometric sonar data, records, record images and associated documentation acquired during the survey.

6.2 DELIVERABLES

6.2.1 Sonar documentation

The acquisition, processing and QC reports should:

- describe the equipment used for acquiring, processing and logging sonar data including the manufacturers and equipment names;
- describe calibration procedures and when these were performed;
- describe the processing steps applied to the raw data;
- state any corrections applied to the data.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

6.2.2 Sonar observer's log

A record of calibration, acquisition and processing activities, significant events and, problems encountered etc. This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file. The log should be stored in the relevant sub-folder in the Side Scan Sonar equipment folder within the Geophysical folder of the pre-defined folder structure (Template F).

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and the content of the file.

6.2.3 Sonar records

Paper sonar records may be printed as part of the survey acquisition and QC process. These should be preserved. The records should be labelled at the beginning and end of the record.

Significant events should be annotated on the face of the record (for example start and end of line), changes to fish height, range and there must be annotation (fixes) that allow the data on the record to be reconciled with the navigation data. The records should be stored in cardboard boxes labelled with the contents. An inventory of paper records should be maintained, which is included in the Survey Metadata spreadsheet (see Template E).

If the records are not a facsimile of stored digital data (same processing steps applied) then they should either be scanned as uncompressed TIFF format images at 300 dpi, or 'printed to file' as uncompressed TIFF format images. The file names should include the survey name and the content of the file.

6.2.4 Raw and processed sonar data

Where CODA is used to acquire side scan sonar data, the files should be stored in a CODA folder in the Geophysical folder of the proprietary folder system. Triton XTF files should then be created and stored in the relevant Raw Data sub-folder in the Side Scan Sonar equipment folder within the Geophysical folder. The entire folder structure will be made available on completion of the survey when the data has been transferred to the Offshore Data Manager. See Template F for the folder system.

Raw and processed CODA data files should be renamed to contain the cruise name and line number, but retain the original CODA file name. CODA files are generally automatically named with the data and time. The convention is:

BGSCruisenumber_EquipmentTypeCode_LineNumber_PartofLineNumber_OriginalFileName.

For example, *BGS2007_2_SS_line3_part2of3_125062007_054532.cod.*

6.2.5 Exchange format dataset

The ability to re-use the sonar data in other projects depends on having the appropriate acquisition and processing system. In order that the data are more generally useable, sonar data should be exported as Triton XTF format.

6.2.6 Sonar metadata

Appropriate, structured, sonar technical metadata should be entered into the predefined spreadsheet. See Template K.

6.2.7 Processed sonar lines and mosaics

Images of the processed lines and mosaics should be output as uncompressed TIFF format at 300 dpi. The images should have a grid, scale bar, title and legend. The images should be geo-referenced. The file names should include the survey name and content of the file.

7 Seismic Sub-bottom Profiler Data

7.1 DEFINITION

Sub-bottom seismic profiler data, profiler records, record images and associated documentation acquired during the survey.

There are a variety of profiler types and configurations, and it is possible to operate two or more profiler types simultaneously on a survey line, or run multiple passes along a survey line using different equipment.

The following deliverables should be applied to each profiler type used during the survey.

7.2 DELIVERABLES

7.2.1 Seismic profiler documentation

The acquisition, processing and QC reports should:

- describe the equipment used for acquiring, recording and processing the seismic data including name, model, deployment, use, and assessment of performance;
- describe calibration procedures and when these were performed;
- describe the processing steps applied to the raw data.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

7.2.2 Seismic profiler observer's log

A record of calibration, acquisition and processing activities, significant events, and problems encountered etc. Times for start and end of line should be recorded in GMT. This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file. The digital log is recorded on a form in the Survey Metadata spreadsheet (Template E). A 'Read me' text file should be created in the Log sub-folder for each equipment type used, indicating the location of the log.

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and the content of the file.

7.2.3 Seismic profiler records

Paper profiler records may be printed as part of the survey QC or interpretation process. These should be preserved. The records should be labelled at the beginning and end of the record. If the records are not a facsimile of stored digital data (same processing steps applied) then they should either be scanned as uncompressed TIFF format images at 300 dpi, or 'printed to file' as uncompressed TIFF format images. The file names should include the survey name and the content of the file.

Significant events should be annotated on the face of the record (for example start and end of line and changes to the print delay). There must also be scale lines, and annotation (fixes) that allow the data on the record to be reconciled with the navigation data.

An inventory of seismic profiler records should be maintained. This forms part of the Survey Metadata spreadsheet (Template E).

7.2.4 Raw and processed seismic profiler data

Where CODA is used to acquire seismic data, the files should be stored in a CODA folder in the Geophysical folder of the proprietary folder system. SEG-Y files should then be created and stored in the relevant Raw Data sub-folder for each equipment type used. The entire folder structure will be made available on completion of the survey when the data has been transferred to the Offshore Data Manager. See Template F for the folder system.

Raw and processed CODA data files should be renamed to contain the cruise name and line number, but retain the original CODA file name. CODA files are generally automatically named with the data and time. The convention is:

BGSCruisenumber_EquipmentTypeCode_LineNumber_PartofLineNumber_OriginalFileName.

For example, *BGS2007_2_PG_line3_part2of3_125062007_054532.cod.*

7.2.5 Exchange format dataset

The ability to re-use the seismic data in other projects depends on having the appropriate seismic acquisition and processing system. In order that the data are more generally useable, the seismic data should be exported in SEG-Y format, if this is appropriate for the type of seismic data (either raw or processed). The 'flavour' of SEG-Y used and details on the contents of the trace headers should be documented in the data management plan.

7.2.6 Seismic profiler metadata

Appropriate, structured, seismic profiler technical metadata should be entered into the predefined spreadsheet. See Template L.

8 Magnetometer Data

8.1 DEFINITION

Towed magnetometer data, magnetometer records, and associated documentation acquired during the survey.

8.2 DELIVERABLES

8.2.1 Magnetometer documentation

The acquisition, processing and QC reports should:

- describe the equipment used for acquiring, recording and processing the magnetic data including name, model, deployment, use, and assessment of performance;
- a statement on the accuracy of the data;
- describe calibration procedures and when these were performed;
- state any corrections applied to the data.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

8.2.2 Magnetometer observer's log

A record of calibration, acquisition and processing activities, significant events and, problems encountered etc. This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file. The digital log should be stored in the Log sub-folder in the Magnetometer equipment folder within the Geophysical folder on the proprietary folder system (Template F).

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and the content of the file.

8.2.3 Magnetometer records

Paper magnetometer records may be printed as part of the survey acquisition and QC process. These should be preserved. The records should be labelled at the beginning and end of the record. Significant events should be annotated on the face of the record (for example start and end of line), and there must be annotation (fixes) that allow the data on the record to be reconciled with the navigation data. The records should be stored in cardboard boxes labelled with the contents. An inventory of paper records should be maintained, which forms part of the Survey Metadata (Template E).

If the records are not a facsimile of stored digital data (same processing steps applied) then they should either be scanned as uncompressed TIFF format images at 300 dpi, or 'printed to file' as uncompressed TIFF format images. The file names should include the survey name and the content of the file.

8.2.4 Magnetometer data

The data must be available in ASCII format. The data may be integrated with the navigation file(s) or be stand-alone. The essential requirements are:

- the files are standard ASCII, csv or tab delimited;
- the file format is documented;
- each data point has an associated date, time, x,y coordinates;
- each coordinate has a line/fix/ping ID if appropriate.

All magnetometer data should be stored in the relevant sub-folder in the Magnetometer equipment folder within the Geophysical folder on the proprietary folder system (Template F).

8.2.5 Magnetometer metadata

Appropriate, structured, magnetometer technical metadata should be entered into the predefined spreadsheet. See Template M.

9 Gravimeter Data

9.1 DEFINITION

Gravimeter data, gravimeter records and associated documentation acquired during the survey.

9.2 DELIVERABLES

9.2.1 Gravimeter documentation

The acquisition, processing and QC reports should:

- describe the equipment used for acquiring, recording and processing the gravity data including name, model, deployment, use, and assessment of performance;
- a statement on the accuracy of the data;
- describe calibration procedures and when these were performed;
- state any corrections applied to the data.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

9.2.2 Gravimeter observer's log

A record of calibration, acquisition and processing activities, significant events and, problems encountered etc. This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file. The digital log should be stored in the Log sub-folder in the Gravimeter equipment folder within the Geophysical folder on the proprietary folder system (Template F).

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and the content of the file.

9.2.3 Gravimeter records

Paper gravimeter records may be printed as part of the survey acquisition and QC process. These should be preserved. The records should be labelled at the beginning and end of the record. Significant events should be annotated on the face of the record (for example start and end of line), and there must be annotation (fixes) that allow the data on the record to be reconciled with the navigation data. The records should be stored in cardboard boxes labelled with the contents. An inventory of paper records should be maintained, which forms part of the Survey Metadata (Template E).

