



Efficiency and Effectiveness of Government-sponsored Museums and Galleries

Measurement and Improvement

Collection Storage Excellence Study

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DCMS Review of the Efficiency and Effectiveness of the Government-sponsored Museums and Galleries

Appendix C : Excellence Studies – Collection Storage

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Section 1: Executive Summary

This Excellence Study on Collection Storage is not intended to summarise the extensive literature available on standards and guidelines for all aspects of collection storage, for most collection types. It is not, therefore, a comprehensive guide to good practice in this area of museum work.

Rather, the study addresses a number of issues that, in the view of the consultants, are essential for efficient and effective storage, but have yet to be addressed fully by many museums.

The study begins by considering the management context of collection storage, recommending that trustees and senior managers:

- Develop and endorse an integrated collection management policy;
- Consider the long-term costs associated with new acquisitions; and
- Make use of some or all of the relevant performance indicators suggested as part of this Efficiency and Effectiveness Review to assist their management of this important museum function.

The study then looks at factors that are key to effective collections storage, in the belief that this is the most important requirement of any store. These are:

- Basic fitness for purpose of storage buildings;
- Disaster planning that actually enables staff to respond to emergencies in practice, as well as on paper;
- Handling and packing procedures that ensure that only trained staff undertake them, and that these staff are provided with the right equipment, materials and, crucially, information about the specific requirements of individual objects where appropriate;
- A rigorous approach to security that, as well as guarding against unauthorised access to collections, protects objects against those with authorised access by means of inventory control, location and movement control and regular, random audits;
- An approach to maintaining environmental conditions in stores that owes less to textbook standards maintained through high-tech means, than to pragmatic and sustainable solutions, with regular environmental and condition monitoring ensuring that these solutions do not compromise collection care; and
- An integrated approach to pest management.

Ways of making stores accessible are then considered, and the point made that the extent to which collections can be made accessible (or, indeed, that anyone would want them to be accessible) varies depending on the type of collection. The impact of accessibility on the efficiency of museum stores is also considered.

The study also considers various strategies for improving the efficiency of museum stores, including:

- Increasing storage density, particularly by investing in compact storage systems;

- Relocating stores out of main museum buildings, and other expensive premises, to more cost-effective accommodation;
- Sharing storage facilities with other museums; and
- Reducing energy consumption by taking a more pragmatic approach to environmental standards for collections, and a greener approach to achieving them.

Section 2: Introduction

2.1 Introduction and Status of this Study

LORD Cultural Resources (LORD) prepared this Excellence Study as part of the Efficiency & Effectiveness Review of the Government Sponsored Museums & Galleries commissioned by the Department for Culture, Media & Sport (DCMS). The study topic, Collections Storage, was chosen by the Review's Working Group as a key activity for which the wider adoption of best practice was thought likely to yield significant benefits in efficiency and effectiveness.

This Study has been developed through iterative consultation with the National Museums and Galleries and through discussion at a seminar. This document should be seen as a position statement contributing to the debate on Excellence within this area. It does not purport to be a guide, or manual, on excellence.

2.2. Study Objectives

The objectives of the study are:

- To identify innovative approaches which will lead to greater efficiency and/or improved quality of the management and care of collections in storage;
- To identify good practice in monitoring the effectiveness of collection management to ensure location and condition are well controlled;
- To ensure that progress in improving collection management can be accurately tracked; and
- To identify examples of good practice where efficient storage of collections is balanced with effective access.

2.3. Scope of Study and Definition of Storage

This study is not intended to cover every aspect of collection storage. There is an extensive literature of relevant standards and guidelines already published, covering both general principles and specific collection types, which need not be repeated here. The most important of these are referred to in the text. The discussion therefore concentrates on factors that are critical to maintaining effective, accessible and efficient storage conditions, yet where good practice is not as widely implemented as it might be.

Unlike libraries and archives, museums hold a huge diversity of objects: from microscopic specimens to ships and aircraft; and spanning every substance and material on the planet. This study does not examine good practice in the storage of specific types of collection; relevant standards and guidelines have been published for many of these¹. Rather, the focus is on issues that are relevant to all kinds of collection.

The term 'storage' is taken to mean the physical housing of all museum and gallery collections – including those items on public display – whether in non-public stores, 'visible storage' facilities or in exhibition galleries. However, the study does not consider the storage of items in transit, which is a specialised field in its own right.

2.4. Acknowledgements

This final version of the Excellence Study incorporates changes suggested at a seminar in London on 5 May 1999. The participants at the seminar, whose thoughtful input is acknowledged here, were:

- Susan Bradley, British Museum
- Adrian Carlton, National Army Museum
- Robert Child, National Museums and Gallery of Wales
- Penny Feltham, Museum of Science and Industry in Manchester
- Mike Fitton, Natural History Museum
- Colin Manton, Museum of London
- Claire Nunns, National Maritime Museum
- David Penn, Imperial War Museum
- Julia Pope, Horniman Museum
- Chris Smith, Royal Armouries Museum
- Jim Tait, National Museums of Scotland

Thanks are also due to the Working Group member assigned to this study, Anna Southall, and to all those staff in various national and non-national institutions who provided information for the brief case studies.

Section 3: Management Context of Collection Storage

3.1. An Integrated Approach to Collection Care

Museum collections are vulnerable to damage, loss or destruction from many different quarters. Caring for them, wherever they are stored, requires an integrated approach that is instigated by senior management, endorsed by trustees, and understood by all staff and other users of the collections.

The 1997 DOMUS survey found that, out of the 41 national museums surveyed, 36 (88%) had a collection management policy. Across the 1,443 museums of all types surveyed, only 66% had such a policy.

Collaboration between the national museums to improve the compatibility between standards of care adopted by each would facilitate the movement of objects between them.

Critical Factors

- Development of a comprehensive collection management policy, led by senior management and involving all relevant staff.
- Endorsement of collection management policy by trustees.
- Regular review and updating of the policy.
- Training, so that staff whose duties fall within the scope of the policy are aware of the implications of it for their work.

3.2. Considering the Long-term Cost of Collecting

Essential elements of any collection management policy are statements of the museum's policies on acquisition and disposal. Most acquisition policies, however, are so worded as to leave considerable room for interpretation, which is entirely appropriate. However, trustees and managers need to be aware of the rate of new accessions, and of any particularly large acquisitions, in order to be able to plan for future storage needs. Even if a museum's collections grow by only one or two per cent a year, the long term effect is likely to be a doubling of its storage needs within a few decades.

