



Gilmerton Core Sample Collection:
Keyworth Transfer Methodology
Feedback Review
December 2010

All key comments relevant to the core transfer methodology have been categorised and summarised below. BGS replies are included as appropriate.

1. Core fragility and trials

- **Having reviewed the Gilmerton Core Sample Collection: Keyworth Transfer Methodology it is clear that a thorough and authoritative approach has been taken in constructing the guidelines and principles for moving samples from Edinburgh to Gilmerton. The detailed processes for photographing, archiving, assessing, stabilising, repackaging and palletising the samples summarised appear sound and are in line with standards I have observed in core stores globally.**

- **The photographs of your trial runs appear to be reasonably convincing.**

However, I would like to see the photographs that were taken of the first trial run.

The first trials were of coloured gravel and thus not representative of the Gilmerton cores – they were intended to measure the typical vibration levels for various forms of transport. The first representative trials were without packaging and examples were included in the transfer document appendix.

- **I am impressed by the care which you appear to be taking with the more fragile material but I would not be wholly convinced until I had seen this care being taken under the pressure of time that the real exercise will demand. There is at least as much risk to the integrity of the core through the manual handling that will take place at Gilmerton before the material is load to HGV.**

The quoted times for photography, addition of protective packaging, and palletisation include a significant contingency allowance and the 18 month timeframe will not start until the systems are fully operational and proven.

- **The procedures document mentions Forties sandstone, but Eocene sandstones are more likely to be sensitive. I suggest that you consult the operators of the Alba field to discuss their experience of core handling. You may want to consider the air cushion vehicle option as standard for such core material.**



We have flagged up all Tertiary strata as potentially fragile. This is a helpful suggestion which we will follow up. The budget includes provision for the use of an air cushioned vehicle when necessary.

- **At the recent meeting held at the Scottish Parliament, the BGS Director said that if the results of the trials were unsatisfactory this would constitute a move stopping development. I would suggest therefore, that if those who like me are sceptical about the safety of the cores during transport are to be in any way persuaded, then these results should be made fully available**

The results of the trials have been made available in the transfer document appendix. Once the transfer commences, the QC results (including representative “before” and “after” photographs) will also be made available as they are generated during the project.

- **How is the integrity of the core being ensured and monitored - will the core be photographed before removal from Gilmerton and after it arrived down south and then visually inspected? What contingency is in place in the event of it becoming obvious that the core is being damaged during the removal process? To that end, Can you confirm that all the trial runs to date have been successful?**

All the core will be photographed before leaving Gilmerton and on arrival at Keyworth, a representative selection of boxes will be re-photographed and the results put on the web. Please see the methodology document for full details of the photography and QC processes. If it becomes apparent that core is being damaged, transport of that particular type of core will be immediately halted until a solution is found. To date, trials with the correct packaging have all been successful – some of those without suffered damage. The budget includes provision for the use of special air cushioned vehicles for the more fragile material when necessary.

- **I am pleased to see that the BGS has published photographs of one of the core move trials, but would like to suggest that all of the proposed core packing methodologies are trialled with vibration checks on dummy material to establish best methods and operating envelopes prior to a cautious test of real material.**

Additional tests are in progress with a vibration table.

2. Core processing timings, throughput and deadlines.

- **The Advisory Board should witness time trials to ascertain an estimate for the length of time that it will take to move it all and see if the remaining time of the 18-month period announced in the summer is realistic or not? If it is not, then what measures will be undertaken to ensure it can be moved safely in that timeframe without damage to the rock? What back-up plan is in place if the transfer proves unworkable and the time frame slips badly?**

The 18-month period will start when the core transport working group endorse the methodology, with any changes following the public comment, and the packing team is fully operational at Gilmerton (it is currently working at the BGS Loanhead core store). This is expected to be January 2011. Whilst the 18 months includes significant contingency

allowances, if the time frame slips, overtime may be worked. A limited extension would also be possible. On no account will the move be rushed and the methodology ignored.