If the records are not a facsimile of stored digital data (same processing steps applied) then they should either be scanned as uncompressed TIFF format images at 300 dpi, or 'printed to file' as uncompressed TIFF format images. The file names should include the survey name and the content of the file.

9.2.4 Gravimeter data

The data must be available in ASCII format. The data may be integrated with the navigation file(s) or be stand-alone.

The essential requirements are:

- the files are standard ASCII, csv or tab delimited;
- the file format is documented;
- each data point has an associated date, time, x,y coordinates;
- each coordinate has a line/fix/ping ID if appropriate;
- raw and processed gravity values and associated parameters.

All gravimeter data should be stored in the relevant sub-folder in the Gravimeter equipment folder within the Geophysical folder on the proprietary folder system (Template F).

9.2.5 Gravimeter metadata

Appropriate, structured, gravimeter technical metadata should be entered into the predefined spreadsheet. See Template N.

10 Survey Station Data

10.1 DEFINITION

Survey station data, including geological observations and measurements, photographic and video data, survey station records and associated documentation acquired during the survey.

10.2 DELIVERABLES

10.2.1 Survey station documentation

The acquisition, processing and QC reports should:

describe the equipment used for acquiring, processing and logging survey station data including name, model, deployment, use, and assessment of performance;

- describe calibration procedures and when these were performed;
- describe the method(s) used to acquire the survey station data;
- describe any processing carried out on the survey station data.

The reports may be incorporated into the Acquisition Report.

If the reports are not part of the acquisition report, in addition to the agreed number of paper copies, digital versions should be provided in PDF document format. The file names should include the survey name and the contents of the file.

10.2.2 Survey station observer's log

A record of operational observations: calibration, acquisition and processing activities, significant events, operational comments, and problems encountered etc. This information may be recorded in a paper log book or log sheet and later transcribed into a digital log file.

If the digital log file is an abridged version of the of the log book or log sheets, they should be submitted with the data. They should be scanned as a multipage uncompressed TIFF format image at 300dpi. The file name should include the survey name and the content of the file.

10.2.3 Survey station metadata

The survey station metadata must be recorded along with the survey station dataset(s). Metadata should be recorded in the BGS Survey Station spreadsheet. Essential information required at the top-level is:

- a unique identifier;
- cruise number;
- vessel;
- general area;
- year;
- date and time (the time is always recorded as GMT on BGS surveys and should be documented in the Acquisition report);
- latitude and longitude;

- the reference spheroid and projection of the coordinates;
- navigation method;
- water depth including the datum;
- water depth source.

For quality control purposes, the accuracy of the latitude, longitude and water depth should also be recorded.

A survey station is the locus about which activities are carried out in order to gather data. There may be one or more Activities associated to a survey station, therefore it is necessary to record metadata at the Activity level. Essential information required is:

- a unique identifier;
- equipment type;
- vessel;
- latitude and longitude;
- the reference spheroid and projection of the coordinates;
- navigation method;
- position fix;
- date;
- start and end time;
- water depth in metres;
- heading;
- total penetration depth in metres;
- sample recovery in metres;
- geologist;
- BGS planned activity identifier;
- general area.

For quality control purposes, it is important to record the success of the activity. This is recorded as a number from 1 to 5, where 1 is successful and 5 is unsuccessful. Dictionaries to aid in entering the metadata are provided in the spreadsheet. Much of the metadata recorded at the Activity level are auto-populated in the spreadsheet from the Survey Station metadata.

For sample curation, additional metadata required are:

- number of cores with top and bottom depths of each relative to the sea floor;
- number of bottles (non-core samples);
- whether or not the core has been cut;
- whether or not the core has been photographed.

Sample curation metadata are recorded as part of the Activity metadata.

Detailed information on Recovery, Lithology and Geotechnical data should be entered into the spreadsheet as appropriate.

The BGS Survey Station metadata spreadsheet (Template O) gives details of the information required. The spreadsheet template is on the hard disk provided by the Coastal and Marine Data Manager along with guidelines on how to populate the fields.

10.2.4 Survey station samples

Within BGS a survey station is uniquely identified by the degree square it lies within, appended with a sequential number for that square, e.g. +54-03/21. The degree square is defined by the coordinates for the south-west corner of the square and is one degree of longitude by one degree of latitude. Coordinates to the north and east of the Equator and Meridian line should be prefixed with a '+' sign, and coordinates to the south and west should be prefixed with a '-' sign.

Survey station samples or 'activities' are identified using the survey station identifier (degree square/number) plus the equipment type code, i.e. +54-03/21VE. The degree square/number does not change for each activity, only the equipment code. In situations where a piece of equipment is used more than once, for example a second attempt if the first has failed, the identifier is simply followed by an incremental number, i.e. +54-03/21VE₂.

Core is split by drawing an orientation line down the length of the core and divided into 1m sections from the top of the core. Yellow caps are used to indicate the top of the core, black caps, the base. Each section is labelled with the activity sample number and core section identifier. The top-most section being A followed by B and so on. In addition the number of sections within a core should also be included to each letter label thus, A/6, B/6...F/6 or, A/2 and B/2 etc. An arrow indicating the top of the core should also be marked on the core. The core will be cut along the orientation line therefore it is important to label either side of the orientation line. On one side of the orientation line, a clear tick should be marked indicating the half to be kept for archiving.

Non-core samples are collected in plastic bottles or bags. These should be labelled with the activity sample number and the type of sample, i.e. shoe sample, grab sample etc. If more than one sample is collected for an activity the container should also be labelled with 1/3, 2/3... etc.

The BGS Sample Labelling & Curation procedure (Enclosure 1) gives more details on the BGS standards.

10.2.5 Geological log sheets

Geological data should be recorded in a geological log sheet. Essential information which should be recorded is the above mentioned metadata and a detailed geological description of the sample including bedforms, lithology types, structures, palaeontology and any other relevant geological information.

Information from the geological log sheets should be transcribed into the lithology and recovery tabs of the Survey Station metadata spreadsheet (Template O).

Recovery is measured from the base of the drilled section when sampling using a rock drill. When samples are collected using the vibrocorer or gravity corer, recovery should be measured from the top down. It is important to record the penetration (total) depth.

Digital graphic logs should then be drawn using the information in the Survey Station Metadata spreadsheet. This is done using Strater. The data in the tables are imported into Strater and logs are generated using a template log (Template Q).

10.2.6 Photographic and video data

Ideally, photographic data for archive should be provided in the highest resolution possible, with little or no processing, and lossless compression. This will provide the best available data for:

- future processing using the latest algorithms and processes;
- feature extraction;
- feature enhancement.

The preferred output is uncompressed TIFF.

Another set of processed and compressed images can be generated for use during the project.

When taking scientific photographs of any physical material or specimens on deck or in the laboratory, a greyscale/colour patch and a scale bar should be included in the shot.

Most digital cameras tag the image file with metadata about the capture of the image. Ensure that this is functioning correctly and that the parameters, for example, data and time, are set correctly.

Photographs will be stored in the BGS Geoscience Imagebase. In order for photographs to be uploaded, essential information required with photographic and video data is:

- camera/photo number;
- a short description of the image;
- a detailed description of the image;
- date/time (in GMT);
- latitude and longitude;
- coordinate system;
- photographer;
- copyright;
- confidentiality;
- any processing applied, such as, colour enhancement, balance, sharpening etc;
- compression method.

Photograph and video metadata spreadsheets are included on the hard disk provided by the Coastal and Marine Data Manager. There are separate spreadsheets for Core Photographs, Seabed Photographs, General Photographs (including deployment of equipment, setting-up, scenery etc) and Video. All the spreadsheets have the same format (Template P) and are stored in the Logs sub-folder in the respective folders (Template F).

Photographs and video will be assigned a unique identifier prior to being uploaded in the BGS Geoscience Imagebase. This number is assigned once the data has been transferred to the Coastal and Marine Data Management Team. During the survey, photographs and videos should be labelled with the camera photo number which is automatically set by the camera / video equipment. It is important during a cruise to assign one camera to take all the core photographs. A second camera can be used for general photographs.

Both a short and long description should be provided in the metadata spreadsheet. The short description should give basic information for example the sample station degree square, and if photographing core, the equipment type. The long description should give more detailed information such as the cruise number, vessel name, run number, depths etc (if photographing core).

Quality control of photographs and video prior to the hard disk being passed to the Coastal and Marine Data Manager is essential. All photographs and video on the hard disk will be loaded into the BGS Geoscience Imagebase, therefore must be both useful and relevant (i.e. Corporate

Value). Consideration must be given to the fact that these data may be used in BGS publications.

