

PREVENTIVE CONSERVATION PROCEDURES FOR SOCIAL HISTORY COLLECTIONS

MANUAL

INTRODUCTION

Conservation procedures will follow the principles set out in the Conservation Policy, which should be drawn up by all heritage institutions. Procedures are processes that are followed, which implement the principles laid down in the policy. The professional practice of all conservation, preventive or remedial, is underpinned by a code of ethics.

All conservation procedures are carried out while working closely with Collections Management staff and/or Curators, in order to contribute positively to the long-term preservation of cultural collections. Policies and procedures must be in place, therefore, in order to protect these collections through education of management.

An Appendix accompanies the Manual and contains details of procedures described in the Manual, a Code of Ethics for Conservators, and a Glossary of Conservation Terms & Definitions.

INTRODUCTION TO PREVENTIVE CONSERVATION

Preventive conservation involves doing everything possible for museum, archives and gallery collections, through careful observation of the whole museum environment, to prevent damage and deterioration of objects caused by adverse environmental conditions, incorrect handling as well as their inherent physical structure.

Preventive conservation optimises environmental conditions in which objects and collections are housed, by controlling the factors that cause damage and deterioration, such as visible light, ultra-violet radiation, humidity, temperature, biological pests, dust and pollutants. Damage and decay of the collections is thereby significantly reduced.

Preventive conservation will also ensure that good handling, storage and display methods are used to preserve museum collections for the future.

We can therefore see that preventive conservation slows down deterioration and stabilises the condition of objects in museum collections by means of routine care and good housekeeping procedures. This can be achieved without interfering with the objects themselves, so that non-specialists, and specialists alike can make a valuable contribution towards the long-term preservation of those collections in your care.

Remember: It's important to know the difference between damage, which happens suddenly, e.g. a ceramic vase that is knocked over accidentally and breaks; and deterioration, which happens over a long time and is not always noticed until it's too late, e.g. a piece of furniture sitting in front of a window that has sunlight streaming in onto it.

In order to minimise damage & deterioration, we need to:

ASSESS & UNDERSTAND THE MUSEUM ENVIRONMENT

Begin by examining the environment in which the collections are housed, for example, local weather conditions, the buildings, vegetation in the form of gardens, proximity of roads & volume of traffic they carry, environmental conditions and human influences inside the museums ...

To help you with the assessment of your museum environment, answer the following questions:

EXTERNAL ENVIRONMENT

- What is the rainfall in your area? During which seasons does heavy rainfall & high levels of humidity occur? Have you noticed leaks or mould?
- Do you feel there are big differences in temperature – daily, monthly, seasonally? Has monitoring equipment been used to measure the changes in Temperature & humidity levels, for a full year, to achieve a range of measured data, or are you basing the changes on observations and physical sensations in response to the question above?
- Where is your museum/archive/gallery located geographically – near the sea, close to industry, next to a river?
- If there are buildings near to the museum, do you think that they have an effect on the internal environment of the museum?
- If there are gardens surrounding the museum, could leaves present a problem for the museum building, like blocking gutters in winter, or harbouring rodents and other pests?
- If there are busy roads close to the museum, is it likely that the volume of traffic could cause pollution and/or vibration?
- How would the environment affect sculpture or other objects that have to be exhibited outside?
- Are the objects in the collections in good condition?

INTERNAL ENVIRONMENT

- Is the museum building structurally sound? Are there leaks, doors or windows that do not seal?
- How are objects on display protected from touch, theft or the environment?
- Are the displays overcrowded?
- Are the storage conditions adequate?
- Are there routine checks of environmental conditions in the public galleries and in the stores?
- Do visitors and staff know how to use the museum properly? For example, is eating and drinking controlled at exhibition openings, and is food & drink forbidden in store rooms? Is garbage and other waste material properly disposed of? How do people behave in the museum?

MATERIALS THAT MAKE UP MUSEUM COLLECTIONS

We shall look more closely at what museum collections are made up of:

1. **ORGANIC** materials are derived from living organisms and contain carbon in their composition.

We are familiar with organic materials such as fur coats, wooden utensils and grass baskets, but it's not as obvious for paper, woollen & linen textiles, and plastics, which are also organic materials, and 'end products' of wood pulp from trees, wool from sheep, and linen from the flax plant.