Critical Factors

- Accession procedures should, ideally, allow trustees and managers to endorse new acquisitions formally before they become part of the collections.
- In the case of larger, mass-produced industrial and similar items, museums should participate in regional and national surveys that aim to identify collecting priorities for specific types of collection, so that they do not unnecessarily duplicate items held by other museums (unless, of course, there are other reasons to acquire the object in question).
- Trustees, when formally approving new accessions into the collections, should do so in the knowledge of the long-term cost of those acquisitions, particularly with respect to storage

A framework for capitalising the costs of new acquisitions (excluding any purchase costs) was developed by LORD Cultural Resources as part of a study for the Office of Arts & Libraries,² and may be particularly relevant for large potential acquisitions such as archaeological site archives, for which recipient museums might have a good case for seeking a contribution towards long-term storage costs from relevant developers.

3.3. Using Performance Indicators to Plan and Monitor Collection Storage

Trustees and senior managers should use performance indicators to set corporate objectives with respect to collection storage, and to monitor progress in achieving them. Relevant indicators, that consultation has shown to be widely agreed among national museums to be useful, are given in the Business Model that forms the key deliverable of this Efficiency and Effectiveness Review.

The following performance indicators are particularly relevant in this context. (Their numbers in the latest version of the Business Model are given in brackets.)

- Ongoing additional cost of holding new items (including storage, etc). (4)
- % of collection registered to minimum SPECTRUM standard for inventory control. (13)
- % of collection documented to Getty Object ID standard. (15)
- Numbers of items in store per cubic metre for different collection types. (23)
- Total costs of storage per cubic metre by collection type, at requisite standard. (24)
- % of items stored or displayed at the appropriate standards (including the requisite environmental conditions) as specified by MGC or institution. (25)
- Proportion of items found during annual stock takes. (26)
- Proportion of items accessible in specific time periods. (27)
- Number of artefacts lost or significantly damaged (through theft, poor handling, pest attack, etc). (28)
- Rate of decay (change in recorded condition over given time). (30)
- Proportion of items checked each year to ensure they are in satisfactory condition. (35)

Section 4: Effective Collection Storage

The greatest potential inefficiency in storing museum collections is that they do not survive for future generations, despite the resources used to look after them now. Museum stores cost a lot to maintain, yet are the key to their institutions' long-term purpose. Money spent on stores that do not maximize the chances of the objects in them surviving for the future must be regarded as money not well spent. This section therefore considers the factors that contribute to effective collection storage.

4.1. Basic Fitness for Purpose of Museum Stores

Many museums would admit that some, or all, of their collection storage does not even meet the basic requirements of fitness for purpose. The critical factors may be summarized as follows:³

Critical Factors

- Structurally sound and weatherproof.
- Secure.
- Fire-safe
- Appropriate internal and local environment, avoiding dust, chemical pollution, salt and pests.
- Good access, circulation and headroom.
- A convenient and safe location.
- Low energy and maintenance costs.
- Space for support staff and visitors.
- Space to accommodate collection growth.

There is no shortage of published guidance on how to plan a new storage facility, or on how to refurbish an existing one, as the references below indicate. Often the problem is getting the acknowledged inadequacies of existing storage facilities onto the agenda of governing and funding bodies as a high priority, given all the other claims on resources. Anecdotal evidence suggests that the Museums & Galleries Commission Registration Scheme, which requires museums to 'store...its collections in such a way as to minimise the risk of damage and deterioration'⁴ has proved a useful spur to improving storage conditions.

Critical Factors

- Systematic assessment of existing storage facilities.
- Developing plans to rectify deficiencies in the basic fitness for purpose of museum stores as an urgent priority.

The Museums & Galleries Commission has published a self-assessment checklist that 'aims to help museums and related organisations evaluate how well they are caring for their collections, giving an indication of where and what improvements might be needed and providing a benchmark against which future progress can be measured.'⁵

The checklist is particularly useful because it takes a wide-ranging view of the factors that affect collection care, including management issues as well as more obvious considerations such as the physical state of museum stores. For each factor, museums can assess their own arrangements as either 'basic practice', 'good practice' or 'best practice'.

Excellence Example: Use of MGC Levels of Collection Care Checklist by English Heritage

Whilst at English Heritage, Laura Drysdale used the MGC checklist to evaluate standards of collection care at all EH's collections stores around the country. The aim of the exercise was establish priorities for action that could inform an institution-wide storage policy, which is currently being developed. The goal is to bring the level of collection care in all EH stores at least up to the basic level.

Another assessment checklist that focuses more closely on museum stores was used by Libby Finney for a survey of museum stores in the East Midlands.⁶ This checklist covers:

- The *Building*, including ownership, the upkeep of its fabric, capacity to act as a buffer against external conditions, and whether objects were stored unprotected outside.
- *Building security* – fire detection and suppression systems, anti-intruder measures, storage facilities for hazardous or flammable materials, and keyholder arrangements.
- *Store security* – establishing whether the security of each store met MGC recommended standards; floor loading capacities and the risk from leaks.
- *Housekeeping* – which assessed the cleanliness of the store, cleaning programmes and the condition of building surfaces.
- *Environmental conditions* – monitoring and control of humidity, pests (such as insects and rodents), temperature and light; and whether a formal policy, stating the museum's desired parameters was in place.
- *Storage systems* – assessing the suitability, quantity and quality of storage equipment, and the quality of packing objects within each store.
- *Access* – the accessibility of the stores and the objects within them, including the use of location identities, and labelling of objects and boxes.
- *Organisational issues* were also considered, including allocation of management responsibility for stores, disaster and emergency planning, the practice of collection audits, and identification of documentation backlogs.

Four levels of practice are described for each of the criteria covered by the survey, ranging from A (excellent) to D (poor). For example, in relation to the condition of building surfaces, the four levels described are:

- A. Building surfaces sealed to reduce dust.
- B. Building surfaces finished and in reasonable repair
- C. The museum is investigating the causes of any problems within building surfaces in store, in order to put them right.
- D. Roof and walls flaking, dusty, unsealed.

Sources of Further Information on the Basic Physical Requirements of Museum Stores

Bordass, Bill and May Cassar (ed.) *Museum Collections in Industrial Buildings: A selection and adaptation guide*. London: MGC, 1996.

ICOM and the International Committee on *Museums Security Museum Security and Protection: A handbook for cultural heritage institutions*. London: Routledge, 1993.

Lord, Barry and Gail Dexter Lord *The Manual of Museum Planning* (Second edition). London: TSO, forthcoming.

Museum Practice, especially Issues 1 and 10.

Museums and Galleries Commission *Standards in the Museum Care of...*

4.2. Risk Management

The most catastrophic risk faced by museum collections is sudden and widespread damage or destruction by disasters such as fire, flood or explosion. Risk management – in practice as well as on paper – should therefore be given the highest priority by trustees and all staff if such risks are to be minimised. Risk management is far broader than simply planning responses to potential disasters, although that is an important part of it. Rather, the emphasis should be on assessing potential risks and taking preventative measures to reduce them. If risk assessment reveals that the location of a store makes it particularly vulnerable, then steps should be taken to minimise the risk. If this is not possible, the store should be re-located.