SECTION C – TEMPLATES

Template B – Data Management Plan

Introduction: A brief description of the survey including data that will be acquired and used, and deliverables.

Responsibilities: List data management activities and who is responsible during the survey for each specific data management activity.

Data: A description of what data will be collected, generated or derived. Include details of any third party data. If third party data are being used, describe the conditions of their use.

Non-digital Data: Specify the data types and procedures.

Digital Data: Specify the data types and procedures including back up.

Data Formats: A list of the formats to be used for both digital and non-digital data.

Data Media: A description of the method of storing and transferring the data upon completion of the survey. This should be hard disk, however circumstances may arise whereby tape or optical (CD-ROM and DVD) media are used.

Data Transfer process and procedures: How the data are transferred at the end of the survey to the client

Metadata: A description of the metadata that will be acquired and where it will be stored.

Quality Issues: A description of arrangements for verification and validation of data (digital and non-digital), referencing any specific data management procedures available.

Data Licensing: A description of any licensing issues for digital and non-digital data, including any likely third party interest in the data or other products being generated.

Data Copyright and IPR: A description of any copyright and IPR issues for both digital and non-digital data.

Longer term data management strategy – Digital: A description of how the digital data will be managed at the end of the survey.

Longer term data management strategy – Non-digital: A description of how the non-digital data will be managed at the end of the project.

Template C – Acquisition Report



**British
Geological Survey**
NATURAL ENVIRONMENT RESEARCH COUNCIL

Master template for Cruise Report

Whatever Programme

Internal Report XX/00/00

BRITISH GEOLOGICAL SURVEY

WHATEVER PROGRAMME

INTERNAL REPORT XX/00/00

A geological background and planning for any area

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Foreword

This report is the published product of a study by the British Geological Survey (BGS)

Acknowledgements

Acknowledge any BGS staff, Scientists from other organisations, the vessels crew and any individuals / organisations who have contributed to this project / cruise / report. Also it is important to acknowledge any staff members that have helped review the report.

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Summary

A summary of the cruise report highlighting any important sections or findings.

1 Introduction

This is the introductory paragraph of the Introduction section. It uses the Normal paragraph style. When you press the Return key to finish this paragraph, Word will create the following paragraph.

In the style, Normal paragraph which has a flush first line and 6pt spacing after (so you don't need any extra Returns to get gaps between paragraphs). Pressing Return will create further paragraphs.

2 Summary

2.1 Mobilisation

Describe the mobilisation

2.2 Survey

Describe the survey

2.3 De-Mobilisation

Describe the de-mobilisation

3 Navigation

This section is mandatory.

4 Geophysical Survey Equipment

Please complete for each equipment type used, with a new sub-heading for each equipment type.

4.1 Equipment Type

This is the first paragraph of the subsection. It uses the Normal paragraph style. Press return to create.

5 Multi-beam/Single-beam Survey

6 Sampling Equipment

Please complete for each equipment type used, with a new sub-heading for each equipment type.

6.1 Equipment Type

7 Core Curation

Describe core curation activities onboard the vessel, including how samples were labelled, cut, split and stored. Include a table of BGS planned sample numbers and 'new' sample numbers.

8 Preliminary Interpretation of Seismic Data

9 Geology

10 Health & Safety

Describe any health and safety issues on board, including safety drills.

Appendix 1 Track Chart

Appendix 2 Location Map

Appendix 3 Daily Log

The heading is in Appendix 1 style; this is like Heading 1 style but provides automatic Appendix numbering. The Appendices will be captured by the table of contents. If required, appendix headings can include title text after the appendix number.

If you don't need any appendices: just select and delete this whole section, from and including the Section break preceding the Appendix 1 heading to the end of this paragraph.

Appendix sub-head

Sub-headings within an Appendix should use the Appendix 2, Appendix 3, etc. styles; these parallel the Heading 2, Heading 3, etc. styles used in the main body of the report but are not numbered.

Appendix 4 Personnel

List Scientific and Operations personnel and their duties on board the vessel.

Appendix 5 Equipment Layback Diagram

Appendix 6 Line Summary Sheet

Appendix 7 Gravity Base Ties

Appendix 8 Swath Images

Appendix 9 Time Utilisation Diagrams

Appendix 10 Cetacean and Sea Bird Observation Summary

Glossary

Jargon term Explanation for the uninitiated professional, layman or customer. To create further preformatted placeholders: type the abbreviation **gterm** on a blank line then press F3 key.

References

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AUTHOR, A N. 1978a. *Title of Book*. (Publication City: Publisher.) ISBN 0 93465 594 2

AUTHOR, A N. 1978b. Academic or technical journal article or paper title. *Name of Academic or Technical Journal*, Vol. 12, 345–378.

AUTHOR, A N. 1988. Title of author's chapter in book. 85–101 in *Bibliographic title of book*. EDITOR A N, and EDITOR, B. (editors). (Publication City: Publisher.) ISBN 0 93464 598 3

AUTHOR, A N. [1988]. Title of book [online]. Last update on 1 January 2010 [cited 1 January 2020]. Available from <http://www.website.com/>

AUTHOR, A N, and AUTHOR, B. 1988. Bibliographic title of BGS report. *British Geological Survey Research Report*, RR/03/xx.

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BRITISH GEOLOGICAL SURVEY. 1986. Type of map of Area. 1:125 000. (Keyworth, Nottingham: British Geological Survey.)

POSTGRAD-STUDENT, A. 1981. Title of thesis. Unpublished PhD thesis, University of Wherever.

Template D – Processing Report



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Master template for Processing Report

Whatever Programme

Internal Report XX/00/00

BRITISH GEOLOGICAL SURVEY

WHATEVER PROGRAMME

INTERNAL REPORT XX/00/00

Seismic Processing for XXX Survey in XXX Area

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Foreword

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Summary

This report describes the processing of XXX that we did as part of BGS research programme XXX. The first part of the report introduces the project and the context of this particular bit of work.....

1 Introduction

This is the introductory paragraph of the Introduction section. The Heading is in Heading 1 style. The paragraph uses the Normal paragraph style. When you press the Return key to finish this paragraph, Word will create the following paragraph.

Normal paragraph has a flush first line and 6pt spacing after (so you don't need any extra Returns to get gaps between paragraphs). Pressing Return will create further paragraphs.

2 Objectives

Explain the purpose of the processing.

3 Data Processing

Describe the processing methods and steps. Use a new sub-heading for each processing method and step and parameter test.

3.1 Processing method / step

4 Quality Control

Describe the QC procedures applied to the processing..

5 Assessment of the Processing

An overall assessment of the processing outputs.

Appendix 1 Acquisition Parameter

Acquisition parameters of the raw data

Appendix 2 Final Processing Sequence

List of the processing steps and sequence

Appendix 3 Final Products

List of data outputs from the processing

Glossary

Jargon term Explanation for the uninitiated professional, layman or customer.

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POSTGRAD-STUDENT, A. 1981. Title of thesis. Unpublished PhD thesis, University of Wherever.

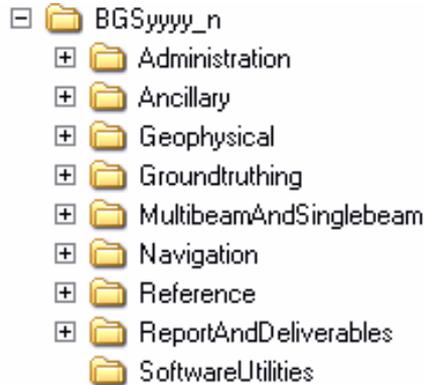
Template E – Survey Metadata

British Geological Survey Marine Operations Cruise Data Summary Sheet		 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>	
Cruise No.			
Area:			
Map Sheet area/s:			
Vessel Name:		Enter new ship here:	
Start Date of Cruise:		End Date:	
Client:			
Contractor:			
Title:			
Data Confidentiality:			
Meta data Confidentiality:			
Project Leader:			
Party chief:			
Operations Manager:			
Offshore Data Manager:			
Geologist:			
Navigation equipment:			
Nav co-ordinate system:			
Navigation point data :		Is it less than 65,000 points and in this s/sheet?	
Navigation laybacks:			
Water Depth Equipment:			
		Digital Y/N	Media
Log Book			
Line Summary Log Sheets			
Sampling Logs			
Seismic Tape Logs			
Navigation Log Sheets			
Offshore QC Log Sheet			
Cruise Report			
General Photographs			

Equipment Used: GEOPHYSICS (Add or remove as req'd)	Paper Records Please record line numbers	Data Format				Corrected Navigation
		CODA	SEG-Y	XTF	TIFF	Other
Airgun						
Sparker						
Shallow Tow Boomer						
Deep Tow Boomer						
Pinger						
Echo Sounder						
Sidescan Sonar						
Multibeam						
Magnetometer						
Gravity						
SAMPLING (Add or remove as req'd)						
Shipek Grab						
Vibrocorer						
Rockdrill						
BH						
Gravity Corer						
Craib Corer						
OTHER (Add or remove as req'd)						
ADCP (Acoustic Doppler Current Data)						
SVP						
CTD						
Photographs						
Video						

Template F – Acquisition Folder Structure

BGS has created the following folder structure which is downloaded onto hard disk prior to the survey.