- **Despite your detailed documentation regarding the ideal methodology you have devised for the movement of the core, there can be no guarantees that these processes will be adhered to once it is realised just how long the process is going to take and corners have to be cut. Originally there were 18 months to complete the move now it is nearer 14 when holidays are taken into account. How does that affect your time per box?**

The 18 month transfer process starts when the Gilmerton Core Transfer Advisory Group confirms that it endorses the transfer methodology in the light of the comments received, and the packing team is fully operational at Gilmerton (it is currently working at the BGS Loanhead core store). This is likely to be January 2011. The calculations are based on a standard year of 212 working days and therefore include holidays and typical sick leave.

- **There does not appear to be any back-up plan if the transfer proves unworkable and the time frame starts to slip. There is a very real possibility that if targets are not met your team will come under increasing pressure to catch up and that the safety of both the archive and personnel could be compromised. My greatest fear is that we end up with one of two worst case scenarios, either the remaining cores are effectively vandalised in an effort to complete on time or we have the archive divided between Gilmerton and Keyworth at the end of the budget and with little hope of re-assembling it.**
- **Given the tight timeline for transfer of all material, I find it very hard to see how the thorough approach recommended can be executed on all of the samples and would recommend a timed set of trials to establish whether all of the core can be transferred on time and in budget. If that can not be established, then there would of course be a risk that not all core would be in one location when time/budget is exceeded. Using information in the Tribal Report, and basing resource/time in either number of items (179892) or approx total feet core (= c.300000 standard core lengths; although I am aware some are not standard 3ft sticks), the amount of time allocated to each item does not exceed 0.01hrs (36 seconds) based on one member of staff. Resourcing 4 full time staff (no holidays/downtime) provides only for 2 minutes per item. This is barely enough to retrieve each item from storage, certainly not enough time to open and assess the condition of each box. Photographing, archival and repackaging within this tight timeline is unobtainable.**
- **The result of this time pressure may either be substandard delivery, endangering the condition of the core, or unsafe handling in the rush to complete an unobtainable target, and thus endangering the individuals involved.**

The 171,965 boxes include 47,119 boxes of cuttings which will not be opened or photographed. The 124,846 boxes of core allows 1.15 minutes per box per person over the 1.5 years, allowing for holidays and reasonable illness. With a team of 5, this represents 5.7 minutes per box. We have trialled collecting the core from the shelves and this can easily be done in 1.15 minutes per box. Likewise the photography will take less than a minute per box as all the metadata is generated automatically from the barcode (all barcoding already

completed). Palletising the boxes takes less than 18 minutes for 18 boxes, even allowing for assembling and attaching the cages to the pallets. The addition of stabilising packaging might take longer than a minute with some complex boxes, but the conveyor system will allow for a second operative allowing 2.3 minutes per box, which with pre-cut components appears to be achievable.

- **I am sceptical about your ability to carry out this exercise in the time frame that you envisage. Until there has been a trial of the full procedures, using the actual personnel to be involved, over a sustained period of several days at least, can you have any idea that it will really work as you imagine. Until that test has been convincingly passed, then the viability of the exercise is, in my view, unproven. Cutting corners will not be an option for the sake of both the core and of safety.**

The quoted times for photography, addition of protective packaging, and palletisation include a significant contingency allowance and the 18 month timeframe will not start until the systems are fully operational and proven. Early tests and timings support our calculations and a modification to the photography procedure suggested by the Core Transfer Working Group has speeded the process. (Instead of using pre-printed cards with well/core information, the core box barcode is read and the information is automatically displayed on a screen against the core samples). Should the transfer fall behind, there is ample scope for increasing output using additional staff and/or working overtime.

- **I am impressed and appreciate the trouble that the BGS has taken in assessing 'appropriate' methodologies for the proposed transportation of core material from Gilmerton to Keyworth. Whilst I can accept that the methods outlined in the document are generally 'fit for purpose', I have trouble with the proposed timeline, which has been highlighted as highly ambitious to the point of being totally unrealistic by many individuals and bodies, including the Petroleum Group. I think that the geoscience community may be able to accept a certain amount of slippage as long as up front guarantees are given that the project, once initiated, will be financed until its successful conclusion, and that an adequate number of sufficiently trained individuals will be employed to take the utmost care of the core material.**

The methods used are only possible because of the quality of the associated metadata – rarely available elsewhere. The BGS is committed to the project which will be financed to its successful conclusion.

