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NATURAL ENVIRONMENT RESEARCH COUNCIL

MEDIN Feasibility Study: Archiving Oil and Gas Industry Site Survey Data

Marine Geoscience Programme

Open Report OR/10/008

BRITISH GEOLOGICAL SURVEY

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MEDIN Feasibility Study: Archiving Oil and Gas Industry Site Survey Data

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The British Geological Survey is a component body of the Natural Environment Research Council.

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Summary

This report was commissioned by the Marine Environmental and Information Network (MEDIN) to investigate the feasibility of collecting oil and gas industry site surveys conducted on the UKCS (UK Continental Shelf) for archive in the MEDIN DAC (Data Archive Centre) network.

The archive of three principle data types is explored; information about legacy site surveys, catalogues of information about data products associated with site surveys and actual site survey data, which may include a survey report and enclosures and/or a selection of data e.g. side-scan or multibeam, sample descriptions and seismic profiles.

The merits of the collection of these data types are explored alongside the cost implications, from both an oil and gas industry contractor's and a marine geoscientist's perspective, thereby enabling MEDIN to better understand and make decisions as to which data to concentrate on.

The principles and proposed procedures for carrying out the collection of these data types are outlined however the practical details of these will require agreement should any decision be made to proceed. At this stage a further thorough detailed scope will be required in order to formulate procedures, qualify numbers, define activities, identify resources and plan timescales.

The time period for the collection of legacy site surveys will require consideration i.e. how far back it is feasible to collect this information, and whether requests should be phased to include surveys acquired within predetermined time intervals.

The size of the actual site survey data holdings, the storage capacity required to archive these and the amount of work involved in processing this data into useable and useful formats will require review. Some of these issues may need to be considered on a case-by-case basis.

The procedures themselves will require regular review dependent on the response i.e. the volume, types and condition of data received.

1 Introduction

MEDIN is an open partnership of UK organisations committed to improving access to marine data. Its partners represent government departments, research institutions and private companies. There are wide benefits from working together to share and properly manage marine data which is expensive to collect and always unique in relation to time and geographical position.

MEDIN aims to achieve data sharing through the establishment of a network of Data Archive Centres which will provide secure long-term management of marine data sets. Access to authoritative marine data held in this network will be through a central discovery metadata portal.

The British Geological Survey (BGS) is an active participant in MEDIN, contributing knowledge, experience and technical expertise. BGS is operating as the MEDIN DAC for seabed and sub-seabed geology and geophysics. In this capacity BGS has commenced a programme of work in collaboration with the Department of Energy and Climate Change (DECC) to archive oil and gas industry site survey top-level metadata.

MEDIN funds the activities specific to the contribution of this DAC to the MEDIN network. BGS provide and support the IT infrastructure performing routine day-to-day DAC activities as an “in-kind” contribution.

MEDIN are ready to work with BGS to bring key data sets into the MEDIN framework. This document is a Feasibility Study commissioned by MEDIN to explore the merits of the collection of additional categories of site survey information.

It incorporates feedback received from a number of marine specialists with key contributions from Colin Graham (BGS), Dave Long (BGS) and Richard Armitage (Senergy). Senergy provide consultancy services in geohazards, geophysics, geotechnics and engineering specialising in the project management of offshore surveys, site investigation and rig positioning.

2 Overview of Activity

The DECC Petroleum Operations Notice Number 14A (PON 14a) requires Licensees to notify DECC of their intention to carry out a survey and apply for consent.

This regulation applies to oil and gas industry surveys or shallow drilling activity in the UK with particular emphasis on UKCS seismic and site surveys that form the bulk of oil and gas related survey activity.

It is a condition of consent that a closeout form must be completed for all non-landward surveys within 12 weeks of completion of the survey.

The DECC Petroleum Operations Notice Number 9 (PON 9) sets out DECC's specific requirements and Licensees' obligations with respect to the retention and provision of Licence Data.

Under both regulations Licensees are required to submit a PON 14a closeout form together with a map of the survey area and boundary coordinates to BGS for MEDIN on completion of a site survey.

On receipt of information acquired through this route BGS is liaising with Licensees to acquire metadata about each site survey which is stored in the MEDIN DAC network and delivered through the MEDIN portal. A standard Excel submission form is used in this process.