A hard disk must be requested when a BGS survey number is obtained from the Coastal and Marine Data Management Team. It is the responsibility for the assigned survey data manager to ensure that the data are stored on the hard disk and that the disk is returned to the Coastal and Marine Data Management Team on completion of the survey. Unused folders should be deleted before returning the hard disk.

Administration

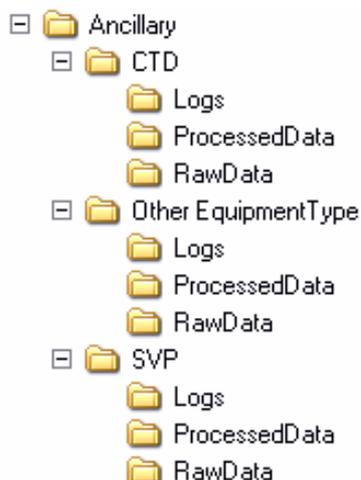
The administration folder contains all documents relevant to the survey that are required or useful whilst Offshore. Subfolders exist for Emails, Personnel and Transmittals.



The majority of information stored in these folders will not be relevant once the cruise has finished, therefore on return, anything no longer required should be deleted. Any information which should be relocated elsewhere should be moved before handing over to the Coastal and Marine Data Management Team.

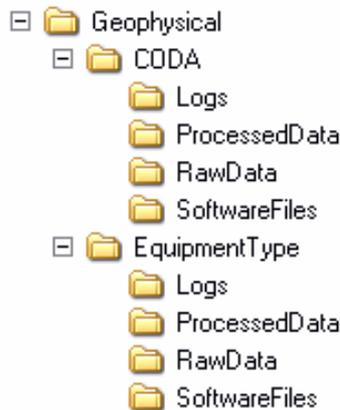
Ancillary

The Ancillary folder contains the supporting data for acquisition; mainly Sound Velocity Profiles (SVP) and Conductivity, Temperature and Depth (CTD) data files. If other supporting data are collected, a folder should be created from the Other Equipment Type folder and the data should be stored in the respective files.



Geophysical

This folder should be used to store raw and processed geophysical data acquired during the survey.



A folder should be created from the Equipment Type folder for each type of equipment used e.g. Side Scan Sonar, Airgun, Sparker, Boomer.

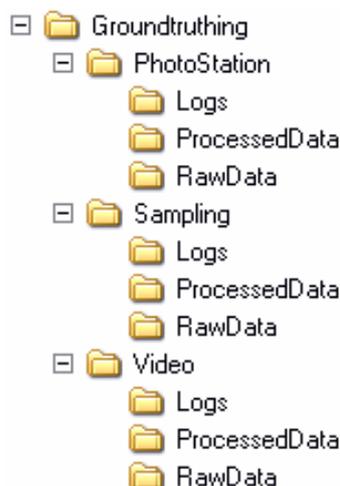
Where the CODA system is used to record multiple equipment types, all the CODA files should be stored in the CODA folder. It is important to keep all original CODA files together otherwise they will not be readable for processing and interpretation. SEG-Y files should then be created from the CODA files separately for each equipment type, specific to the start and end of lines, and exported to the Raw Data folder for that specific equipment type.

The Software Files folder in each of these should be used for storing all the files produced by the software packages (other than CODA) during the acquisition and processing phases of the data.

Line summary logs should be recorded in the Survey Metadata spreadsheet in the top level of this folder structure, i.e. in the BGSyyyy_n folder. A 'Read me' text file should be placed in the Log subfolder of each equipment type used indicating the location of the summary logs.

Groundtruthing

This folder should be used to store data that verifies facts related to the survey, which include Photo, Video and Sampling data.



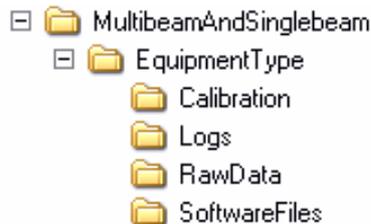
A Photo Index spreadsheet is included to record details of all photographs and videos in the required format for adding into the GeoImage database, if relevant. Photos of general interest e.g. equipment, scenery should be stored in the Reports and Deliverables/General Photographs folder.

Sampling data should be stored in the Sampling sub-folder. Within this folder further sub-folders for the different types of samples can be created e.g. Grab Samples, Rock Drill Cores,

Gravity Cores etc. Within these folders data should be stored in the relevant sub-folder; Logs, ProcessedData and RawData.

Multibeam and Singlebeam

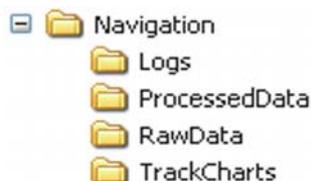
The Multibeam and Singlebeam echo-sounder data collected during the survey are stored in this folder. A new folder for each equipment type should be created from the Equipment Type folder.



The Calibration folder should contain all the data from the calibration exercise including tidal information, and the consequent report, if applicable. The logs and raw data should be stored in the respective folders. The Software files folder name should include the name of the software used eg SoftwareFiles_CARIS. This is where all the files produced by the software package during the acquisition and processing phases are stored.

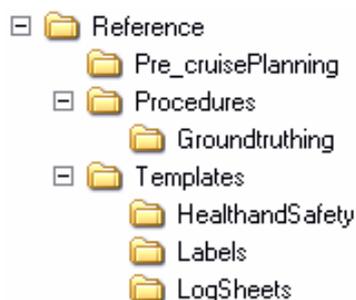
Navigation

All data relevant to the course of the ship during data acquisition should be stored here, including the Observer's Log and digital track charts.



Reference

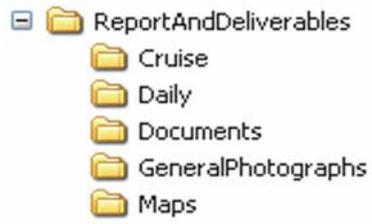
This folder should be used for papers, reference materials, software manuals etc, that are applicable to the survey. The Pre-Cruise plan and data acquisition procedures are also stored here.



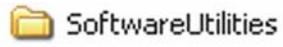
Templates include risk assessment forms, labels and log sheets. The Procedures and Templates folders should be removed at the end of the cruise before the data transfer to the Coastal and Marine Data Management Team.

Reports and deliverables

This folder should be used for storing any deliverables produced onboard ship. This includes daily reports and the Survey Acquisition Report. General photographs should be stored here for onward release to Photography - a Photo Index spreadsheet is included to record details of all photographs and videos, in the required format for adding into the GeoImage database.