Critical Factors

- Museums should implement a policy and procedures for risk management that meet the minimum standard set out in SPECTRUM: The UK Museums Documentation Standard.
- This policy should address preventative measures such as the regular inspection of buildings and utilities, as well as setting out measures for responding to disasters. Inspection of water pipes and electrical systems is especially important.
- All staff should be trained to respond appropriately to emergency situations, preferably through the use of mock incidents with no prior warning.
- Risk management policies and procedures should be regularly reviewed and updated.

As noted above, while risk management involves more than just planning for disasters, it is essential that museums are prepared for all reasonably foreseeable emergencies. The 1997 DOMUS questionnaire revealed that 35 of the 41 national museums surveyed had prepared a disaster plan (85%). Across the 1,443 museums of all types included in the survey, only 36% had such a plan.⁷

Excellence Example: National Museums of Scotland

Although the National Museums of Scotland had developed a disaster plan, it discovered during one or two minor incidents that it could be difficult to establish a clear chain of command quickly in the event of a real disaster. A number of individuals were nominated for a rota of duty officers. When on call, these individuals have a responsibility to be contactable by the museums' security staff, and to take control of the situation. In order to test the effectiveness of its disaster planning, NMS has staged mock

incidents – with the participation of the fire brigade, but without prior warning to staff. The scenario for one such drill, for example, was a fire leading to flood damage. These exercises revealed some of the practical difficulties that staff and the emergency services would deal with in the event of a real incident, enabling procedures and training to be improved where necessary.

Sources of Further Information on Disaster Planning

Cowton, Jeff *SPECTRUM: The UK Museum Documentation Standard* (Second edition). Cambridge: mda, 1997.

East Midlands Museum Service. *The Museums and Records Office Emergency Manual*. Nottingham: EMMS, 1991

ICOM and the International Committee on *Museums Security Museum Security and Protection: A handbook for cultural heritage institutions*. London: Routledge, 1993.

4.3. Appropriate Handling and Movement

Scarcely less serious than the risks posed by disasters – at least to individual objects – is the risk of mechanical damage caused by inappropriate handling. Inappropriate handling can also cause injury to staff and others. The principles of appropriate handling of various types of collection are well-developed and have been published. Good practice in this instance lies in ensuring that those authorised to handle and pack collections have access to all the information, materials and equipment they need to do so safely, and receive adequate training.

Notwithstanding the discussion later in this study about the potential to increase storage density by using compact storage systems, ‘unplanned’ overcrowding in stores increases the risks associated with inappropriate handling. The 1996 MGC Care of Collections Survey asked museums to rate the amount of storage space they had available. Of the 27 national museums that responded, 7 (26%) described their stores as ‘severely overcrowded’.

Critical Factors

- Clear policy and procedures regulating who is allowed to handle objects, and minimizing the number of occasions on which objects have to be moved. This should include measures to prevent unauthorized, incidental movement of objects by cleaning staff and contractors.
- Any object that is moved should have an immediate destination, rather than being left in an unsatisfactory temporary location.
- Written guidelines on safe handling of various types of object, backed up by training of authorised staff and posters within storage areas.
- Capability to record specific handling recommendations for individual objects, over and above the normal guidelines for that type of object, within the object’s catalogue record (SPECTRUM units of information: Handling recommendations). “Hazard marks” on the object packaging may also be useful.
- Availability of materials, equipment (including protective equipment where needed) and personnel required for safe handling of objects, as appropriate.
- Stores designed (or adapted) to minimise the risk of handling damage or accidents to staff (eg. avoiding the need for staff to reach high, level and clear routes for trolleys, etc).
- Stores not overcrowded in a way that is likely to increase the risk of damage.
- Procedures for reporting health and safety incidents

- Procedures for reporting damage to objects (SPECTRUM procedure: Object condition checking and technical assessment)
- Regular training sessions for staff who undertake this procedure (including refresher training).

Excellence Example: Horniman Museum

The Horniman Museum's Conservation Section has developed internal Standards and Guidelines for the Handling and Storage of Museum Objects. The Conservation Section gives all new members of staff training in object handling, regardless of whether or not they will be working with collections. This ensures that, in the event of a disaster, all members of staff will have a good idea of safe object handling techniques.

Sources of Further Information on Handling

Benson, Glenn 'Health and safety' *Museum Practice (Vol. 4, No. 1)*, 1999, pp 66-67

British Museum *A Guide to the Storage, Exhibition and Handling of Antiquities, Ethnographia and Pictorial Art* (second edition). London: British Museum, 1990.

Cowton, Jeff *SPECTRUM: The UK Museum Documentation Standard* (Second edition). Cambridge: mda, 1997.

Museums & Galleries Commission series *Standards in the Museum Care of...*

4.4. Appropriate Storage Packing Materials and Furniture

Similarly, inappropriate packing materials and storage furniture can also cause damage to objects, and be potentially hazardous to staff too.

Critical Factors

- Clear policy and procedures regulating who is allowed to pack objects.
- Written guidelines on safe packing of various types of object, backed up by training of authorised staff and posters within storage areas.
- Capability to record specific packing recommendations for individual objects, over and above the normal guidelines for that type of object, within the object's catalogue record (SPECTRUM units of information: Packing recommendations).
- Availability of materials, equipment and personnel required for safe packing of objects, as appropriate.
- Awareness of current research into safe packing materials and methods.
- Stores designed (or adapted) to give appropriate loading levels for floors and shelving. These loading capacities should be displayed, so that they are not accidentally exceeded.
- Procedures for reporting damage to objects (SPECTRUM procedure: Object condition checking and technical assessment)
- Regular training sessions for staff who undertake this procedure (including refresher training).

Sources of Further Information on Packing

Museums & Galleries Commission series *Standards in the Museum Care of...*

4.5. Preventing Theft

Most museums have security strategies in place to minimise the risk of theft by persons gaining unauthorised access to collections, usually combining physical protection and operational procedures that limit unsupervised access. Most also have procedures for supervising access to collections by visitors, ideally with a study area that is separate from the stores. It is also good practice to keep a log of persons entering storage areas, either through a signing-in procedure, or through electronic means such as electronic swipe cards and CCTV.

However, it is a sad fact that several notorious thefts from museums and similar institutions have been 'inside jobs' by curatorial, security and cleaning staff, volunteers and researchers with authorised access. Good practice in reducing the risk of this, or any other kind of theft, begins with the rigorous implementation of three procedures – inventory control, location and movement control, and audit – that together allow museums to account for any object at any time.

Sources of Further Information on Security in General

ICOM and the International Committee on *Museums Security Museum Security and Protection: A handbook for cultural heritage institutions*. London: Routledge, 1993.

Museums & Galleries Commission *Improving museum security*. London: MGC, 1997.