The metadata is stored in the BGS Oracle database running on a Unix server. This includes a spatial component, to manage both relational attribute data and map layers. The database systems are archived and backed up both daily and on a weekly tape backup.

Digital data files (including closeout forms and survey area maps) are stored using logical directory structures on the BGS Storage Area Network (SAN), which is managed internally by the BGS Systems and Network support team. The SAN uses a combination of nightly and full weekly backups to ensure data protection. All email correspondence are archived within an electronic management records system.

Currently the information being collected is top-level metadata for all new site surveys acquired by Licensees under both exploration and production licenses. BGS estimate collecting approximately 100 new site surveys per year via this route.

In future it is envisaged the remit of this programme of work will be extended to include the collection of the following:

1. Information about legacy sites surveys i.e. top-level metadata.
2. Details about data products associated with new site surveys.
3. Actual site survey data which may include a survey report and enclosures and/or a selection of data e.g. side-scan or multibeam. The collection of site survey data would facilitate the population of both point 1 and 2 above.

The objective of this exercise is to establish the MEDIN DAC network as the holder of a complete and definitive record of oil and gas industry site surveys conducted on the UKCS. Similar datasets exist for non oil and gas industry activities, for which licences are issued by the Crown Estate, which could also be incorporated over time.

3 Merits of the Collection of Site Survey Data

The feasibility of the collection of each of these items is detailed under the appropriate section headings in this document.

3.1 LEGACY SITE SURVEYS

This section examines the feasibility of collecting information about legacy site surveys.

BGS have been collecting top-level metadata for new site surveys identified using the PON 14a regulation since September 2009.

The collection of legacy site surveys will involve the acquisition of the same set of top-level metadata from Licensees and will require additional funding from MEDIN. BGS estimate approximately 100 site surveys are acquired by Licensees per year under both production and exploration licences.

This is likely to be most successfully achieved by a phased request for site surveys acquired within clearly defined time periods. For example Licensees may initially be requested to provide site surveys which were acquired during the period from 1st January 2005 to 31st December 2010, and which have not been previously submitted to BGS for MEDIN.

On the successful completion of this call for information a further call will be made for all site surveys acquired during the period from 1st January 2000 to 31st December 2005. Further calls will be made for surveys acquired within five year intervals. How far back in time it is feasible to make requests for legacy site surveys will require consideration.

The volume of information collected is not expected to require much storage space, but will require the ongoing use of the IT infrastructure and related support, provided by BGS as an "in-kind" contribution to MEDIN.

In order for this to be achieved the following actions will need to be carried out in addition to the activities BGS currently performs for MEDIN:

A call for information about legacy site surveys will be made to Licensees by email accompanied by the following attachments:

- A letter outlining the background to the exercise, the data submission requirements and the benefits of collecting this data.
- An Excel spreadsheet form for data submission.

The call for information will be made through a request to Licensees for a bulk submission of legacy site surveys acquired within a clearly defined time period. A blanket email will be sent to

all Licensees, with an accompanying submission form designed for this purpose and relevant documentation.

DECC maintains up-to-date contact information with Licensees through the Petroleum Operations Notice 9 (PON 9). Each Licensee must appoint a single 'focal point' to co-ordinate PON 9 compliance for their company (the 'PON 9 Coordinator'). BGS will use the PON 9 coordinator contact list to make the call for information.

Dependent on the response to this initial call, BGS will make further individual requests to Licensees via a personal email with accompanying submission form and relevant documentation attached. These will be sent to each Licensee on submission of a PON 14a survey closeout form to MEDIN. Each request will be made once to every Licensee and will be copied to the PON 9 coordinator of the company involved.

The metadata will be stored in the BGS Oracle database running on a Unix server. This includes a spatial component, to manage both relational attribute data and map layers. The database systems are archived and backed up both daily and on a weekly tape backup.

Digital data files will be stored using logical directory structures on the BGS Storage Area Network (SAN), which is managed internally by the BGS Systems and Network support team. The SAN uses a combination of nightly and full weekly backups to ensure data protection. All email correspondence will be archived within an electronic management records system.