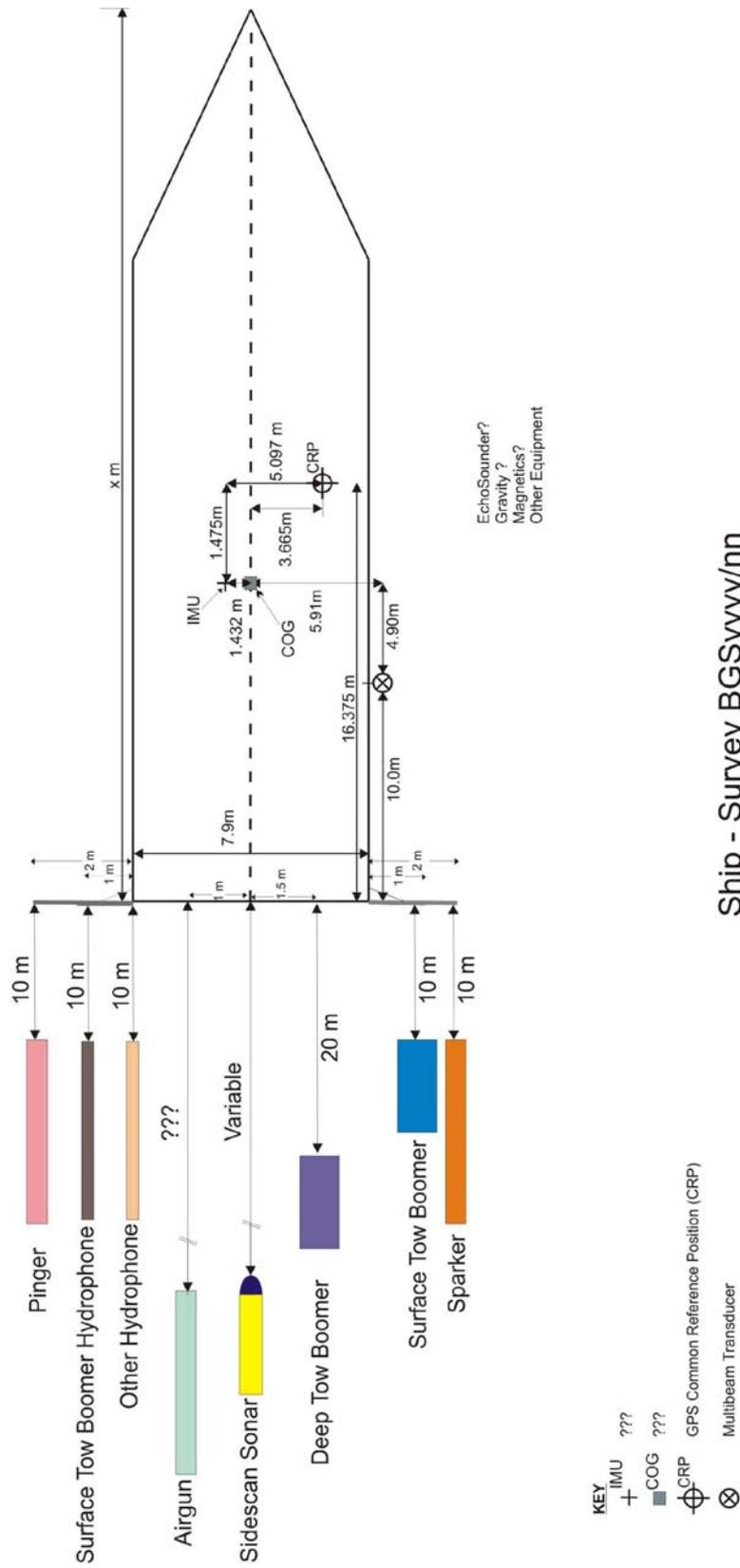
Software Utilities



Any software utilities that are useful to have on board can be stored in this folder.

Template G – Layback Diagram

BGS Layback Diagram



Ship - Survey BGSyyyy/nn

Template H – Positioning Information

	A	B	C	D
1	NAVIGATION / POSITION INFORMATION			
2			 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>	
3	Cruise No:			
4				
5				
6	Positioning Method	Purpose		General Comments
7				
8	Insert one or more positioning method(s)			
9				
10	Equipment make/model	Generic equipment type	General comment	
11				
12	Insert positioning equipment type(s) (acquisition and processing hardware)			
13				
14	EPSG Code	General Comment		
15				
16	Insert EPSG codes with a comment on the extent of the survey covered by the code			
17				
18	Equipment Offsets from Common Reference Point (CRP)			
19	Equipment Type	X(m)	Y(m)	Z(m)
20				
21	Insert one or more items of survey equipment			
22				
23				
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Template I – Echo-sounder Information

	A	B	C	D
1	ECHO-SOUNDER INFORMATION			
2			 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>	
3	Cruise No:			
4				
5				
6	Equipment make/model	Generic equipment type		General comment
7				
8	Insert one or more echo-sounder equipment type(s) (acquisition and processing hardware)			
9				
10	Digital Parameters			
11		Specification	General Comment	
12	Motion compensation			
13	Raw data format			
14	Processed data format			
15	Datum shift applied			
16	Backscatter data format			
17	Insert the specifications used and any general comments			
18				
19	Analogue Parameters			
20		Specification	General Comment	
21	Sweep (metres)			
22	Recorded length (metres)			
23	Scale lines			
24	Insert the specifications used and any general comments			
25				
26				
27				
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Template J – Multibeam Information

	A	B	C	D
1	MULTIBEAM INFORMATION			
2			 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>	
3	Cruise No:			
4				
5				
6	Equipment make/model	Generic equipment type		General comment
7				
8	Insert one or more multibeam equipment type(s) (acquisition and processing hardware)			
9				
10	Digital Parameters			
11		Specification	General Comment	
12	Motion compensation			
13	Raw data format			
14	Processed data format			
15	Backscatter data format			
16	Insert the specifications used and any general comments			
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Template K – Sonar Information

	A	B	C	D
1	SONAR INFORMATION			
2			 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>	
3	Cruise No:			
4				
5				
6	Equipment make/model	Generic equipment type		General comment
7				
8	Insert one or more sonar equipment type(s) (acquisition and processing hardware)			
9				
10	Acquisition Parameters			
11		Specification	General Comment	
12	Sampling frequency (Hz)			
13	Firing rate (s)			
14	Deployment speed			
15	Tow distance (source)			
16	Tow distance (receiver)			
17	Tow depth (source)			
18	Tow depth (receiver)			
19	Tow speed			
20	Maximum vessel turning rate (deg/min)			
21	Insert the specifications used and any additional acquisition parameters			
22				
23	Recording Parameters			
24		Specification	General Comment	
25	Samples per shot			
26	Filter HP & Anti-alias (Hz)			
27	Record length (ms)			
28	Insert the specifications used and any general comments			
29				
30	Processing Parameters			
31		Specification	General Comment	
32	Signal processing			
33	Fix interval (min)			
34	Swell			
35	TVG			
36	TVF			
37	No of trace mixes			
38	Filters (Hz) High cut Low cut Time			
39	Digital Format			
40	Digital Logging			
41	Recorded length (ms)			
42	Insert the specifications used and any general comments			
43				

44	Analogue Processing Parameters		
45		Specification	General Comment
46	Sweep (ms)		
47	Line direction		
48	Scale lines		
49	Insert the specifications used and any general comments		
50			
51	Digital Parameters		
52		Specification	General Comment
53	Raw data format		
54	Processed data format		
55	Navigation data format		
56	SVP data format		
57	CTD data format		
58	Insert the specifications used and any general comments		
Navigation / Echo-sounder / Multibeam / Sonar / Sub-Bottom Profiler / Magnetometer / Gravimeter /			

Template L – Sub-bottom Profiler Information

	A	B	C	D
1	SUB-BOTTOM PROFILER INFORMATION		 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>	
2				
3	GENERIC EQUIPMENT TEMPLATE			
4	Complete a separate metadata spreadsheet for each type of equipment used - Sparker, Pinger, Boomer, Airgun etc.			
5	NOTE Specifications will vary for each equipment type			
6	Cruise No:			
7				
8	Equipment make/model	Generic equipment type	General comment	
9				
10	Insert one or more seismic equipment type(s) (acquisition and processing hardware)			
11				
12	Acquisition Parameters			
13		Specification	General Comment	
14	Sampling frequency (Hz)			
15	Firing rate (s)			
16	Tow distance (source)			
17	Tow distance (receiver)			
18	Tow depth (source)			
19	Tow depth (receiver)			
20	Tow speed			
21	Maximum vessel turning rate (deg/min)			
22	Insert the specifications used and any additional acquisition parameters			
23				
24	Recording Parameters			
25		Specification	General Comment	
26	Samples per shot			
27	Filter HP & Anti-alias (Hz)			
28	Record length (ms)			
29	Insert the specifications used and any general comments			
30				
31	Processing Parameters			
32		Specification	General Comment	
33	Signal processing			
34	Fix interval (min)			
35	Swell			
36	TVG			
37	TVF			
38	No of trace mixes			
	Filters (Hz)			
	High cut			
	Low cut			
39	Time			
40	Digital Format			
41	Digital Logging			
42	Recorded length (ms)			
43	Insert the specifications used and any general comments			
44				

45	Analogue Processing Parameters		
46		Specification	General Comment
47	Sweep (ms)		
48	Line direction		
49	Scale lines (msec)		
50	Insert the specifications used and any general comments		
51			
52	Digital Parameters		
53		Specification	General Comment
54	Raw data format		
55	Processed data format		
56	Navigation data format		
57	SVP data format		
58	CTD data format		
59	Insert the specifications used and any general comments		
60			
61			
62			

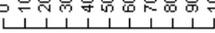
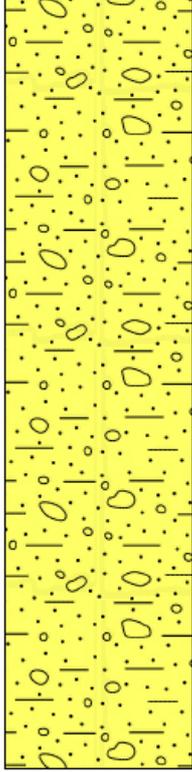
Template M – Magnetometer Information

	A	B	C	D	
1	MAGNETOMETER INFORMATION		 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>		
2					
3	Cruise No:				
4					
5	Equipment make/model	Generic equipment type	General comment		
6					
7	Insert one or more magnetometer equipment types (acquisition and processing hardware)				
8					
9	Parameters				
10		Specification	General Comment		
11	Sensitivity				
12	Recording Interval				
13	Recording Format				
14	External Logging				
15	Output format				
16	Data Medium				
17	Meter Calibration				
18	Tow depth				
19	Tow distance				
20	Insert the specifications used and any additional comments				
21					
22					
23					
24					
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Template N – Gravimeter Information