Museums & Galleries Commission series *Standards in the Museum Care of...*

4.5.1. Inventory Control

Museums cannot account for the items in their care if they do not maintain an inventory of every item (or, in certain circumstances, every group of items⁸). Many do not have such an inventory, although almost all of these are working towards achieving one.

Different collection types pose different challenges to museums trying to achieve this goal. In particular, natural history collections numbering millions of specimens, collections of bulk archaeological material such as pot sherds and industrial waste fragments, and large archival collections all pose problems.

These difficulties are, however, often exaggerated, particularly if the goal of compiling a basic inventory is confused with that of 'full cataloguing' (a problematic term, since a collection catalogue is never 'complete', but accrues new information over time). If a museum does not know how many objects it has, nor where they are, good practice is to devise strategies that give the museum the most useful information about the entire collection, rather than detailed information about only part of it. The term 'documentation backlog' can, in fact, usefully be reserved for material that is not yet included in such an inventory. Beyond this modest definition, the recording of more detailed information ('cataloguing') can thus be considered as an outcome of discrete research projects that may have other outcomes such as publications or exhibitions.

Critical Factors

- Awareness by trustees and senior managers that an accurate inventory of their entire collections is a prerequisite for accountability.
- If no inventory exists, prioritisation of the task, ensuring that the project is supported and led at the highest level, and that it is adequately resourced.
- Computerisation of the inventory.
- Use of efficient strategies to capture essential information about the whole collection, before capturing more detailed information about parts of it.
- Implementation of SPECTRUM minimum standards on Inventory control and (if appropriate) Retrospective documentation.

Excellence Example: Nottingham City Museums

An inspiring example where a museum service that has completed a basic inventory of its collections in order to improve, among other things, its accountability for them is Nottingham City Museums' Baseline Project. With the full support of senior management, Registrar Michael Cooper directed a team of contract staff who worked with the service's curators to inventory around 750,000 objects between 1991 and 1996. Approximately 80,000 of these were from the 'humanities collections' (archaeology, history and arts), and the rest were natural science specimens. A further two years of work was required to reconcile all the queries that arose during the course of compiling the inventory. Strict procedures for location and movement control (see below) are now in place to keep the inventory up to date.

The whole project, including specifically-allocated curatorial time and contract staff but excluding hardware and software, cost £400,000. As well as transforming the service's ability to manage its collections, staff are able to answer enquiries far more easily and accurately than before. There are plans to make the database directly accessible to visitors at Nottingham Castle Museum via a fibre optic link with the nearby Brewhouse Yard storage and support facility.

Sources of Further Information on Creating an Inventory

Cowton, Jeff *SPECTRUM: The UK Museum Documentation Standard* (Second edition).
Cambridge: mda, 1997.

4.5.2. Location and Movement Control

Having created such an inventory, which should be computerised, it should be kept up to date, particularly with respect to the movement of objects from location to location. Without procedures to do this, it cannot be known for certain whether an object that is not found when required has been stolen, or is merely lost within the building. Poor location and movement control also diminishes the value of previous investment in compiling inventories: the £400,000 spent by Nottingham City Museums to create a full inventory of its collections would soon be rendered meaningless if the accuracy of the location information could not be relied upon in years to come.

Critical Factors

- Strict implementation of SPECTRUM minimum standard for Location and movement control.
- Limiting the number of people allowed to move objects.
- A recording procedure (preferably computerised) that can be carried out immediately, to update the main inventory directly.
- Training (including refresher sessions) for all staff who undertake this procedure.

Since this is such an important procedure, yet one which is often not observed as rigorously as it could be, it is worth quoting SPECTRUM's policy guidelines in full:

The institution should have a location and movement control policy including:

- A requirement to maintain an up-to-date location for ALL objects
- Identification of the staff with authority to access location and movement records
- Identification of staff with authority to edit location records. [For security reasons these staff may need to be named.]
- Identification of staff with authority to request and approve object movements
- Identification of staff with authority to move objects and under what circumstances
- A statement of the physical security required of locations
- Conditions for the storage and display of objects

The institution should determine the length of time an object may remain in a location without the location record being updated. For example, during the installation of an exhibition, an object may be moved within the exhibition area several times in one day. In the case of providing objects for researchers, the museum may wish to record each time an object is brought to the research room. The minimum requirement should be that an object is not left unattended outside normal working hours without updating the location.

The policy should require that all recorded movements be maintained to provide an 'audit trail' as part of the object's history.

Excellence Example: Science Museum Stores at Blythe House and Wroughton

The Science Museum's store at Blythe House in West London houses 85% of the Museum's objects, around 250,000 in total. They are divided into around 100 discrete collections, which are grouped according to curatorial department (eg. Engineering, Transport, etc). Generally, Blythe House stores the Museum's small- to medium-sized objects (usually up to around a cubic metre in volume).

Half the objects kept in the Science Museum's Blythe House Store belong to the Wellcome Medical Collection. These objects are well stored, thanks to a two-year project to repack and document them. The location of each item was recorded – using standard location codes – on the Museum's MultiMIMSY collection management system. (Standard location codes have not yet been recorded for all the other

collections in the store, but this task is in hand.) Networked PCs are located within many of the storage locations, so that when objects are moved, the change can be recorded directly onto their MultiMIMSY records.

At Blythe House, each Curator (or Assistant Curator) is responsible for updating the location records of his or her department's collections, rather than the Store Manager. At the Museum's remote store for larger objects, at Wroughton near Swindon, store staff rather than curators are responsible for moving objects and updating location records, again directly onto the central, networked database. This means that fewer people are responsible for the task than at Blythe House. Moreover, the whole focus of the Wroughton staff is to run a well-ordered store, whereas this is just one of many responsibilities of curatorial departments.

Sources of Further Information on Location and Movement Control

Cowton, Jeff *SPECTRUM: The UK Museum Documentation Standard* (Second edition). Cambridge: mda, 1997.

4.5.3. Collection Audits

Regular and random audits of the collections are needed to ensure that the location and movement control procedures described above are always carried out, and to increase the likelihood of thefts being discovered. Research for this study suggests that this procedure is by no means common practice among the national museums.

Critical Factors

- Implementation of the SPECTRUM minimum standard for Audit
- In addition to an auditing programme developed along the lines recommended in SPECTRUM, an ongoing programme of random audits led by the museum's Registrar, or equivalent postholder
- Regular reporting of audit results to trustees and senior managers

Again, it is useful to quote SPECTRUM's guidelines with respect to audit policy:

Your institution should establish a series of object and information categories for auditing priority. These may take account of one or more of the following:

- The storage location of objects
- Historic significance
- Scientific significance
- The monetary value of an object
- Whether the object is accessioned, on loan or deposited
- Security of storage or display arrangements
- Type of object information
- Who will be responsible for performing the audit (e.g. internal staff, external bodies)

Excellence Example: National Museums of Scotland

Wendy Turner, Head of Documentation at NMS, is part of an Accountability Committee that meets twice yearly. Also on the committee are the Director, the two Deputy Directors, and the Heads of Conservation and Security. Her role on this committee is to report on the results of a rolling programme of collection audits, led by her department.