2. **INORGANIC** materials are derived from rocks and minerals, for example, stone & metals.

Organic

Bone
Horn
Ivory
Tortoise shell
Shell (marine, egg)
Scales
Hair
Teeth
Claws

Feathers
Fur
Partly-dressed Skin
Tanned leather
Textiles (cotton, linen, silk, wool, synthetic)
Plant fibres (basketry, mats, brooms, etc.)
Wood
Plastics
Adhesives & sizes
Drawing & binding media
Lacquers & varnishes
Waxes & resins

Inorganic

Stone
Metals (silver, gold, copper, iron, brass, bronze, etc.)
Ceramics
Glass
Plaster & stucco
Earth pigments

Organic and inorganic materials are often combined to form one object, for example, a metal knife in a leather sheath.

ACQUISITION PROCEDURES

As part of the process for motivation for acquiring an object, an assessment of its condition has to be carried out by conservation staff in order to establish whether it is in a good enough condition to be included into the permanent collections.

This can be done in consultation with the responsible curator and/or collections management staff.

Assessment will include the following:

- Assessing the general physical condition of the object with regard to the need for immediate treatment and the possible rate of deterioration;
- Determining whether the potential material for the collection is insect-free;
- Establishing whether the material/s used in manufacture is/are stable;
- Working out the implications for the long-term - for exhibition, education or any other use.

Pest control procedures for new acquisitions:

A careful examination must be carried out before objects made of organic material, in particular, are allowed into the stored or exhibited collections. Inspection may reveal insect damage, but insect eggs or small larvae are more difficult to see. However, although the flight holes of wood-boring insects may be obvious, developing larvae will be hidden in the wood;

Quarantining material once it has been acquired for the permanent collections:

New material, but particularly organic material, must be quarantined to determine whether there is an infestation and if so, whether it's active or long dead. If objects show evidence of active infestation, they should be further isolated for several months, bagged and labelled, with a fumigant, under the appropriate sealed conditions, to destroy any further insect activity. After the incubation period, a condition report must be done along with a photographic record of the damage. Affected objects must be cleaned of all evidence e.g. frass, insect bodies or larval cases.

REGISTRATION PROCEDURES

Marking & labelling objects:

Introduction

Each object that is accessioned into the collection must be marked with its unique identity number, in a way that is as permanent as possible without damaging it. Each object must carry its number at all times, so that it can be linked to the information held in the data base or written records.

Guidelines for labelling or marking objects in the collection

- **Security** – the chances of accidental removal of the number from the object must be extremely low.
- **Reversible** – it should be possible for a label or mark to be removed intentionally from an object, even after 50 – 100 years, with as little trace as possible.
- **Object safety** – neither the materials used, nor the method by which they are applied, should cause any damage to the object.
- **Discreet but visible** – the method of marking should not spoil the appearance of an object, nor obscure any important detail. However the number should be visible enough to reduce the need to handle the object.
- The accession number should be written neatly and clearly on each object, in a place that is not immediately obvious.
- The number is written in the same place on each category of object (photo. of several objects of same kind to illustrate here)
- The number is marked directly onto objects unless there isn't a suitable surface to write on, using Indian ink, a suitable alternative black ink, or an archival marking pen.
- Attach tie-on card labels or paper tags to objects where the number is written underneath, or in some less obvious place, which is not easily visible in storage. The number is written on both sides of the card/tag, and is tied close to where it is marked on the object.
- Choose a tie-on label/tag relative to the size of the object, for example, the smallest size tag for a tiny pair of beaded earrings.

Marking the number directly onto an object:

- Use only good quality black Indian ink, white ink or paint, with mapping pens, & fine brushes; or water-proof, archival marker pens.

- Some object surfaces, like baskets, will not accept the ink directly, a consolidant, Paraloid B-72, can be used as a barrier coat, so that the number can be written on more easily with ink.
- Paraloid B-72 has the best ageing characteristics of any barrier coating; it doesn't change colour; and stays soluble in the solvent, acetone (a flammable solvent), which is quick-drying.