	A	B	C	D	
1	GRAVIMETER INFORMATION		 British Geological Survey <small>NATURAL ENVIRONMENT RESEARCH COUNCIL</small>		
2					
3	Cruise No:				
4					
5	Equipment make/model	Generic equipment type	General comment		
6					
7	Insert one or more gravimeter equipment types (acquisition and processing hardware)				
8					
9	Parameters				
10		Specification	General Comment		
11	Sensitivity				
12	Recording Interval				
13	Recording Format				
14	External Logging				
15	Output format				
16	Data Medium				
17	Meter Calibration				
18	Base-tie 1 (Cruise start)				
19	Base-tie 2 (Port call)				
20	Base-tie 3 (Cruise end)				
21	Printer output				
22	Range (mGal)				
23	Insert the specifications used and any comments				
24					
25					
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Template Q – Digital Log Template

BGSYYYY_n: Activity ID		 British Geological Survey Natural Environmental Research Council				
Latitude:	General Area:	Vessel:				
Longitude:	BGS Plan No:	Station Keeping:				
Navigation:	Total Depth:	Date:				
Equipment:	Water Depth:	Geologist:				
Recovered Core Image	Depth (m)	Drilled Length (m)	Recovery	Lithology, Structure, Grain Size (Clay 10% to Boulder 100%)	Description	
						
	0 1 2 3 4 5 6 7 8 9 10	A B C D			<p>SAND WITH ASSORTED PEBBLES AND GRAVEL. Angular, sub-angular and sub-rounded pebbles. Medium to coarse grained sand matrix proposed, but has mainly been washed away. Lithologies of pebbles include sandstone and schist. Two small cored sections of probable cobbles also recovered.</p>	

ENCLOSURES

Enclosure 1 – BGS Sample Labelling & Curation Procedure

Purpose

To formalise and standardise the method by which marine cores and bottle samples collected by the BGS should be labelled.

Responsibilities

The ultimate responsibility lies with the Party Chief on each Cruise or Leg of a cruise to ensure that samples are correctly identified. However each member of the Party must also accept responsibility for their work and ensure they handle, label and store the samples correctly according to these guidelines.

The nominated cruise or leg Data Manager or their deputy is responsible for the issuance of BGS Sample Numbers.

The Marine Core Store Manager, or deputy, is responsible for validating all samples prior to acceptance into the Marine Archive.

Definitions

BGS Sample Number	The unique identifier each sample is labelled with. This comprises the degree square in which it is collected, a sequentially increasing number and the equipment-type code.
Equipment Type Code	A two letter abbreviation identifying the equipment used to collect the sample.
Core Section Identifier	The label assigned to core sections; the top-most or sea bed being A followed by B and so on. In addition the number of sections within a core should also be included to each letter label thus, A/6, B/6... F/6 or A/2 and B/2 etc.

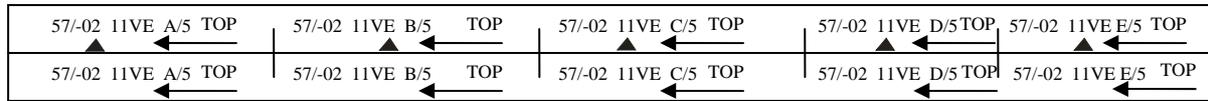
Procedure

Initial core labelling

- 1 Lay core length on bench (orientation will depend on deck layout of ship, but for the remainder of this procedure the base will be to the right).
- 2 Cut off any spare liner at top of core and cap with a yellow cap labelled 'A'. Put a black cap on the base, having put any shoe sample in a 1lb bottle. See paragraph 26
- 3 Clean the core *thoroughly* and dry the top surface.
- 4 Draw an orientation line along the length of the core.
- 5 Measuring from the TOP, mark off 1-metre sections. If there is a length of core at the base which measures more than 1m, but less than 0.4, cut it in half, i.e., do not leave a piece smaller than 0.4m as these are difficult to curate.
- 6 Before cutting, each section must be labelled with the BGS Sample Number and Core Section Identifier: e.g. 57/-02 11 VE A/5.
A safeguard symbol (an arrow indicating the top) is also included **on both sides** of the orientation line:



- 7 The base is marked TD.
- 8 A tick should be marked at the midpoint of each core section on one side of the orientation line (and ensure that the same half of the core is photographed should this prove desirable, e.g., with dipping beds), thus:



N.B. Remember to allow room for caps, tape and mark at the ends of each section.

- 9 The core is now cut into sections along the lines marked.

Cutting Core

- 10 Yellow caps marked A, B, C, etc, are placed at the tops of the sections, black caps at the base.
- 11 **N.B. Should any sub-samples be taken prior to splitting (i.e. whole lengths of core) their absence should be clearly marked on the liner, e.g. ECU sub-sample 2.0-2.2m.**
- 12 The caps are now taped onto the liner using 35mm tape, which must be wound on very tightly. (25mm or 50mm tapes are not suitable).
- 13 The taped ends are dipped into the wax bath, ensuring the wax completely covers the tape (this helps the caps adhere to the liner once split). If possible the ends should be dipped in wax twice, one covering the other.
- 14 When the wax has hardened (preferably after approximately 5 minutes) the cores can be split along the orientation line and along an imaginary line diametrically opposed to it.
- 15 Use cheese wire or a pallet knife to separate the two halves
- 16 The half to be photographed may be cleaned with an electro-osmotic knife if it is suitably muddy.
- 17 The cores are now logged, sub-sampled and photographed.
- 18 Normally only one half of each section will be photographed, the choice of half being based on geological observation. **Remember to photograph the same 'halves', see 8 above.** This section will be labelled “Archive Half”, the second section will be designated the “Working Half”.

Working Half

- 19 Sub samples may be taken from the “Working Half” only, see paragraph 24.
- 20 All testing, including geotechnical measurements, will be performed on the Working Half

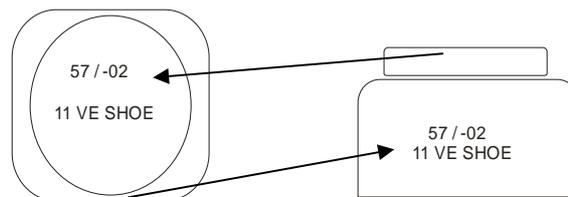
Archive Half

- 21 The Archive Half will be the photographed section.
- 22 The Archive Half should be stored as the top-most section in the core box.
- 23 Only non-destructive testing may be carried out on the Archive Half.

- 24 The Archive Half should not be sub sampled without first referring to the Marine Core Store Manager for permission to do so.

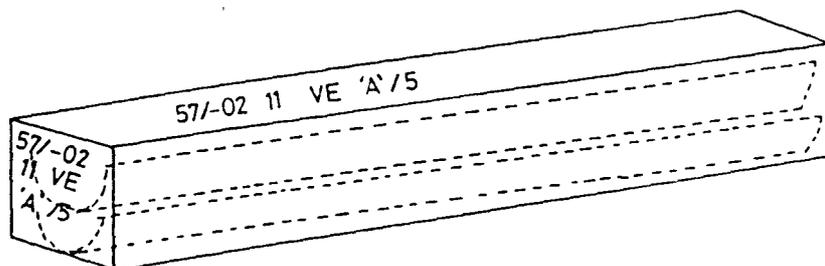
Non-core Samples

- 25 All grab samples and any sample not large enough to be retained as a core or any part of a core sample not in a liner tube should be stored in an appropriately labelled bottle or bag.
- 26 All grab samples must be stored in 41b bottles regardless of size. All other samples are to be stored in 11b bottles.
- 27 The correct manner to label bottles is to annotate the top and facing side with the BGS Sample Number. Bags should be clearly labelled front and back.
- 28 Where multiple non-core samples have been collected for the same activity, containers should be labelled with 1/3, 2/3...etc.
- 29 All shoe samples (VE and CS) should be stored in 11b bottles and clearly labelled 'SHOE'
- 30 Any sample from a core that is not a 'SHOE' sample must be labelled to identify the location from the core from where it came, for example TOP; base of section B, etc.



Storage of Samples

- 31 Each split section must now be sealed in 5" (125mm) layflat tubing:
- Cut length of layflat at length of core + 30cms.
 - Label each length with all details on each split half (except ticks) ie 57/-02 11 VE A/5 TOP ←
 - Heat seal one end of layflat.
 - Carefully push split section into the layflat, avoiding any tearing of the polythene and observing the position of the yellow cap and direction arrow.
 - Heat seal both ends of the layflat, having wiped the inside clean if necessary.
- 32 The two splits from each core section should be placed into a cardboard box labelled appropriately at the top and both ends.