Three levels of collection audit are undertaken. In all, the target for the stocktaking programme is to audit 25,000 objects per year. All audits are undertaken by the service's documentation staff, accompanied by the relevant curator.

Firstly, each curatorial department has nominated 20 or so of its most important objects. These are not necessarily the most valuable in monetary terms, but rather reflect curatorial judgements about their significance. In the case of natural science collections, all type specimens are included. Across all curatorial departments, there are 500 such prime objects, every one of which is audited at the end of each financial year.

For the second audit programme, the NMS collection management system, QUIXIS, generates a random sample of 200 object numbers each year for each curatorial department. These samples are then audited. NMS staff prefer to work from paper printouts generated by QUIXIS, although at other museums (for example, the Science Museum) the records of randomly sampled objects are downloaded onto laptops for the duration of the audit, and subsequently transferred back to the main database once the process is complete. Thirdly, one-off events such as major store moves are used as an opportunity to audit the objects in question.

Some collections, particularly of high-value objects on public display, require more frequent audit.

Excellence Example: National Gallery

The National Gallery conducts a daily security check of all pictures on public display and a monthly check on all pictures in store or in private areas.

Sources of Further Information on Collection Audits

Cowton, Jeff *SPECTRUM: The UK Museum Documentation Standard* (Second edition). Cambridge: mda, 1997.

4.6. Maintaining Appropriate Environmental Conditions

Many types of museum object are vulnerable to the effects of environmental factors such as inappropriate or fluctuating relative humidity (RH), inappropriate temperature, atmospheric pollutants and light. While the latter is usually easily controlled, the others can be more challenging in certain types of building. Published standards exist for many collection types, and these have often been followed uncritically. The result has sometimes been that objects have been placed in supposedly 'optimum' conditions that, in fact, cause damage because the items have previously stabilised in dryer or more humid conditions.

However, good practice is now considered to be the informed interpretation of textbook standards in the light of the specific circumstances of particular collections and parts of collections. This enables appropriate environmental conditions to be specified. One pragmatic

consideration to be kept in mind when deciding what environmental conditions are appropriate is that they should be sustainable in the long term. The specification of appropriate environmental conditions is therefore considered in detail as a factor relating to efficiency as much as effectiveness.

4.6.1. Environmental Monitoring

Once environmental conditions appropriate to the needs of the stored collections have been specified, monitoring is essential to ensure that they are being maintained within the required limits.

In particular, sudden fluctuations in relative humidity are widely regarded as potentially the most damaging to sensitive items, and it is therefore important that these are picked up as early as possible so that corrective action can be taken.

The MGC's 1996 Collection Care Survey found that the following percentages of national museums surveyed (29 in all) reported that they used the following means of monitoring their environments.

	%
RH measured by continuous electronic sensors	70
RH measured by any form of continuous recording device	93
RH not measured	0
Temperature measured by continuous recording device	82
Temperature not measured	7
Environmental data evaluated weekly/monthly	71
Environmental data evaluated quarterly	11
Environmental data evaluated occasionally	18

Critical Factors

- Establishment of agreed baseline environmental requirements.
- Continuous monitoring of temperature and relative humidity within storage areas containing objects that are sensitive to them.
- Ideally, electronic sensors linked to a central computer that can log the data and make it easier for staff to analyse trends across all monitored spaces.
- Ideally, the monitoring system should raise an alarm in response to rapid changes in environmental conditions.
- Regular analysis and reporting by conservation staff.
- Procedures for responding if monitoring suggests that environmental requirements are not being achieved.

- Regular calibration and checking of monitoring equipment, and independent checking of integrated building management systems.
- Continuity of staff responsible for monitoring, and appropriate training of them.

Excellence Example: Museum of Scotland

The new Museum of Scotland has around 100 electronic sensors monitoring temperature and relative humidity around the building, that send data, via radio telemetry, to a central, computerised logger. A report analysing the data is prepared weekly by conservation staff.

Further Sources of Information on Environmental Monitoring

Cassar, May *Environmental Management: Guidelines for Museums and Galleries*. London: Routledge, 1995.

4.6.2. Condition Monitoring

Initially, condition surveying is an important first step to take before deciding on environmental specifications and handling and packing guidelines for various types of object. Subsequently, it is required to ensure that the specified environment is indeed the appropriate one, and that objects are not being damaged through handling or packing. The MGC's 1996 Collection Care Survey found that the following percentages of national museums surveyed (29 in all) reported that they had fully or partly surveyed various categories of collection relevant to them.

Collection Type	Total No. Collections	% Fully Surveyed	% Partly Surveyed
Agriculture	5	0	40
Archaeology	9	0	67
Archives	20	0	30
Arms & Armour	13	0	38
Biology/ Natural History	4	25	50
Costume & Textiles	18	44	39
Decorative/ Applied Arts	17	6	35
Ethnography	12	25	25
Fine Art	23	39	39
Geology	4	0	0
Maritime	6	17	33
Medicine	6	0	17
Military	11	0	27
Music	7	29	14

Collection Type	Total No. Collections	% Fully Surveyed	% Partly Surveyed
Numismatics	9	11	56
Oral History	6	0	0
Personalia	10	0	40
Photography	15	13	0
Science & Industry	13	0	38
Social History	14	7	29
Transport	10	10	50
Total Collections	232	13	33

Critical Factors

- Implementation of SPECTRUM minimum standard for Object condition checking and technical assessment
- In the case of all but the smallest collections, a programme for monitoring the condition of a sample of objects.
- As well as targeting items known to be particularly vulnerable to deterioration, statistically-valid random samples of objects should also be checked as part of an rolling programme of condition monitoring.
- The results of condition monitoring should be analysed by conservation staff and used to inform pragmatic decisions about appropriate environmental specifications.

Excellence Example: National Museums of Scotland

The audit regime carried out by NMS documentation staff has already been described above. Dr Jim Tate, the Head of Conservation, also sits on the Accountability Committee, and is responsible for managing a parallel programme of condition monitoring.

All 500 or so key objects nominated by the various curatorial departments as the most important in the collections are checked by conservators each year. In addition, a subset of the thousands of objects chosen at random for audit is also checked by conservation staff each year. The number of objects whose condition is monitored is necessarily lower than the number of objects audited by documentation staff, due to the longer time needed to carry out a thorough examination of each item.

In the case of relatively small collections of sensitive and valuable material, such as fine art collections, regular condition monitoring of all items is appropriate.