- **I am unimpressed by comments in the published documents that maintain BGS has 'considerable experience' of transporting cores, the real situation being that BGS is very much a bit player with limited experience of large scale core transportation when compared to companies operating on a world-wide basis. I have previously mentioned two individuals with core companies as being individuals locally available and knowledgeable but, having spoken to them both recently, am somewhat disappointed that no-one from BGS has taken the trouble to contact either of them. One in particular has recently and successfully undertaken the transfer of a large core archive into a new core store in Aberdeen and his comments would be useful to say the least. There are many aspects of the logistics involved in such a move that only become apparent once it is in progress but**

which, without prior consideration, will significantly impact both the safety of the transfer and the time taken to accomplish it.

Certain commercial core companies have experience in the worldwide transportation of fresh core, but BGS has considerable experience in transporting historical cores, particularly of the Gilmerton type. A member of the Gilmerton staff was in touch with two commercial core companies during the planning stage of the transfer exercise and their comments have been noted.

3. Core photography

- **The claims relating to the photography sound fine although the value of core photographs where the core has not been cleaned and depths are impossible to determine (especially in the older wooden and plastic boxes where depths are marked on the reverse of the core pieces) is very limited. The photographs are just a means of demonstrating what condition the core was in prior to leaving Gilmerton and not an archive that will be of much use to the industry (cf NPD archive).**

The photographs are primarily a record of the condition of the core prior to leaving Gilmerton, and will play an essential role in the QC process when compared to photographs of a random subset of cores on arrival at Keyworth (see transfer document for full details). Photographs of the "Gilmerton cut" – old, subsampled, quarter-cut core – are unlikely to be as good as the operators' original images of fresh half cut core, and the BGS fully supports the current DECC/CDA initiative to assemble a collection of operators' original core images. Nevertheless, a complete set of high resolution images taken under uniform lighting should help users plan their visits more productively. The NPD archive is not complete, and is of variable resolution and quality.

- **The trialling and attention to detail is impressive, as is the procedure for photographing all cores. One issue seems to have escaped discussion. That is, for UKCS cores it has been standard procedure for many years for Operators' contractors to photograph newly slabbed cores. These photographs are normally of very high quality. From personal experience, I know that repeat photographs of old stored cores will never achieve the same quality.**

The BGS agrees with your comments and is actively working with DECC and CDA to establish a collection of original images.

4. Publishing timetables of core transfers

- **An initial timetable should be provided at least two months in advance of the scheduled start of the move.**
- **We are very unhappy that you have reverted to the idea of moving material in order of original accession. This will inevitably lead to huge inconvenience for anyone carrying out a multi-well study where the constituent wells may have been drilled over a number of years. It is inevitably going to mean that such studies will be split between two locations and we surprised that you have not followed the**

suggestion that material be moved in batches determined by geographic location and stratigraphy.

The idea of moving wells in batches determined by geographic location seemed to have a number of advantages and was thoroughly investigated. It was concluded that the work involved in selecting runs and individual boxes from numerous different parts of the store would slow the operation down so much as to be unworkable. Instead, the current system was adopted whereby teaching cores and any cores currently used for academic research would be held to the last. All other material would be transported in sequence, except that where a visitor wished to view material likely to be spread between sites, when we will be happy to discuss holding material back or fast tracking samples as appropriate. We will post on the BGS website indicative transport dates for all the cores and samples and provide more detailed monthly schedules. We are also in discussion with UKDEAL to see whether a location flag can be added to the public core database.

- **I would also suggest that you make known a deadline before which suggestions can be made on which cores should be held back to aid users with logistics over the next 18 months plus. There are a number of university research projects taking place over the next three years that I am aware of which have a potential requirement/preference for core material to be available in Gilmerton. A request for input on this should be made available to the wider academic community through as many publications as possible.**

A useful suggestion which we will adopt.

5. Conservation issues

One specific point I have relates to Section 4.3.h. (Conservation issues). In addition to pyrite, I have seen a number of examples of cores where salt has leached/precipitated out of cores (notably the Triassic of the Central Graben, but presumably also in other intervals) to the point that damage has started to occur to the integrity of the material. I assume that this is due to fluctuations in humidity, but it would be worth noting for examination and documentation by the curators.

