

HIGH QUALITY CORE IMAGES FROM UK CONTINENTAL SHELF

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INTRODUCTION

High quality images of the core from most of the wells drilled on the UK Continental Shelf, North West Europe, are now available for free on the British Geological Survey (BGS) website at:

www.bgs.ac.uk/data/offshoreWells/wells.cfc?method=searchWells



QR Code.

These images have been taken as part of the quality assurance process during the transfer of the core from the BGS Gilmerton Core Store in Edinburgh, Scotland to a new extension to the BGS Core Store in Nottingham, England. Each core box has been photographed with a high resolution camera (approximately 40 million pixels).

The core collection has been created under the Petroleum Act 1998, and the previous legislation that this act replaced. The act requires that a third cut of any core, and a proportion of the washed chippings, are deposited with the Department of Energy and Climate Change (DECC). The BGS manages the core collection on behalf of DECC. The collection comprises 174,000 boxes of core and chippings. New additions to the collection are held in confidence for a period, and can then be examined by any interested party.

The new core images will make it easier for commercial and academic users of the collection to assess which cores they wish to examine. The images can be viewed on line or supplied to an organisation as a complete collection under a free license. It is expected that a range of products, services and educational packages will be created by commercial organisation who will add value to the images supplied.

ORIGIN OF THE COLLECTION

The collection was created under The Petroleum Act 1998, and previous legislation that the act replaced. Under the act companies who have been granted a license are obliged to hold accurate records in order to preserve all information about the geology of the license area. A license holder

has exclusive use of the data for a defined period. DECC Petroleum Operations Notice 9, widely known as PON 9, explains how the data and samples are to be made available by a range of organisations.

PON 9 requires that a representative set of cutting samples should be supplied to BGS. These should be washed and dried samples, depth labelled, which were collected whilst drilling the well at selected intervals. Wherever possible each sample is to be at least 100g weight, but ideally larger, especially from Exploration and Appraisal wells. Licenses must also supply a slabbed core. This should be cut from all cores and a continuous vertical section comprising at least the full width of the core, enough for a standard poro-perm plugs to be taken.

The resulting collection comprises approximately 172,000 boxes of curated core and cuttings. There are approximately 125,000 boxes containing one or more core slabs and approximately 47,000 boxes containing cuttings. Most of these are held in kraft-lined board core boxes 100 x 12.7 x 15.25 cm., although some older material is held in a variety of either wooden or plastic trays.

Over the years the collections have been stored in a number of different locations including the Leeds area and four locations in the Edinburgh area. It should be noted that no special protective measures were in place to mitigate potential damage to core integrity during any previous transportation, including from seaport to store.

PHOTOGRAPHY PROCEDURE

It is accepted that photographs of well sampled archival core slabs, up to 40 years old, are unlikely to equal the quality of photographs of clean slabs of core from recent wells. Nevertheless, a full set of high resolution core photographs, documenting its present condition under standard photographic conditions, forms a major asset. As there was no requirement to photograph the core when it was originally collected, this project has created the best available option. The photographs also form a key part of the project QA process, and will assist BGS in monitoring visitor use in the future and reducing invasive sampling.

To eliminate potential degradation at this stage of the process, no attempt was made to clean the core (this decision was taken after discussions with commercial core repository experts). Core sealed in plastic was photographed as is and was not opened. This provided additional protection during transport. These cores will be re-photographed when opened for a visitor.

The whole photography process was controlled by a BGS software application linked to the existing borehole database. The photography procedure used six steps:

1. The core boxes or trays were selected from the shelves according to the transfer schedule, packed on caged pallets and moved to the photography station.
2. Where core boxes contained inner boxes, the outer box was opened, and the inner boxes removed, opened and placed in order on the photographic jig at the start of the conveyor. Otherwise the box or tray is opened and placed on a jig. There were two sizes of jig – one to accommodate trays and the other to accommodate core boxes. The jigs were vac-formed in grey plastic.
3. The camera operator scanned the barcode on the box end, which allowed the well number, core number(s) and top and bottom depths and core box number (taken from the existing database) to be displayed on a small horizontal flat screen forming part of a fixed panel

adjacent to the conveyor and fixed to the camera/lighting array. This fixed panel also included a Q-13 Kodak Colour Separation Guide and Grey Scale.

4. The jigs were stopped in the same position under the photographic gantry and against the data panel, where they were imaged with a Phase One P45+ camera: an ultra-high resolution camera (7216 x 5412 pixels, i.e. ca. 200 dpi at 100% size for a 1 metre x 0.6 metre core tray) achieving 1 frame per second. The camera was linked to and controlled by a high specification PC. The image files were written to the PC in RAW format and automatically renamed with the core box number. They were then automatically backed up to a BGS server off-site.
5. The Phase One camera forms part of an ICAM Guardian System™ as used by a number of archives around the world.
6. The images were then post-processed to JP2 format and linked to the database for easy viewing.



BENEFITS OF THE PHOTOGRAPHY PROGRAMME

The following benefits arise from the core photography programme:

1. The primary purpose of the core photography programme was as part of a monitoring programme to ensure that the cores were not damaged in transit. The photographs taken before the cores were transported from Edinburgh to Nottingham were reviewed against a random sample of cores that had arrived in Nottingham.
2. The photographs form a baseline that will be used to monitor the core condition in the future. BGS is unable to assess past damage to the core through several moves and frequent examination and sub-sampling, because no systematic photography was done at the time of collection.
3. The resource will provide the opportunities for users of the BGS core store in Nottingham to assess the core before their visit. They can decide whether the core looks as though it will provide the answers to their questions.

4. A number of University Departments use the core store in Nottingham to run core workshops for post-graduate courses. The photography will provide opportunities for departments to develop teaching tools in addition to the core workshops.
5. A number of organisations are planning to link their systems to the core photographs, or take copies of the core photographs to embed within their existing systems, to provide additional services to their customers. This provides the opportunity for the resources to assist in creating real economic impact by aiding the discovery and exploitation of oil and gas resources on the UK Continental Shelf.



ACKNOWLEDGEMENTS

I would like to acknowledge the hard working team who have photographed, packed and moved over 172,000 core boxes and taken approximately 125,000 core images in less than 18 months.

REFERENCES

British Geological Survey 2012. Gilmerton Core Sample Collection: Keyworth Transfer Methodology. www.bgs.ac.uk/downloads/start.cfm?id=1899

Department of Energy and Climate Change 2010. Petroleum Operators Notice (PON) 9 <http://og.decc.gov.uk/assets/og/pons/pon-09.pdf>