Excellence Example: National Gallery

The National Gallery examines the condition of all the pictures in the collection at least twice a year, and all fragile panels five times a year.

Sources of Further Information on Condition Monitoring

Cowton, Jeff *SPECTRUM: The UK Museum Documentation Standard* (Second edition). Cambridge: mda, 1997.

Keene, Suzanne *Managing Conservation in Museums*. Oxford: Butterworth-Heinemann, 1996.

4.7. Pest Control

A third kind of monitoring – of insect activity within storage areas – is also recommended good practice as part of an integrated pest management strategy. 1996 MGC Care of Collections Survey found that, of the 29 national museums surveyed 25 (89%) had some form of pest management programme.

Critical Factor

- Implementation of an integrated pest management strategy, regularly reviewed and updated.
- Procedures and facilities for dealing with incoming material that may be infested.
- Training of all staff involved in monitoring pest activity within stores.
- Training of all those who may use affected material to raise awareness of the health and safety issues relating to previous pest treatments that may be hazardous to health.

Integrated pest management (IPM) is a term used to describe a proactive approach to pest control that does not rely on the widespread use of pesticides. Rather, IPM strategies emphasise monitoring, discouraging pests, modifying the environment and targeted treatments when infestations do occur.

Excellence Example: National Museums & Gallery of Wales

The Head of Conservation at NMGW, Robert Child, is an authority on IPM, and has introduced an appropriate strategy across all the sites managed by that institution.

At the heart of the strategy is a programme of regular monitoring of insect traps laid in areas where collections are kept. In this way, any infestations that do occur in spite of the strategy's preventative measures (which includes, for example, good housekeeping to discourage pests) are detected at an early stage, enabling prompt action to be taken. Not all storage areas are monitored with the same frequency: particularly vulnerable collections are monitored weekly during the summer months; other stores containing material that is relatively impervious to pest attack might be checked annually. A specific conservator coordinates the monitoring schedules of colleagues responsible for particular collections, and collates their reports. The pest management programme is included within the institution's collection care reporting.

Robert Child estimates that the IPM strategy requires around 80 staff hours per year, across all the NMGW sites, to implement. Staff training forms an important part of the strategy.

Sources of Further Information on Integrated Pest Management

Pinniger, David and Peter Winsor *Integrated Pest Management: Practical, safe and cost-effective advice on the prevention and control of pests in museums*. London: Museums & Galleries Commission, 1998.

Section 5: Accessible Collection Storage

Almost always, museum exhibition galleries display only a percentage of the institution's collections. The extent to which the rest can be made accessible varies according to the type of collection in question. Physical access to certain natural science collections, for example, has to be limited, even to staff, due to the presence of radioactive material or the use of hazardous pesticides by past curators. Other collections lend themselves very well to that most accessible form of storage: display in public exhibition galleries. Stores containing collections of vehicles or large industrial equipment can be opened for public tours and special events with relatively few security risks. Other stores are filled with archaeology and natural history collections that are of research interest only.

5.1. Virtual Access

The 1997 MGC Visitor Services Survey found that, out of the 41 national museums surveyed, only 8 (20%) offered public access to the museum's documentation system. Across the 1,443 museums of all types surveyed, only 16% provided such access.

However, anecdotal evidence suggests that, in many instances, enquirers require access to information about objects not on display more than physical access to them. In cases where close examination of actual objects is needed, adequate collections documentation allows the ones required to be pinpointed, saving unnecessary rummaging through the rest. Where high-quality images of the required objects exist, these meet the needs of many enquirers.

Excellence Example: Tate Web Site

The World Wide Web site of the Tate includes a concise catalogue of that institution's entire collection. Works out of copyright, or for which copyright agreements have been reached, are illustrated in colour.

Excellence Example: Bryggens Museum, Bergen, Norway

A good example of virtual access to a relatively obscure collection, of value to researchers in the field, is the on-line corpus of runic inscriptions from medieval Bergen. All 600 or so excavated inscriptions have been catalogued, including transliterations of the runic texts, and posted on the Web. The usefulness of this sort of virtual access is attested by the writer, who several years ago spent a whole week in the stores of Bryggens Museum sifting through every single runic artefact in connection with a research project.

5.2. Supervised Access

The minimal level of access, and for research collections of limited interest, the most appropriate, is that enquirers are able to view items they are interested in, under supervision and by appointment.

The 1997 MGC Visitor Services Survey found that, out of the 41 national museums surveyed, 29 (71%) had facilities to see objects not on display. Only 26 (63%) had facilities to study objects. Across the 1,443 museums of all types surveyed, only 64% provided facilities to see objects not on display, and only 54% had study facilities.

Critical Factors

- Museums should have a policy on supervised access to collections by enquirers. This should include a statement that, in principle, any item in the collection may be viewed by enquirers.
- The collections documentation should be sufficiently detailed to help enquirers pinpoint exactly which items they wish to view.
- There should be appropriate facilities where enquirers can view items in secure and environmentally-suitable conditions, with the aid of equipment such as microscopes as required.
- The records of objects viewed by enquirers should be updated, so that patterns of collection use can be analysed in order to inform the museum's storage policy.

Excellence Example: National Museum of the American Indian: Cultural Resources Center, Maryland

The new Cultural Resources Center of the National Museum of the American Indian is included here for its innovative approach in providing access to reserve collections to meet the specific needs of a community. It is one of three Smithsonian facilities located just across the Potomac from Washington DC, at Suitland in Maryland. It is unlike any museum storage facility here in its ambition to provide innovative forms of access to reserve collections.

The National Museum of the American Indian (NMAI) is the newest of the Smithsonian Museums, having been created from the million-artefact collections of the former Heye Foundation of New York. Its first public museum branch is in New York, but a second is in architectural design for the Smithsonian Mall in Washington. The NMAI will thus have three buildings – the New York public museum, the public museum on the Mall, and this Cultural Resources Centre, which has just been completed.

Although it is primarily as a storage and collection care facility, this new building in Suitland is also intended to be used as a Resource Centre by American native elders and scholars, as well as by Smithsonian staff. It is therefore an attractive building with many features associating it with native American cultures. For instance, there is a room where elders may not only examine objects but even use them in rituals if necessary. This room includes a view to a grove of trees outside and a circular recessed area in the floor where sweetgrass fires can be lit if needed in ceremonies. There is also a Library and curatorial offices, since it is expected that this building will be actively used as a Resource Centre by native Americans requiring access to their traditional cultures, quite aside from the exhibition function of the NMAI in its two public museums.

5.3. Supervised Tours of Stores

'Behind-the-scenes' tours of museum storage facilities are popular with visitors, and are particularly appropriate for larger items. Such tours are also possible in stores for smaller objects, but security considerations usually limit the numbers of people who can be guided at any one time.