There are a number of obstacles which are likely to be detrimental to the success of the collection of legacy site survey information:

- Licensees may have reports with enclosures for legacy site surveys and/or a selection of data e.g. side-scan or multibeam. However, surveys may be incomplete or inaccessible e.g. have components residing with individuals, contractor companies or in storage. These may not be indexed, archived or otherwise data managed sufficiently to enable their retrieval or the extraction of the metadata to be straightforward.
- Provision of legacy site survey metadata may present a significant data management overhead to companies and as there is no regulatory requirement to do so, may be treated as a low priority.

These obstacles could be addressed by offering the facility for Licensees to submit the actual site survey data, which may include a survey report and enclosures and/or a selection of data e.g. side-scan or multibeam, for archive in the MEDIN DAC network. This is covered in section 3.3 of this document. BGS have the knowledge and technical expertise to provide the data management necessary to populate the relevant legacy site survey metadata given the provision of appropriate funding by MEDIN.

In most cases the submission of legacy site survey reports for the past few years should not be a major problem. An electronic version (usually a PDF file) of the report has been a fairly standard deliverable for at least the last five years. Submission of the actual data to the MEDIN DAC network may prove to be more problematic. Many Licensees use external storage companies where fees would be charged for un-archiving of the data.

It is proposed that the facility to submit top-level metadata for legacy site surveys to MEDIN is developed. This exercise should be promulgated through the MEDIN Oil and Gas webpage. BGS will contact all PON 9 coordinators with the relevant information, and it may be beneficial if this information is sent out through DECC.

This will require the:

- Design of an Excel spreadsheet submission form for this purpose, based on the data submission form currently used for new site surveys.
- Drafting of a letter detailing the objectives, benefits and requirements for data submission.
- Changes to the MEDIN Oil and Gas webpage.

BGS already holds a wealth of legacy site survey reports from the oil and gas industry and will initiate the loading of top-level metadata from these surveys to the MEDIN DAC network. This work will be co-funded, as part of the BGS contribution to MEDIN. Consideration should be given to undertaking a review of the legacy site survey reports held by BGS to establish both the quality and quantity of this data.

It is envisaged that top-level legacy site survey metadata will compliment the existing new site survey metadata in the MEDIN DAC network. This will be made available to the MEDIN portal, and will be accessible, searchable and downloadable through the MEDIN website subject to any access restrictions or on expiry of any period of confidentiality.

3.2 DATA PRODUCT CATALOGUES

This section examines the feasibility of collecting details about the data types associated with new site surveys. The collection of these details will be in addition to the activities BGS currently performs for MEDIN and will require additional funding from MEDIN.

This will involve the request for catalogues about site survey data, rather than the submission of the actual data itself. Site surveys are conducted for a variety of purposes and generate a wide range of data types, formats and media.

Catalogues of metadata for data products will be associated with site surveys and loaded to the MEDIN DAC network. These will be made available to the MEDIN portal, and will be accessible, searchable and downloadable through the MEDIN website subject to any access restrictions or on expiry of any period of confidentiality.

Catalogues will include links to data repositories together with key contact details in order to facilitate any requests to access the actual site survey data.

Licensees are currently required by the PON 9 regulation to submit catalogue submissions to DECC for seismic data associated with surveys they have acquired. In collaboration with DECC the PON 9 regulation could be amended to include a request for the submission of data catalogues for site surveys to the MEDIN DAC network.

On receipt of a new PON 14a closeout form for a site survey BGS requests the completion of an Excel spreadsheet submission form. This form captures top-level metadata about the survey which is loaded to the MEDIN DAC network. BGS will adapt this submission form to include a worksheet to capture metadata about the data products associated with each survey.