Method:

- make up a 20% solution of Paraloid B-72 - measure out 10g (weight) of the B-72 'beads', and dissolve them in 50 ml (volume) of acetone;
- mix up in a container that can be made airtight, and label the container;
- seal the container and wait for the beads to dissolve (shaking the container periodically to help dissolve them);
- small quantities can be decanted into smaller, more convenient containers;
- Paraloid B-72 in acetone should be stored in a sealed container;
- mark the container clearly with: 20% solution, Paraloid B-72.

Application:

- select a clean area on the surface of the object – support the object if necessary so that it can be left to dry after the final marking;
- dip an artist's brush into the B-72, but don't overload it, to avoid drips;
- non-porous surfaces*: cover an area only slightly larger than the size of the number to be marked;
- spread the B-72 with one steady brush stroke, and then spread again, in the opposite direction to use the solution on the other side of the brush;
- leave it to dry for at least 24 hours;
- porous surfaces*: it is important to build up enough layers, so apply 3 coats of B-72 to prevent the ink penetrating the surface. Allow each coat to dry thoroughly before applying the next one. Enough B-72 solution has been applied when it dries to a fairly consistent, smooth, dull sheen.

Guidelines for working safely with potentially hazardous substances, like Paraloid B-72.

- remember to wash your hands before and after a marking session;
- work only where there is adequate ventilation;
- you will need access to disposal of waste;
- clean & care for equipment before and after use;
- protective clothing in the form of gloves and eye protection should be worn;
- safe storage of materials is important, as well as safe methods of decanting them;
- food & drink will not be allowed in the work area;
- particular care should be taken when working with acetone, which is a highly flammable solvent.
- Make sure that the number is written consistently, clearly and neatly in the same place on each type of object, e.g. always on the soles of shoes, at mouth-end of pipe stems, top right, or left hand corner of framed paintings, or under the seats of chairs.

Positioning of numbers on objects:

General guidelines for positioning numbers on objects

- Avoid physically unstable surfaces, or writing the number across a line of weakness, or fracture;
- Avoid decorative, painted, varnished, pigmented or waxed areas;
- Avoid surfaces where the number is likely to be affected by abrasion, such as surfaces on which it normally rests, or where touched during handling;
- Mark all detachable parts of an object;
- Position the number so that handling, necessary to read it, is minimised – consider adding a tie-on label as well;
- With composite objects, mark the part on which the most secure method can be used;

Positioning the numbers on different categories of objects in collections

- objects with short handles, e.g. **adzes, awls, axes, clubs, hoes, knives, hammers, swords, tongs, and other small tools**, at the butt end of handle.
- long handled objects, e.g. **paddle, spear, blow pipe, pestle, fishing rod, harpoon, staffs-of-office**, along butt end of handle or on butt end.
- stick-like objects, long & short, e.g. **arrows, fire sticks, needle, stirrer, stick**, along butt end.
- on tang of **adze & hoe blade, spear head**.
- **framed art works** will be marked at the back, at the top, right or left hand corner; **unframed works on paper** will be marked at the back, at the top, right or left hand corner, using a soft pencil only; **3-dimensional art works** will be marked in a consistently, inconspicuous place, underneath being preferable, but if not, at the back, near the base.
- **tusks & horns** will be just inside the opening at the base end.
- **bags made of soft skin or cloth** will be just inside the mouth of the bag or at the end of the carrying strap/s. A paper/card tag will also be attached. Some cloth bags may require a cotton tape label (sewn just inside the mouth, if it isn't possible to write the number directly onto the cloth).
- containers, e.g. **wooden vessels, flasks, ceramics & glass, calabash vessels & mortars**, will be, as far as possible, underneath each object. For the number to be more immediately visible in storage, a tie-on card tag is attached. If there

isn't a suitable place to attach it, cotton tape is tied around the container, and the card tag attached to that.