Excellence Study: Science Museum Stores at Wroughton and Blythe House

The Science Museum's larger objects, such as aircraft and land vehicles, are stored at Wroughton near Swindon. The site was formerly a military airfield, and the Museum acquired title to it from the MoD in 1997, having occupied it since 1979.

Around 10,000 objects are kept in seven WW2 hangers of varying quality, and a further 10,000 in a purpose built store dating from 1994. The latter was built to a very high specification, with full environmental control keeping fluctuations of relative humidity within tight limits.

Remarkably, Wroughton attracts around 70,000 visitors per year, including a thousand children in school groups. Adults in pre-booked groups are charged £3, and children are free. Of the fourteen staff on the site, one is a dedicated Marketing/Events Officer, and a number of themed open days and other special events are held each year, many in partnership with other organisations

Adult admission charges for these events ranges from £3 to £5. During these open days, the site staff are supplemented by up to thirty volunteers to provide interpretation and security cover. The Wroughton site is a few miles from Swindon, and on event days a shuttle bus operates to bring visitors from the town. Sponsorship is currently being sought for a bus that can be used to bring more school groups to the site.

Three of the hangers can be characterised as low density 'display storage'. These house larger items such as aircraft, which can easily be roped off for conservation and safety reasons. One of these hangers has a clear central area that is a popular venue for corporate events such as car and aeronautical product launches. Access to the purpose-built store is more limited, since half the area is taken up by 'deep storage': mobile racking 12 m high, with items kept on pallets that are moved by fork-lift truck. The other half of this store has static shelving at present, but the floor was laid to the same high specification, allowing compact storage to be installed in the future. This store has a secure viewing area, where visitors can examine objects. However, visitors have to be fairly focused about what they want to see, given the likelihood of the required objects being kept high up on the mobile racking. The collections at Wroughton are, however, well documented, allowing staff to help enquirers to pinpoint the objects they would like to see.

At the Museum's Blythe House store, where smaller items are housed, access is necessarily more limited. Around 500-600 visitors per year participate in guided tours. According to the site manager, Jackie Britton, the larger objects are the most popular with visitors, particularly the collection of astronomical instruments, which are stored openly on the floor or in the cabinets in which they were previously displayed at South Kensington. Blythe House would benefit from a dedicated space where visiting groups could be briefed and shown smaller items from the collections.

5.4. 'Visible Storage'

The term 'visible storage' has come to refer to a mode of museum exhibition in which didactic displays are supplemented by secure drawers or cases full of reserve collection material that are located within public galleries and can be accessed by visitors who are particularly interested. Often only a representative sample of an entire collection is required. For example, a natural history 'visible storage' display might aim to include one example of every native species, leaving the rest of the collection in closed storage.

'Visible storage' is scarcely new, sharing many characteristics with the scantily interpreted, systematic displays that museums began to abandon in the 1960s. The difference is that, at their best, 'visible storage' galleries provide both an interesting introduction to their subject for those with a casual interest, and a treasure store for those with a deeper interest. They are particularly effective if visitors can also access catalogue records and supporting multimedia within the gallery too.

Excellence Examples

There are now many examples of this style of display in museums large and small. Several of these have been reported in depth in the professional literature. Well-known examples include the Glass Gallery at the Victoria & Albert Museum, the Music Gallery at the Horniman Museum and the Natural History Centre at Liverpool Museum.

Section 6: Efficient Collection Storage

While there should be no conflict between operating an effective store and an efficient one, a balance must often be struck between accessibility and efficiency. Efficient collection storage is considered here, after issues relating to accessibility, in the belief that a museum should first decide a storage policy that meets the needs of its users as well as its collections, and then develop the most efficient means of implementing it.

6.1. Calculating the Cost Implications of Storage Options

Any strategy for improving the efficiency of collection stores depends initially on knowing the full costs of the existing situation, so that the cost benefits of proposed improvements can be quantified. Such costs might include the costs of frequent moves from temporary store to temporary store, staff costs incurred in travelling to remote locations and other costs as well as the obvious ones relating to storage buildings themselves.

Excellence Example: National Maritime Museum

As the first step towards developing a future storage strategy for the Museum, NMM's Head of Storage undertook a detailed assessment of four existing storage sites (two of which are owned by the Museum, and two on short-term leases), calculated the total costs of each, reviewed the collections stored in them and produced a strategy for access. This process has informed the Museum's current proposals for a Collection Support Centre, which will incorporate a Centre for Maritime Research. A full economic appraisal of this proposal will be carried out.

Sources of Further Information on Economic Appraisal of Capital Projects

HM Treasury *Appraisal and Evaluation in Central Government: Treasury Guidance ("The Green Book")*. London: TSO, 1997.

Lord, Barry, Gail Dexter Lord and John Nicks *The Cost of Collecting: Collection Management in UK Museums*. London: HMSO, 1989.

6.2. Increasing Storage Density

Increasing storage density can, in certain circumstances, increase the efficiency of stores without compromising their effectiveness or accessibility. In particular, investment in compact storage systems can make much better use of existing stores, or reduce the size (and cost) of new facilities.

Excellence Example: Victoria and Albert Museum, Blyth Road Store

At the Blyth House Store, near Olympia in West London, the V&A has recently spent £800,000 investing in compact storage for the reserve collections of the Furniture and Woodwork Department. The scheme increased the usable space in existing stores on two upper floors by 218% – from 1,970 sq m to 4,899 sq m. This better use of existing storage space is expected to achieve a pay-back on the investment within five years. A notable feature of the scheme is an ingenious load-bearing steel sub-structure beneath new raised floors, which overcame the problems of existing floors so weak that the ratio of total floor area to usable storage area was previously only 17%⁹

Storage density can also be increased by arranging objects within stores where they best fit, rather than according to subject-based classification systems.

Excellence Example: Science Museum Store A1, Wroughton

The purpose-built store at Wroughton (known, appropriately, as A1) has already been described above. As well as making full use of the building's height and compact storage systems for half its area, staff at Wroughton arranged the objects stored in A1 according to best fit, not according to any other system. The excellent computerised documentation at the store makes it easy for staff to locate any item quickly.

6.3. Relocation to Cheaper Sites

Many existing stores are in Listed historic buildings, occupying prime city-centre space: the museums themselves. The opportunity costs of not relocating such stores in order to develop income-generating public facilities should be considered, as well as the potential savings of relocation to more cost-effective buildings. Relocation can also provide an opportunity to address the inefficiencies of operating ad hoc stores at various remote sites, particularly if these are on short-term leases. However, while relocation can often improve the effectiveness of museum stores, it may affect accessibility, not least for staff.