- 33 The splits should be placed one above the other so that the sediment is retained in the liner, a card separator being sandwiched between the two core halves to reduce compression of the lower half.

Curation

- 34 Samples will be validated before they are archived in the core store. The validating process will check the sample labels, equipment and lengths against the recorded metadata.
- 35 The information required for the curation of samples is:
- Sample number
 - Sequence number
 - Original number (if applicable)
 - Equipment type
 - Success code (1-4)
 - Total depth
 - Number of cores
 - Core size
 - Cut (yes/no)
 - Photo
- 36 In addition, the Marine Core Store Manager will record number of shoe and bottle samples, and a sample QC code. Notes will also be made of whether cores are cut longitudinally and the diameter of liner.
- 37 These data will be stored in the Corporate Database.

Enclosure 2 – Navigation Crib Sheet

Documentation (may be incorporated into the Survey Acquisition Report)

- methods used for acquiring, logging and processing the data
- technical description of each item of navigation equipment
 - name and model
 - deployment
 - use
 - assessment of performance
- calibrations, filtering and corrections applied to raw data
- a statement on the positional accuracy for each navigation dataset output from the survey
- lay-back diagram of all survey equipment relative to the ships Central Reference Point
- reference spheroid and projection information
- vertical datum
- list of all navigation files output for the survey
- navigation observers log
 - a record of navigation acquisition and processing activities
 - significant events related to survey activities (for example, start of line and end of line)
 - tide and weather conditions
 - problems encountered

Data

- the files are standard ASCII, csv or tab delimited
- file formats are documented in the data management plan
- each coordinate is output as a pair of real numbers, x coordinate, then y coordinate
- for latitude and longitude real numbers, a negative number represents south of the equator and west of the Greenwich meridian respectively
- each coordinate has an associated date and time stamp “YYYY-MM-DD HH:MM:SS”
- each coordinate has an associated unique activity identifier (line, station), and fix/ping identifier if appropriate
- the data files should include as much ancillary information as necessary to assist in the subsequent processing and re-use of data, for example, vessel motion, speed and heading, water depth
- the file name should include the survey name and the reference point

Metadata (Equipment Specifications)

- positioning method
- equipment make/model
- coordinate system
- survey equipment offsets

Enclosure 3 – Echo-Sounder Crib Sheet

Documentation (may be incorporated into the Survey Acquisition Report)

- method(s) used for acquiring, processing and interpreting the echo-sounder data
- description of each item of sounding equipment, including name, model, deployment, use, and assessment of performance
- description of calibrations, filtering and corrections applied to the raw data
- statement on the accuracy of the data
- describe calibration procedures and when these were performed
- state the sound velocity used to calculate depths
- state any corrections applied to the data including datum shifts and motion compensation
- echo-sounder observer's log:
 - calibration, acquisition and processing activities
 - significant events
 - problems encountered

Data

- the entire folder structure containing the collection of files that comprise the raw and processed echo-sounder datasets acquired during survey activities in an appropriate exchange format
- if employed on the survey, the entire folder structure containing processed backscatter data and interpretations
- for ASCII format output, the processed soundings and backscatter data should be in csv or tab delimited format
- each sounding should have an associated x,y coordinate, date and time stamp, and associated unique activity identifier (line, station), and fix/ping identifier if appropriate
- file names should include the survey name and content of the file
- all echo-sounder data should be stored in the Echo-sounder equipment folder within the MultibeamAndSinglebeam folder of the pre-defined folder structure

Metadata (Equipment Specifications)

- equipment make/model
- motion compensation
- raw data format
- processed data format
- datum shift applied
- backscatter data format
- sweep
- recorded length
- scale lines

Enclosure 4 – Multibeam Crib Sheet

Documentation (may incorporated in to the Survey Acquisition Report)

- method(s) used for acquiring, logging and processing the multibeam echo-sounder data
- technical description of each item of sounding equipment, including name, model, deployment, use, and assessment of performance
- description of calibrations, filtering and corrections applied to the raw data
- statement on the accuracy of the data
- description of calibration procedures and when these were performed
- state the sound velocity used to calculate depths
- state any corrections applied to the data including datum shifts and motion compensation
- multibeam observer's log:
 - record of calibration, acquisition and processing activities
 - start and end of line
 - significant events
 - problems encountered

Data

- entire folder structure containing the collection of files that comprise the raw and processed multibeam echo-sounder datasets in the appropriate exchange format
- for ASCII format output, the processed soundings should be in csv or tab delimited format
- Each sounding should have
 - an associated x,y coordinate
 - date and time stamp
 - associated unique activity identifier (line, station)
 - fix/ping identifier if appropriate
- all calibration data files should be provided also
- file names should include the survey name and content of the file
- all multibeam data should be stored in the Multibeam equipment folder within the MultibeamAndSinglebeam folder of the pre-defined folder structure

Metadata (Equipment Specifications)

- equipment make / model
- motion compensation
- raw data format
- processed data format
- backscatter data format

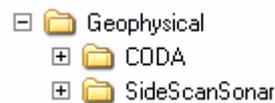
Enclosure 5 – Sonar Crib Sheet

Documentation (may be incorporated in to the Survey Acquisition Report)

- description of the equipment used for acquiring, processing and logging sonar data including the manufacturers and equipment names
- description of calibration procedures and when these were performed
- description of the processing steps applied to the raw data
- description of any corrections applied to the data
- sonar observer's log:
 - record of calibration, acquisition and processing activities
 - significant events
 - problems encountered

Data

- all coda files should be stored in a CODA folder in the proprietary folder system:



- Triton XTF files should then be created and stored in the relevant RawData sub-folder in a SideScanSonar equipment folder within the Geophysical folder
- raw and processed CODA data files should be labelled with:
BGSYYYY_n_EqipType_LineX_partAofB_originalCODAfilename

Metadata (Equipment Specifications)

- equipment make / model
- acquisition parameters:
 - sampling frequency (Hz)
 - firing rate (s)
 - deployment and tow speed
 - tow distance and depth (source)
 - tow distance and depth (receiver)
 - maximum vessel turning rate (deg/min)
- recording parameters:
 - samples per shot
 - filter HP & anti-alias (Hz)
 - record length (ms)
- processing parameters:
 - signal processing
 - fix interval (min)
 - swell
 - TVG, TVF
 - no trace mixes
 - filters (Hz)
 - digital format
 - digital logging
 - recorded length (ms)
- analogue processing parameters:
 - sweep (ms)

- line direction
 - scale lines
- Digital parameters:
 - raw data format
 - processed data format
 - navigation data format
 - SVP data format
 - CTD data format

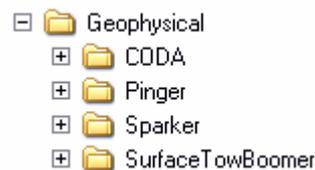
Enclosure 6 – Sub-Bottom Profiler Crib Sheet

Documentation (may be incorporated in to the Survey Acquisition Report)

- description of the equipment used for acquiring, recording and processing the seismic data including name, model, deployment, use and assessment of performance
- description of calibration procedures and when these were performed
- description of the processing steps applied to the raw data
- seismic profiler observer's log:
 - record of calibration, acquisition and processing activities
 - significant events
 - problems encountered

Data

- all coda files should be stored in a CODA folder in the proprietary folder system:



- SEG-Y files should then be created and stored in the relevant RawData sub-folder for each equipment type used
- raw and processed CODA data files should be labelled with:
 - BGSYYYY_n_EqipType_LineX_partAofB_originalCODAfilename*

Metadata (Equipment Specifications)

- equipment make / model
- acquisition parameters:
 - sampling frequency (Hz)
 - firing rate (s)
 - tow distance and depth (source)
 - tow distance and depth (receiver)
 - tow speed
 - maximum vessel turning rate (deg/min)
- recording parameters:
 - samples per shot
 - filter HP & anti-alias (Hz)
 - record length (ms)
- Processing parameters:
 - signal processing
 - fix interval (min)
 - swell
 - TVG, TVF
 - no trace mixes
 - filters (Hz)
 - digital format
 - digital logging
 - recorded length (ms)
- analogue processing parameters:
 - sweep (ms)

- line direction
 - scale lines (msec)
- digital parameters:
 - raw data format
 - processed data format
 - navigation data format
 - SVP data format
 - CTD data format

Enclosure 7 – Magnetometer Crib Sheet

Documentation (may be incorporated in to the Survey Acquisition Report)

- description of the equipment used for acquiring, recording and processing the magnetic data including name, model, deployment, use, and assessment of performance
- statement on the accuracy of the data
- description of calibration procedures and when these were performed
- description of any corrections applied to the data
- magnetometer observer's log:
 - record of calibration, acquisition and processing activities
 - significant events
 - problems encountered