- **baskets, including containers made of other materials, e.g. gourds/calabashes, beer strainers**, the number will be, as far as possible, written underneath the object, but a paper/card tag will also be attached so that the number is more immediately visible in storage (see 'Number not marked directly on an object', pp. 7/8). In some cases the basket weave may not be open enough to attach a tag. Therefore cotton tape will be tied round the neck or circumference of the basket or gourd, and a tie-on tag attached to the tape. Baskets with open weave will allow the use of an awl to push through the tag string, gently, but firmly.
- **jewellery from European collections**, e.g. brooches, necklaces, rings. The number will be written clearly and discreetly, using the 'Paraloid B-72' method (see section on 'Marking the number directly onto an object', pp. 6/7). A tie-on card tag can also be attached.
- **beaded ornaments (head, neck, body, arms, legs) beaded onto cloth or skin** will be consistently in the same place on each type of ornament, on the cloth or skin backing. In some cases, where it isn't possible to use string tags, it will be safer to write the number on a piece of cotton tape and stitch it to the wrong side of cloth or skin backing (see 'Number not marked directly on object', p. 11).
- on other 3-dimensional objects, e.g. **toys, dolls, figures (sculptures), shoes, headrests, masks, musical instruments, quivers, pipes, stools, chairs** will be marked according to size and category of object.
- on 2-dimensional objects, e.g. **posters, framed paintings, shields**, will be on the reverse side at the top, but not necessarily all in black Indian ink (see below).
- **weapons (hand guns, rifles & other weapons of similar length)** will be underneath, at the butt end.
- **swords** – the number will be written on the handle, as well as on the sheath at the handle end. It is advisable to attach a tie-on tag to the handle as well.
- **Other objects made only of metal (silver, brass, copper)**, the number will be written clearly and discreetly, according to type of object, e.g. *cutlery* – underneath, at end of handle; *containers* – written on base in discreet place, also card tag; *large pieces of machinery* – written big and bold to be easily seen in their storage position; *memorial plaques* – written on the back at the bottom edge. The 'Paraloid B-72' method is used (see section on 'Marking the number directly onto an object', pp. 3/4).
- **horse trappings** will be marked at one end of a leather strap, and/or on any metal parts, like bits, using Paraloid B-72.

- **heavy stone objects, e.g. rock paintings, grinding stones, gravestones, postal stones** will be marked clearly & neatly on top or side surface. Paraloid B-72 is used to mark the number more permanently.
- **mats (sleeping, sitting, table, food)** will be marked consistently on the underside, at one end, on the left or right hand corner. A tie-on card tag will also be attached to the mat for easy identification of the number.
- **rope and string** will be marked at one end, accompanied by a tie-on card tag attached to same end.
- **large unwieldy objects, e.g. maritime material, sledges, 'fridges, small boats, wagons, bicycles, machine tools and work benches** will be marked consistently, clearly and neatly in the same place for each category of object. Large, numbered, tie-on card tags will also be attached.
- **smaller objects, e.g. mixed collections such as typewriters, suitcases & maritime material**, will be marked consistently and clearly, and where an object has a cover, both parts must be marked, attaching a numbered, tie-on card tag where necessary.
- **Furniture: large & tall pieces, like armoires, chest-of-drawers, tables, & long-case clocks**, will be marked, clearly and neatly, inside at the back, in the top right or left hand corner, or in a drawer. Tie-on card tags with the number written on both sides, can be attached to objects in storage, to be more easily visible.
- **Other smaller clocks** will be marked on the back, at the top or bottom edge. If it isn't possible to mark the back of a clock, the number can be written underneath, using the Paraloid B-72 method (see section on 'Marking the number directly onto an object').
- **Musical instruments** will be marked consistently in the same place, according to the category of instrument, e.g. flutes will be marked at the mouth ends; drums around the top just below the drum skin; and at one end of the bow for musical bows.
- **Archaeological material**
Larger, individual artefacts will be marked clearly with the relevant museum excavation code and accession number, ensuring that each is marked in an inconspicuous place.
- **Objects made of, or incorporating materials that are most vulnerable to insect attack: feathers, fur, partly-dressed skins, ivory, tortoise-shell**, will be marked according to the kind of objects they are (see marking of all types of objects above).