The opportunity presented by the first 100% core examination, consequent on the core move methodology, will be used to flag up a variety of conservation issues which will be attended to by the onsite conservator at Keyworth. Such facilities have never been available at Gilmerton.

6. Location

- **Keyworth is a difficult place to get to and the location will be a great inconvenience to users, especially those based in Scotland.**

The BGS Keyworth core store is not difficult to get to – it well located on the motorway and trunk road network (M1, M42, A46, A50, etc). It is 16 miles from East Midlands airport – ca. 30 minutes by taxi – and 20 miles from Newark North Gate Station on the main East Coast line - ca. 35 minutes by taxi. (The BGS Gilmerton core store is 14 miles from Edinburgh Airport, but the journey time can take significantly longer than 30 minutes at rush hour.) Easter Airlines currently run three flights a day each way between Aberdeen and East

Midlands and total travel times are very similar to rail travel between Aberdeen and Edinburgh.

- **The staff at Keyworth are not experienced at coping with large numbers of visits, so staffing up will be required at Keyworth in order to cope.**

Two additional staff will be recruited as the number of visits to Keyworth increases.

However, the mechanised handling system and the moveable bench system mean that the Keyworth staff can operate significantly more productively.

- **Gilmerton has the capacity to cope with new core material for another 20-30 years but Keyworth will be almost full by 2012. How does building an extension save money?**

After the migration of all material from Gilmerton and Loanhead, the Keyworth core store is currently estimated to have an additional 15 years spare capacity.

- **What is the capacity of the new core store in Keyworth vis a vis the total volume being moved there from Gilmerton? How much physical space will there be for new core once the Gilmerton Archive has all been transported?**

The new store at Keyworth can accommodate the entire contents of the Gilmerton and Loanhead core stores plus an additional estimated 15 years of spare capacity.

7. Teaching Resources

- **Students from the Edinburgh and Aberdeen universities will be especially hard hit even though you are making a token gesture in providing them with some core. Where are they supposed to view the core once Gilmerton is closed?**

The BGS has been provided with a list of the cores desired for teaching by Scottish Universities, and is in contact with the appropriate operators in an attempt to secure core cuts. The material will be housed on the ground floor of one wing in Murchison House, and made available for study in a laboratory of similar size to the combined labs at Gilmerton.

8. Manual handling & mechanised handling concerns

- **Health and safety is a red herring and not an issue. Very few days have been lost at Gilmerton through injury.**

Health and safety is a real issue for staff engaged with core handling, and BGS has a legal obligation to follow HSE guidelines in minimizing risk. Health and safety is much more than days lost through injury – it is ensuring that staff remain fit and healthy and can look forward to a long and active retirement. BGS management is required to be proactive in designing safety in and the manual handling of heavy core boxes from high up and low down in relatively narrow aisles (i.e. requiring a twist action) is a matter of great concern, which has repeatedly been identified as an issue in the past.

- **One of the industry leaders in core storage has abandoned mechanised handling as they have far more accidents (including deaths) from core falling from pallets than they have from manual handling.**

The BGS has 175 years experience in the storage of geological samples. It uses caged pallets throughout its Keyworth store, with core and samples stored in rigid kraft-lined core boxes. In the 25 years that it has operated this system it has not had a single case of material falling from a pallet.

- **Mechanised racking is prone to breakdown and this will be a great inconvenience to users when core cannot be retrieved for a number of days whilst repairs are being undertaken.**

Advice from other users of system adopted suggest that it is reliable if regularly serviced and that in the rare cases when a breakdown occurs, the racks can usually be operated one at a time.

- **There is no clear reason why moving material in high-rise pallet stores is inherently safer than manual lifting of individual boxes and, it seems to me that the Keyworth system has much more potential for a really serious incident compared with the likely minor nature of any incident at Gilmerton.**

The HSE is currently placing considerable emphasis on manual handling and in particular the need to avoid lifting from near the ground or from high up. The Keyworth system removes the need to do any of this.

- **Have the HSE risks of the move itself have been factored in to the overall risk assessment? Having a very busy team working under pressure at Gilmerton must, itself, carry more risk than very many years of normal operation at either Keyworth and Gilmerton.**

A full manual handling risk assessment has been carried out and the appropriate steps taken to mitigate the risks.