Data

- the data must be available in ASCII format
- the data may be integrated with the navigation file(s) or be stand-alone
- each data point must have an associated date, time, x,y coordinates
- each coordinate must have a line/fix/ping ID if appropriate
- all magnetometer data should be stored in the relevant sub-folder in the Magnetometer equipment folder within the Geophysical folder on the proprietary folder system

Metadata (Equipment Specifications)

- equipment make / model
- sensitivity
- recording interval
- recording format
- external logging
- output format
- data medium
- meter calibration
- tow depth
- tow distance

Enclosure 8 – Gravimeter Crib Sheet

Documentation (may be incorporated in to the Survey Acquisition Report)

- description of the equipment used for acquiring, recording and processing the gravity data including name, model, deployment, use, and assessment of performance
- statement on the accuracy of the data
- description of calibration procedures and when these were performed
- description of any corrections applied to the data
- gravimeter observer's log:
 - record of calibration, acquisition and processing activities
 - significant events
 - problems encountered

Data

- the data must be available in ASCII format
- the data may be integrated with the navigation file(s) or be stand-alone
- each data point must have an associated date, time, x,y coordinates
- each coordinate must have a line/fix/ping ID if appropriate
- raw and processed gravity values and associated parameters

Metadata (Equipment Specifications)

- equipment make / model
- sensitivity
- recording interval
- recording format
- external logging
- output format
- data medium
- meter calibration
- base-tie 1 (cruise start)
- base-tie 2 (port call)
- base-tie 3 (cruise end)
- printer output
- range (mGal)

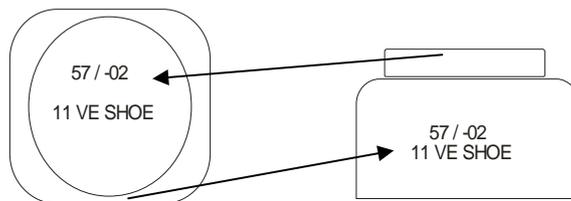
Enclosure 9 – Sample Labelling Crib Sheet

Activity Identifier (BGS Sample Number)

- activities are identified by the survey station degree square/number plus the equipment type code i.e. +54-03/21VE
- the degree square is defined by the coordinates for the south-west corner of the square
- the degree square/number does not change for each activity, only the equipment code
- in situations where a piece of equipment is used more than once the identifier is simply followed by an incremental number, i.e. +54-03/21VE₂

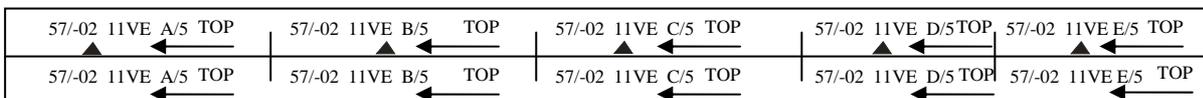
Non-core Samples

- all grab samples, shoe samples and any samples not large enough to be retained as core should be stored in a bottle or bag
- bottles should be labelled on the top and facing side with the activity identifier
- bags should be clearly labelled front and back
- shoe and grab samples should be clearly labelled SHOE or GRAB
- any sample from a core that is not a shoe must be labelled to indicate from where in the core it came i.e. TOP; base of section B, etc



Core Samples

- draw an orientation line down the length of the core and divide into 1m sections from the top of the core
- label each section (both sides of the orientation line) with the BGS Sample Number and section identifier: A/6, B/6... F/6 or A/2 and B/2 etc, where A is the top section (from the seabed)
- an arrow indicating the top should be marked on both sides and a tick at the midpoint of each section on one side of the line



- the core should be cut into the marked sections and each section capped with a yellow cap at the top and black cap at the base. 35mm tape should be tightly wound the caps
- the taped ends should then be dipped in into a wax bath ensuring the wax completely covers the tape
- when the wax is dry the cores can be split along the orientation line (if required)
- The whole core (the two splits) should be placed in a cardboard box labelled on the top and both ends with the BGS Sample Number and section identifier

Enclosure 10 – Photographing Core Crib Sheet

Set-up

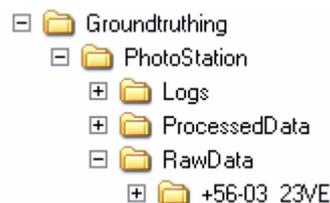
- one camera to be used only for photographing core
- greyscale/colour patch
- scale bar and measuring tape
- stand for detailed photographs
- sample identification peg board with numbers/letters

Taking the photographs

- photographs should be taken at the highest possible resolution (do not change the resolution between photos)
- clean the core
- put the activity (core) id number (i.e. +56-03/23VE) on the peg board using the white letters and numbers
- photograph the entire core with the greyscale/colour patch, scale bar and peg board
- lay the measuring tape along the length of the core section so it can be clearly seen from above
- with the camera on the stand, zoom in as far as possible to take detailed photographs of the core ensuring the measuring tape can be clearly seen in each photograph

Downloading the photographs

- photographs should be downloaded from the camera as soon as possible after photographing the core
- a subfolder should be created with the activity id number, within the RawData folder in PhotoStation i.e.



- all the photographs taken of that core should be stored in this folder
- photographs should be labelled with the unique number automatically assigned by the camera
- any poor quality photographs should be re-taken, and any duplicates should be deleted

Processing

- the detailed close-up photographs should be stitched together to form detailed whole core photographs and labelled indicating the numbers of the photographs used to create the image i.e. D0176-D0184

Metadata

- appropriate metadata should be entered into the Core Photograph Metadata spreadsheet

Enclosure 11 – Labelling Paper Records Crib Sheet

General

- all records should be clearly labelled with sufficient information to identify the record, the content of the record and the associated survey activity
- the face of the record should be labelled with timing and scale marks and appropriate notation to describe the application of print delays or any unusual or anomalous features on the record
- labels should be attached to both ends of rolled or fan-folded records
- if a survey activity is split between more than one physical record then each label should indicate this (for example, if there are 3 Sparker records for a survey line they should be labelled '1 of 3', '2 of 3' and '3 of 3')
- records should be stored in clearly labelled storage boxes
- if records are not a facsimile of the digital data stored, an uncompressed TIFF format image of each record should also be generated at the time of the survey (by scanning or 'print to file' as uncompressed TIFF format images)
- the image resolution should be 300dpi and black/white, greyscale or colour as appropriate
- the image file name should include the survey name, the unique activity identifier, the record type, and the part number (if the record is part of a more continuous data item)
- an inventory of records should be kept

Labelled Information

- line number
- equipment
- line direction
- start of line date and time
- end of line date and time
- scale lines
- annotation (fixes) to allow the data on the record to be reconciled with navigation data
- changes to fish height (sonar)
- range (sonar)
- changes to the print delay (SBP)

Enclosure 12 – Quality Control Crib Sheet

General

- ensure the Survey Metadata spreadsheet has been completed with the appropriate information
- ensure the Survey Acquisition Report is complete or as complete as possible
- ensure all data has been transferred from ships system(s) onto the hard disk(s)

Datasets

- ensure datasets are complete
- ‘flag’ poor quality data
 - such data should not be managed within the Coastal & Marine Data Management System;
 - if deemed useful for the project the data should be stored in the relevant folder with a ‘Read me’ text file indicating the data is to be transferred to the Project folder on the W drive on return;
 - if not deemed useful for the project, the data should be discarded
- ensure correct file naming conventions have been used
- ensure data has been stored in the correct folder within the BGS propriety folder structure
- ensure non BGS standard data formats are explained in a ‘Read me’ text file -the text file should describe the type of data, the software used to collect the data, and the software that can read these file types

Photograph & Video Data

- ensure all photographs and videos are relevant and useful – photographs are likely to be used in BGS publications
- discard poor quality images
- ensure all data has been stored in the correct folders: Core Photos, Video, General Photographs, Seabed Photographs within the BGS propriety folder structure
- ensure all photographs and video are correctly labelled
- ensure the appropriate metadata spreadsheet has been populated

Sample Station Data

- ensure all samples are correctly labelled
- ensure samples are stored appropriately
- ensure correct metadata has been recorded

Geophysical Data

- ensure file formats are documented
- ensure files are labelled correctly
- ensure the line summary log has been completed
- ensure quality assessment has been recorded in Survey Metadata spreadsheet
- ensure correct metadata has been recorded for each piece of equipment used

References

British Geological Survey holds the reference listed below, and copies may be obtained via the library service subject to copyright legislation (contact libuser@bgs.ac.uk for details). The library catalogue is available at: <http://geolib.bgs.ac.uk>.

MORANDO, A. 2007. BGS Management of Marine Acoustic Data.. *British Geological Survey Internal Report*, IR/07/53R.