Number not marked directly on an object:

- If the number cannot be written on an object, a card tag will be attached to it in a more visible position.
- The accession number is written on both sides of the card tag.
- An accession number can be written on a piece of cotton tape with a black marker, and the tape is stitched on at one end, to the wrong side of flat textiles, & cloth.
- What to remember when attaching the tape:
 - i. it must be possible to stitch into the textile without causing damage;
 - ii. if the label needs to be visible when the rolled textile is in storage, it might be worth sewing a marked cotton tape to the calico textile cover;
 - iii. select a tape width appropriate to the size of the object;
 - iv. for a standard cotton tape label, sewn in, cut the tape approximately 5 mm longer at each end than the finished length of the label, turn under the raw edges, and stitch in place with a few hemming stitches at each end, using a fine thread without making a knot.
- The tape with the number on it should always be stitched to the left, or right top, open corner on a flat, rolled textile, mat, rug, or beaded ornament for easy identification, and with the minimum amount of handling.
- Objects such as coins, too small and detailed to be marked, or not easy to tie a label/tag onto them. The only option is a loose label:
 - i. write the number on a piece of acid-free paper, cut to the size of coin, place under coin in storage tray/drawer;
 - ii. photograph the reverse side of the coin, mark the number on rear border of coin-shaped print, and place under coin in storage drawer. Place a coin-shaped piece of Mylar over the coin, write the number on the Mylar;
 - iii. as an additional means of identification, record the weight of the coin.
- Archaeological material:

Other smaller excavated material (stone, bone, shell & pottery) stored in Correx (see Appendix, 'List of Products', p. 8) boxes, will have information marked on the individual boxes, within the cardboard boxes. Details of the contents of each cardboard box will be marked on a separate sheet of paper, folded in half and hung over the narrow end of the box (see Appendix, p. 23, Figs 1 & 2). For the type of information written on the paper label, see Appendix, pp. 24, 25, Figs 3 & 5);

small finds stored in unsealed polyethylene, Ziploc bags, will have excavation numbers & other details marked on a paper label, and placed inside the bag (see Appendix, p. 25, Fig 4).

Rock paintings & engravings will be marked clearly on the back surface of the rock, as well as on the Correx lid made for each painting & engraving (see Appendix, p. 31, Fig. 13, 'Protection of rock paintings & engravings from dust.)

Positioning of number on:

- **Clothing:**
head wear: headdresses, hats & caps will be on cotton tape stitched inside the crown of the head wear (see p. 1, points 3 – 5, for how to number head wear).
body coverings: blouses, shirts, jackets, smocks, tunics, skirts, dresses, trousers, robes, cloaks, capes will be on cotton tape stitched inside the neck of the garment (see p. 11, points 3 – 5, for how to number flat textiles).
- **flat textiles, e.g. cloth, carpets & rugs, mats, hip-wraps & loin-cloths** will be on cotton tape stitched on the wrong side at the open end (if rolled), and in the left or right corner.

STORAGE OF COLLECTIONS

Location:

- external environment – trees & gardens, birds, guttering, roofs, fumes & vibrations from traffic;
- internal environment – even, sealed & load bearing nature of floors, sealed & waterproof nature of walls & ceilings, suitable width/height of entrance/exit to move largest material in and out.

How best to protect the collections from:

- air pollution – motor vehicles, filtered air, closed environment (seals on windows & doors);
- fire, floods – fire preventive system, regular maintenance programme;
- pests – Integrated Pest Management programme, good housekeeping, vigilance;
- ultra violet (UV) & visible radiation (Infra red/heat) – blinds, shutters, UV film, tungsten lighting, controlled lux levels; keeping collections in the dark, in storage, when not being examined or exhibited;
- mechanical damage – handling guidelines, safe storage techniques;
- theft & vandalism – access control, single entrance/exit to store, tamper-proof locks.

Storage furniture:

- efficient use of space:
 - adjustable shelving;
 - mobile units for large objects;
 - mezzanine levels;
 - platforms should be raised a minimum of 100 mm off the floor.
- requirements for different collection materials:
 - rollers for textiles;
 - hanging space for robust clothing/costume;
 - compartmentalised drawers for small objects;
 - adjustable shelving (max. 2 m high) strong & low level for heavy objects;
 - racking;
 - pallets, with or without wheels;
 - closed cupboards with glazed fronts for viewing fragile objects & solid doors for most other collections.