Excellence Example: Science Museum A1 Store, Wroughton

In the mid 1980s, the lease ran out on a two-acre store at Hayes that the Science Museum had occupied for a number of years. The cost of this leasehold was set to double to £0.5 million per year, which was felt to be excessive, especially since the store itself was not ideal. The new store at Wroughton was built for £2.4 million, on land that did not cost the Museum anything at the time (and for which it subsequently acquired the freehold from the MoD for nothing). The store, which was built in 1994, has thus achieved payback compared to the cost of remaining at the Hayes store. Since the Hayes site was already some distance from the main South Kensington site, the move further out to Swindon has not greatly increased actual journey times for London-based curators.

6.4. Sharing Storage Facilities

Sharing storage facilities with other museums can bring economies of scale, but raises various issues that need to be addressed if such partnerships are to work well. Such arrangements can work extremely well if the participating museums share the same governing body, as happens in Singapore.

Excellence Example: Jurong Artefact Repository, Singapore

In the early 1990s, LORD Cultural Resources produced a Master Plan for the National Museum precinct in Singapore. The plan recommended that a National Heritage Board should be established as the governing body of the three constituent museums: the Singapore Art Museum, the Singapore History Museum and the Asian Civilization Museum. The plan also recommended that, in order to free prime space in the historic buildings that were to house the three museums, a purpose-built repository should be built and operated as a shared facility. Both recommendations were implemented, and the store is managed by the National Heritage Board on behalf of the three museums.

In the case of facilities shared between museums with different governing bodies, those museums normally prefer to maintain as much control as possible over their own collections, whilst collaborating on building-wide issues.

Excellence Example: Blythe House, West London

Blythe House, near Olympia, is owned by the Government and used by the British Museum, the Science Museum and the Victoria & Albert Museum as a shared storage facility. Each museum has a third of the building, giving each a storage area of around 9000 sq m. There are plans to transfer title to the building to the three museums jointly.

One museum acts as the administrator of the building on behalf of the other two, for around five years each on a rotating basis. This museum employs a Site Manager who is responsible for building-wide issues, but not for the collection stores themselves, which are controlled by their respective museums. A joint Managing Committee, comprising two senior representatives from each museum, meets quarterly to discuss common issues. Security cover is provided for the site as a whole. Until now, security staff have been employees of the administering museum. However, there are currently proposals to contract out this function.

The administering museum is responsible for the financial management of the building, and covers all expenditure, invoicing the other museums monthly.

Although plans are at an early stage, the Science Museum staff at Wroughton are exploring ways of offering secure and managed storage space to smaller museums. One model might be to offer a basic storage service, charged per square metre like the sort of secure storage offered by commercial companies such as Christies, and then to offer a range of additional options which would be charged for as extras. These might include bespoke packages of services (perhaps including condition monitoring, documentation or supervision of public access) subject to individually-negotiated service level agreements.

6.5. Appropriate Environmental Conditions and Cost Efficiency

As a final thought on improving efficiency in collection stores, the study returns to the specification of appropriate environmental conditions, and considers the implications for cost savings through better energy efficiency.

There is an increasingly influential view that stores that make uncritical use of full air-conditioning systems to maintain textbook standards of temperature and relative humidity may be inefficient due to high maintenance and energy costs, and can be ineffective because those standards are not achieved in practice. In any case, many conservators are taking more of a pragmatic line when specifying target conditions, in the light of current knowledge about the effects of environmental factors (although much research remains to be done on many collection types).

Critical Factors

- Informed interpretation of published standards by qualified staff, in the light of the specific needs of the objects to be stored.
- Grouping together of objects with similar environmental requirements.
- Passive measures for environmental control.
- Environmental monitoring strategy.
- Condition monitoring strategy.

Excellence Study: National Museums of Scotland

NMS has a formal energy policy and employs a full-time Energy Manager. The Museum is committed to raising its energy management to the highest level described by the BRESCU Energy Management Matrix:

- *Energy policy, action plan and regular review have commitment of top management as part of an environmental strategy.*
- *Energy management fully integrated into management structure. Clear delegation of responsibility for energy consumption.*
- *Formal and informal channels of communication regularly exploited by energy manager and energy staff at all levels.*
- *Comprehensive system sets targets, monitors consumption, identifies faults, quantifies savings and provides budget tracking.*
- *Marketing the value of energy efficiency and the performance of energy management*
- *Positive discrimination in favour of 'green' schemes with detailed investment appraisal of all new build and refurbishment opportunities.*

As a good example of the last point, before developing a brief for a further store on the NMS storage site at Granton, the Museum developed a study from Edinburgh University. The scope of this study was to ask, in fairly general terms, whether the Museum could build a 'green' store that would – without the use of full air-conditioning – be capable of maintaining an internal relative humidity of between 45-60%. If so, the study was to recommend the steps that needed to be taken to develop such a building.

Dr Jim Tate, Head of Conservation, reports that the specification of an RH of 45-60% (which is far more relaxed than the 55% ± 2% maintained by a full HVAC system at Wroughton's A1 store) was a pragmatic decision based on the fact that most of the collection has been with the Museum for many decades and is stable although never stored at supposedly 'optimum' RH. The few objects known to be particularly sensitive will be kept in microclimates within tighter limits.

The University's study suggested that such a store could be built, and formed the basis of an internal NMS guide for the procurement of environmentally friendly buildings, refurbishments and exhibitions. A full economic appraisal of the proposed new 'green' store at Granton is now being undertaken.

Sources of Further Information about Energy Efficient Means of Maintaining Museum Environments

Cassar, May (ed.) *Museums Environment Energy*. London: Museums & Galleries Commission, 1994.

Cassar, May *Environmental Management: Guidelines for Museums and Galleries*. London: Routledge, 1995.

Notes

1. For example, in the Museums and Galleries Commission series *Standards in the Museum Care of . . .*
2. Lord, Barry, Gail Dexter Lord and John Nicks *The Cost of Collecting: Collection Management in the UK Museums*. London: HMSO, 1989.
3. Adapted from Bordass, Bill and May Cassar (ed.) *Museum Collections in Industrial Buildings: A selection and adaptation guide*. London: MGC 1996.
4. MGC *Registration Guidelines* (Phase 2) London: MGC, 1995.
5. Windsor, Peter (ed.) *Levels of Collection Care: A self-assessment checklist for UK museums*. London: Museums and Galleries Commission, 1998.
6. Finney, Libby *Museum Storage in the East Midlands*. Nottingham: East Midlands Museum Service, 1998.
7. This and all subsequently quoted data from MGC surveys is taken from Coles, Alison, Bethan Hurst and Peter Winsor *Museum Focus: Facts and Figures on Museums in the UK* Issue 1) London: MGC 1998.
8. This applies particularly to large natural history collections, where strategies to inventory the most important specimens rather than every single specimen are appropriate.
9. Hershberg, Sorrel, Stephen King and Amanda Ward "Making the most of storage space" *Museum Practice* (Vol. 4 No. 1) 1999. pp 72-74.