This worksheet will include fields such as:

Product Type	Type of data product constrained to a drop down list. The main product will be the survey report; with the exception of high resolution seismic data other data may be unprocessed i.e. raw or have undergone various stages of processing.
Data Format	File structure standards e.g. UKOOA P1/90, SEG-Y, constrained to drop down list. However, this will prove impractical where for example, side-scan data can be in around 20 different file formats, some of which are proprietary formats from specific contractors which can change/be replaced over time. Also within each format of side-scan there are numerous corrections that may or may not have been applied to the data (e.g. navigation, bottom tracking, slant-range, speed correction etc). There are no true industry standards for side-scan sonar, sub-bottom profilers, magnetometer or bathymetry data. There are also no standards for how navigation and motion correction is applied to the different types of data, often this is simply done in playback whilst interpreting and will not be recorded with the data.
Creation Date	Year in which the product was created
Media	e.g. PAPER, DIGITAL TAPE 3590, DIGITAL CDROM, constrained to a drop down list
No of Pages	Applies only to non-digital MEDIA, not applicable where survey data is on rolls rather than pages.

This will require the:

- Re-design of the existing Excel spreadsheet submission form to include a worksheet for data products.
- Revision of the existing DECC letter detailing the objectives, benefits and providing detail on data submission.
- Update to the MEDIN Oil and Gas webpage to reflect the change in submission requirements.
- Design, development and implementation of a database table to hold data products.

Consideration should be given to:

- Clarifying and defining the types of data available for site surveys.
- The time-scale whereby information about the data for a survey becomes available, and whether this coincides with the PON 14a survey closeout.

The metadata will be stored in the BGS Oracle database running on a Unix server. This includes a spatial component, to manage both relational attribute data and map layers. The database systems are archived and backed up both daily and on a weekly tape backup.

Digital data files will be stored using logical directory structures on the BGS Storage Area Network (SAN), which is managed internally by the BGS Systems and Network support team. The SAN uses a combination of nightly and full weekly backups to ensure data protection. All email correspondence will be archived within an electronic management records system.

The main product of a site survey is the final report. The data that the Licensee receives and archives is not strictly speaking a product as this may have undergone various stages of processing, or no processing at all i.e. raw data. The only data that is provided in a standardized format is high resolution seismic data which will be in SEGY format.

For this reason it may not be feasible to request catalogues of information about data types for site surveys. However, the provision of a facility whereby Licensees can archive actual site survey data within the MEDIN DAC network would expedite this. This is covered in section 3.3 of this document. The data management involved in extracting the required metadata for data types associated with site surveys would then be carried out by BGS who have the necessary knowledge and technical expertise to undertake this work, given the provision of appropriate funding by MEDIN.

3.3 SITE SURVEY DATA

This section examines the feasibility of collecting actual site surveys which may include a survey report and enclosures and/or a selection of data e.g. side-scan or multibeam, sample descriptions and seismic profiles. The collection of this data will be in addition to the activities BGS currently performs for MEDIN and will require additional funding from MEDIN.

The facility exists to archive site surveys within the NHDA (National Hydrocarbons Data Archive), and data have been archived through this route. The PON 9 regulation and the NHDA Data Management Handbook were updated in February 2010 to include details of the procedures for archiving site survey data in the MEDIN DAC network.

The NHDA is the primary, long–term data archive for the geoscientific legacy resulting from UK offshore oil and gas exploration and production activity and is operated by BGS under an agreement with DECC. The data are made available from the archive at low cost to the public for commercial projects and academic research.

DECC requires as part of the PON 9 regulation that certain types of site survey data must be retained as Licence Data in perpetuity. These are:

- High resolution, multi-channel, 2D and 3D seismic data acquired to determine drilling hazards (e.g. to detect shallow gas) during site surveys.
- Site survey reports for wells (but not the actual survey data)

Relief from this obligation can be gained by archiving this survey data within the NHDA using the seismic surveys process.

All other types of site survey data can be disposed of once they are no longer of interest to the Licensee. DECC recommends that Licensees offer any such data to MEDIN (either directly or

via the NHDA) for archiving as part of the disposal process, at any time after the acquisition of the data. MEDIN will then archive this data within its network of DAC's.

However, there is no obligation on the Licensee to comply with this request. This is a voluntary process for both parties, a Licensee does not have to offer the data and MEDIN and its DAC's are not obliged to accept all or part of the data being offered.

There is currently no Archive Endowment Fee payable (although the Licensee will have to pay the shipping costs). In addition MEDIN and its DAC's are not obliged to store the data in perpetuity. If MEDIN and its DAC's decide at some point in the future that it no longer wishes to archive the data, it will be offered back to the provider before disposal.