Storage materials should be as inert, or neutral as possible:

- baked enamelled metal cabinets & shelving are best, but if they are made of wood, they must be completely sealed to avoid damage from acidic fumes;
- polyethylene foams, that come in many different grades and thicknesses;
- cellulosic textiles preferred as covering materials, as protein material, like wool, felts and velvet, can tarnish metals & damage black & white photographs (sulphur compounds like sulphur dioxide given off which is damaging);
- be careful of dyed cottons, as some dye processes contain sulphur;
- watch out for plastics that are labelled 'archival', but have no description. Polyester is suitable and is found in Mylar, or mellinex, Perspex, polypropylene;
- avoid oil-based paints which produce organic acid vapours if not allowed to dry properly. They are fine once the smell has disappeared. Best to use as little paint as possible – wood sealers or neutral fabrics are preferable;
- PVA emulsion adhesives like Alcolin & rubber-based adhesives should also be avoided as they contain sulphur.

Storage methods:

storage packing:

make use of trays;
open & lidded boxes (acid-free where possible);
neutral supports & cushioning, or padding for headwear, jewellery
& other ornaments, clothing & flat textiles

accessibility:

do not overcrowd;
accession numbers must be clearly visible;
shelves should not be too deep;
heavy objects to be placed on lower level shelves;
shelving should not be higher than 2 m. to avoid light fittings,
pipes & ducts;
access to objects is easier if a strong ladder is used;
minimum width of aisles is 1 m.

Procedures to follow when working in the collection store:

- Access to the collection stores must be strictly controlled. If access is by means of an *access card with code* and/or *key* system, only certain, responsible staff members should have card/key access to the stores;
- Keep entrance/exit door closed when working in a store in order to keep the collection safe & maintain a stable environment inside the store room;
- If there is a Fire system (for detection &/or prevention), for protection of the collections, it must be switched to 'Manual' on the fire panel before entering stores, and switched back to 'Automatic' when leaving;
Smoke detectors in stores are usually so sensitive that they will pick up smoke from distant fires, and even dust from tools like angle-grinders, or from building works in the vicinity.
- Lighting is important to enable work to be carried out in the store, such as retrieving objects for research, exhibition or loan. It is critical, however, to light up only the section of store being worked in, allowing the rest of the store to remain in darkness. This system of lighting will minimise the cumulative damage that visible lighting does to the collections (see Appendix, Agents of Deterioration, Light, pp. 41 - 50);
- The Climate in the store:
 - ❖ Keep the entrance/exit door closed when working in the store in order to maintain a stable environment around the collection housed in there;
 - ❖ It is advisable to place digital data loggers (see Appendix, List of Suppliers ..., p. 21) in stores, so that the temperature & relative humidity (RH) can be monitored accurately. Levels must be checked before work starts in the store, to monitor extremes or daily fluctuations of temperature & RH. The data logger/s will be downloaded every 2 months to assist with maintaining the appropriately safe levels (see Appendix, for procedures on where to place the data logger & how to read it; download records, p. 26);
 - ❖ Understanding temperature & RH, and light, as agents of deterioration of collections in storage (see Appendix, Agents of Deterioration, pp. 33 - 50);
 - ❖ Control of insect pests, rodents & mould (see Appendix, Biological pests, controls & procedures, pp. 51 - 72);
 - ❖ Control of dust and gaseous pollution (see Appendix, Agents of Deterioration, Atmospheric Pollution, pp. 73 – 78; see Manual, Housekeeping programme, pp. 17 -19)

Handling collections (see Appendix, Agents of Deterioration, Mechanical, or Physical damage, pp. 79 - 83):

- ❖ Clean hands or gloves (see Appendix for Types of gloves, p. 27), are essential for handling collections;
- ❖ Cover work surfaces in the store with bubble wrap or polyethylene foam before laying objects down;
- ❖ Before objects are removed from storage and placed on the work surface for any purpose, such as research, exhibition or loan, make sure that the way is prepared, to avoid the risk of damage.
- Working in an ordered way – keeping the store tidy even while working on parts of the collection, retrieving objects from storage for researchers, exhibition or loan. Leaving the store tidy at the end of each day of work.
- Using ladders & trolleys in the store:

Ladders

- ❖ The best ladders to use in the collection store, are sturdy, good quality, A-frame ladders;
- ❖ check that the ladder is stable before climbing it;
- ❖ **never** climb to the very top of a ladder, depending on its height, leave 2 or 3 rungs clear;
- ❖ if a ladder is used in front of a door, lock the door, or open it wide.
- ❖ do not lean over sideways too far, while standing on a ladder;
- ❖ always place the ladder on a stable floor surface, protecting the surface if necessary;
- ❖ use strong closed shoes with clean non-slip soles when climbing a ladder;
- ❖ use both hands when climbing up and down;
- ❖ keep facing the ladder when going up or down.
- ❖ take tools up a ladder in a belt worn around the waist, or a bag that can be attached to the ladder. Do not carry them in the hand, while at the same time climbing the ladder;
- ❖ never jump off a ladder;
- ❖ never have more than one person standing on a ladder at a time. A second person may steady the ladder while the first person climbs it.

Trolleys

- ❖ 2- or 3-tier trolleys are the most suitable to use in the store;
- ❖ they should be epoxy-coated steel, and be able to carry up to 180 kg;
- ❖ all four wheels should be able to swivel, and the front 2 wheels should be fitted with stops or brakes;
- ❖ each collection store should be equipped with 2 or 3 trolleys;
- ❖ where there are collections that are particularly vulnerable to mechanical damage, it's advisable to 'pad out' one of the trolleys with foam (see Appendix, p. 27, for illustration of trolley modification).

Housekeeping programme for collections in closed and open storage:

Includes general cleaning of storage areas, environmental monitoring, pest control & mould prevention.

General cleaning programme

In order to maintain a dust- & pollutant-free environment for the collections in storage, a regular cleaning programme is needed. The importance of a regular and thorough programme is borne out by the fact that most social history collections are made up of mainly organic materials, which are particularly vulnerable to deterioration by dust & other pollutants, insects and mould, as a result of extremes & fluctuations in levels of temperature and relative humidity (RH) (see sections at end, on Integrated Pest Management).

Cleaning methods

Dusting:

Collect the dust into the folds of a clean, soft, dry and lint-free duster, using a light touch. Take great care near loose mouldings and veneers, as it's easy to dislodge them. Dust from the top down, so that any dust that escapes the duster will fall to the ground and be flat-mopped or vacuumed up. For example, the top of an armoire is dusted first, then the sides, the back, front doors, and drawers, leaving the feet until last.

Sweeping: (see Appendix, p. 33, Fig. 15)

Use a flat mop to sweep floor surfaces, shaking off the dust & dirt in the same place, every so often. The mop handle can lie flat so that the mop can slide under storage furniture. A dust pan & short-handled, soft broom may be used to collect the 'sweepings', which must then be transferred to a black garbage bag.

Vacuuming:

After the floor areas, in the storeroom, have been swept or 'flat-mopped', they should be vacuumed, remembering to vacuum in all corners, and other areas inaccessible to the flat mop.

A routine cleaning schedule for collections in storage

Monday **dust** **flat mop** **vacuum**

Tuesday **flat mop**

Wednesday **dust** **flat mop** **vacuum**

Thursday **flat mop**

Friday **dust** **flat mop** **vacuum**

Housekeeping equipment

General requirements for a store room:

- It should be equipped with shelves, cupboards & racks to ensure all materials and equipment are **visible, easily accessible**, and the store is kept **clean & tidy**.
- A check list for all equipment & cleaning materials should be kept.

Equipment requirements for housekeeping team:

- Each member of the team must have own set of **brushes, cloths, masks & gloves** (protective clothing & equipment), for which they have sole responsibility, i.e. to **clean & care for**, to use sparingly but to best effect.
- The team must have access to a set of general tools which are to be kept in the housekeeping equipment store.
- The housekeeping programme must provide time for routine care of equipment, as well as for regular checks of the store room, and where necessary, re-stocking. This should be done at least twice a year.
- Identify a time, once a year, to have all portable electrical appliances tested for electrical safety, as well as when vacuum cleaners, polishers and other machinery need servicing.

General equipment:

- Vacuum cleaner (with all appropriate nozzles & extension pipes, & a soft bristle brush)
A wet/dry vacuum cleaner is preferred as a domestic dry vacuum cleaner will allow some of the dust to be exhausted back out into the air. The one drawback

is, however, that the wet/dry vacuum cleaner is considerably more expensive than the domestic dry vacuum cleaner.