Unlike the archive process for other types of Licence Data, the data do not need to be on modern media or in digital format (although this is preferred). Acceptance of data in whatever format and media is done on a case-by-case basis by the appropriate DAC on behalf of MEDIN.

The criteria for acceptance in order of priority for BGS operating as the DAC for seabed and sub-seabed geological and geophysical data are:

1. All data are in digital format and on modern media.
2. Selected data that will augment the existing BGS collection of geological and geophysical data in the geographic area.
3. Selected data that are higher resolution or better quality than the existing data in the BGS collection for the geographic area.

Further details can be found in the NHDA Data Management Handbook.

The establishment of the MEDIN DAC network as the definitive archive of site survey data where there is no obligation for Licensees to retain data in perpetuity eliminates data management costs to the Licensee and increases data availability. A Licensee can dispose of site survey data via MEDIN whenever they archive a well or a Licence with the NHDA, or at any other time.

This provides the means to extract top-level metadata for legacy site surveys and create catalogues of information about data types. BGS have the knowledge and technical expertise to provide the data management necessary to undertake this work in addition to the activities BGS currently performs for MEDIN, given the provision of appropriate funding by MEDIN.

From the oil and gas industry contractor's perspective the archiving of site survey data is likely to prove problematic and require considerable input from Licensees whilst providing little benefit over that of archiving the survey report. This is because there are many different formats and the data is not provided as a standardized product. Archived data of this nature would require considerable explanation of the data set and any processing undertaken for it to be of use.

For example, although a bathymetry XYZ file is fairly standard it is of little use without knowing whether it has been tidally corrected, and if so whether observed or predicted tides were used,

what datum it is referenced to, what type of gridding was used, what grid-cell size was used etc. For most data formats there is no way to record in the data itself this sort of information. An additional processing report would be required alongside the data.

Some of the data will not be useable as it is recorded in proprietary formats that are no longer readable without the specific software used to record it. Often this software will only be available internally to the survey companies and will not be available on the open market.

An attempt to establish standards and requirements for data to be submitted in specific formats would require a massive change in the way site surveys are acquired and interpreted and would have significant cost implications for the industry.

From a marine geoscientist's perspective, the XYZ datasets derived from multibeam surveys, even if not supplied with details of the tidal corrections or datum's applied, are valuable sources of information on the geomorphology of the seabed. This allows accurate mapping of bedforms, recognition of active sedimentary processes and guides habitat mapping.

However, details of datum's and positioning systems used are usually given within the survey report and together provide an enormous step forward in understanding the regional environmental setting. The absence of processing information from the public domain ensures that precision information upon which economic decisions are made is not freely available.

Conclusion

The final product of a site survey is invariably a report. The Licensee will often not look at the data in its raw or processed form, all processing and interpretation being carried out by the survey contractor. With the exception of high resolution seismic there are no standards for data sets, and these exist in many different formats and states of repair. The majority of Licensees use external storage companies and fees would be charged for un-archiving the data for submission to the MEDIN DAC network.

Additional costs may be involved in acquiring data to provide for free to others, and this combined with issues of confidentiality and the lack of control over the data once it has been submitted to the MEDIN DAC network may deter Licensees from participating in this exercise. From an oil and gas industry perspective, the most feasible method of retaining information regarding site surveys is likely to be through the collection of survey reports, rather than through the actual data.

In the field of marine geosciences, site survey data are valuable sources of information on the geomorphology of the seabed, even without details of the processing and interpretation carried out. This allows for the accurate mapping of bedforms, recognition of active sedimentary processes and guides habitat mapping. From this perspective the collection of the actual survey data, is as valuable as the information contained within the survey report. However, although bathymetry data is almost universally gridded to an XYZ file as a standard deliverable, some types of data such as side-scan sonar, sub-bottom profilers, magnetometer etc may exist in a form which is unreadable without the specific software used to record it.

The collection of the actual site survey data will have cost implications in terms of storage. It is likely that many terabytes of information will be generated each year in addition to the hard-copy data which will require substantial storage facilities. Consideration should be given as to how these costs will be met given that free, long term storage of this information is now being offered to the industry, subject to acceptance criteria. These costs are expected to be met by MEDIN, but agreement is required from BGS, operating as the MEDIN DAC for this data type, before site survey data will be committed to long-term storage.

The confidentiality of all information collected must be considered and will impact on its use and disclosure. Any period of confidentiality must be clearly and formally established on receipt of the information, together with any access or use restrictions. Confidentiality will be determined by any regulatory period relating to the survey release and in consultation with the Licensee. A lengthy period of confidentiality may impact on the validity and therefore the usefulness of the information. Any limitations on the access and use of each dataset together with the date on which any period of confidentiality is deemed to have expired will be recorded in the MEDIN DAC network. These will be used to restrict access and regulate the provision of information. The IPR of all data will continue to reside with the Licensee.

The benefits of the collection of the items which are detailed in the three sections of this document are:

- The provision of a complete and accurate MEDIN ‘register’ of UKCS site surveys.

- The provision of one principal source of site survey data, which can be shared by industry and Government bodies.
- Free, long-term and secure storage of data
- The preservation of data for posterity
- Wide and effective promotion and publication of data, subject to access restrictions and once any period of confidentiality has expired
- More efficient use of time and resources
- The ability for BGS to update and provide the best available seabed geology and shallow geological models
- Ready access to data for new uses such as renewable energy technology, aggregate mining, Carbon Capture and Storage (CCS)
- A reduction in costs of future site surveying and other offshore infrastructure location
- A reduction in repeat surveying. Although this will be relatively small as much site survey data is time limited (particularly seabed information) therefore new surveys over the same area are frequently required. That data which is not time limited is routinely re-used already as it belongs to the Licensee.
- As marine spatial planning increasingly impacts on the effective use of the seas around the UK, the presence of data or access through a standard portal will improve the speed of evaluation.

The MEDIN site survey initiative is seen as a pilot approach to industry, and proposals to extend the programme to other offshore industries in the future will help to improve the availability of good quality data across more areas. This is a demonstration that industry and Government can work together to reduce costs and provide added benefits through the sharing of data. By establishing one principal source for the sharing of this information the MEDIN DAC network will benefit the industry stakeholders submitting it, as well as the scientific sector.

Appendix

DEFINITIONS USED IN THIS DOCUMENT

DAC	Data Archive Centre, a MEDIN accredited archival organisation, part of the network of MEDIN DAC's, specialising in certain data types.
DECC	Department of Energy and Climate Change (split from BERR, formerly DTI, in 2008).
Licence Data	Records relating to activities conducted under or pursuant to Exploration Licences and Production Licences, which the Secretary of State has requested, or would be entitled to request, from Licensees pursuant to applicable Model Clauses.
Licensee	A company who is party to an Exploration Licence or a Production Licence with the Secretary of State.
MEDIN	Marine Environmental Data and Information Network is a partnership of UK organisations committed to improving access to marine data.
Metadata	Data about data. A good Metadata record enables the user of a dataset or information resource to understand the content they are reviewing, its potential and its limitations.
NHDA	National Hydrocarbons Data Archive, operated by BGS under agreement with DECC, to accommodate the geoscientific legacy from UK offshore oil and gas exploration and production activity. It forms part of the BGS National Geoscience Data Centre (NDGC), the BGS long-term national archive of geoscience data for the UK onshore and offshore area.
PDF	Portable document format. A file format created by Adobe Systems for document exchange.
PON 9	Petroleum Operations Notice 9. A regulation outlining the record and sample requirements for seaward surveys and wells issued by DECC.
PON 14a	Petroleum Operations Notice 14a. A regulation for the application and consent to carry out oil and gas surveys and shallow drilling issued by DECC.
PON 9 Coordinator	A focal point nominated by a Licensee to co-ordinate that company's compliance with the requirements of the PON 9.
Site Survey	A survey of a limited area proposed for drilling, infrastructure emplacement etc. There are two types of site survey. A site survey using a small (<200 cubic inches) towed airgun array is considered to be a high-resolution seismic site survey. A site survey that does not use an airgun array is considered to be a seabed survey.

4 References

The National Hydrocarbons Data Archive Handbook. Version 3.1 is available at: http://www.bgs.ac.uk/nhda/docs/NHDA_HandbookVersion3_1.pdf.