- Flat mop
Conventional brooms are not to be used anywhere near collections in storage, as they spread the dust & dirt, which re-settles in the area just swept. It is important to obtain at least 2 or 3 flat mop covers so that a cover can be washed after each use.
- Dust pan & short-handled, soft broom can be used to collect up the dust & dirt gathered by the flat mop.
- Dusters
Micro-fibre cloths make the most suitable dusters, as they are smooth textured, soft, lint-free and a decent size. They are easily obtainable at supermarkets. Traditional 'yellow dusters' are generally of poor quality, i.e. they do not last long, are not lint-free, and have become a third of their original size. It is advisable to obtain 2 or 3 dusters, so that a duster can be washed after each use.
Feather dusters are forbidden in stored collection areas, because, like conventional brooms, they scatter and spread the dust into the air, until later when it re-settles over the dusted areas. The feather tendrils are likely to catch on loose or raised pieces of veneer or marquetry on furniture. They also tend to scratch furniture surfaces.

See Appendix for *Procedures for safe cleaning routines*, pp. 104 – 105

Integrated pest management

- Pest control is carried out by DPW pest control contractor/external pest control contractor four times a year (see Appendix for procedures around routine Pest Control programme, pp. 56 - 57);
- Sticky insect traps are set in various undisturbed corners of the exhibition areas in order to identify the insect pests that are likely to cause damage to the collections;
- Cockroach traps, discreetly placed in open display areas, must be checked regularly.

Storing collections

Introduction

Well-organised storage should reduce the risk of mechanical or environmental damage, but at the same time it should facilitate accessibility to the collections. A very small percentage of social history collections end up on exhibition. The major part of the collections remain in storage, and for a very long time, so it is important to provide the best possible storage conditions for them. Because of the perishable nature, and variety of materials comprising museum collections, special storage measures have to be devised for the many different categories of objects.

If storage conditions do not allow the collections to be viewed easily, there is a real danger of deterioration continuing undetected, until it's too late to save some objects. This is where good collections records will affect accessibility and retrieval requirements. Our aim is to try to achieve and maintain stable environmental conditions in the store room, in order to create a safe and pest-free environment.

Factors which influence the selection of a particular method of storage:

- the type of material to be stored;
- the condition of the objects and the materials they are made of;
- the physical space allocated to storage with regard to environmental conditions; be certain that it is a stable & dry space in a well-insulated building;
- the need for visual accessibility;
- how often objects are physically removed from their storage location;
- the possibility that a storage system could be modified or improved to accommodate unconventionally-shaped objects in a variety of sizes;
- the environmental requirements of various materials in the collections, for example, temperature, moisture & light levels (see Appendix, Agents of Deterioration, pp. 33 - 50);
- appropriate security measures inside and outside the store room;
- the effective use of space for existing collections, to avoid overcrowding as well as to estimate storage needs for their future growth.

Procedures for storing the variety of objects that make up social history collections.

Arms & armour

Hand guns, Knives - check accession numbers (see 'Positioning of nos.' p. 10)

- white cotton, vinyl or nitrile gloves are to be worn when handling the hand guns & knives throughout the storage process;
- line the drawers with polyethylene foam (SPX 33, white, 10 mm thick);
- store hand guns & knives, separately, on the foam, starting at the back LH side of drawer;
- place hand guns so that butts & barrels are in line with the sides of the drawer; knives should lie so that blade & handle are in line with the front and back of drawer (photo. needed here);

Rifles, Shotguns, etc. – check accession numbers (see 'Positioning of nos. ...' p. 10)

- gloves must be worn when handling the long weapons;
- gun racks have been made to accommodate rifles and other longer weapons, but the recesses to hold the barrels & butts must be lined with polyethylene foam: for barrel - SPX 33, black/white, 3 mm thick, adhesive-backed; for butt – SPX 120, black/white, 30 mm thick, adhesive-backed;
- the butt will be supported by the bottom recess, while the barrel will be held in the top one. Make sure that they are securely held and supported.

Spears – check accession numbers (see 'Positioning of nos. ...' p. 10)

- gloves must be worn when handling the spears;
- spear storage consists of wall bands & brackets;
- the brackets will be covered with polyethylene foam (SPX 33, white, 5 mm thick);
- the spears will be laid across the brackets, making sure that each spear is supported by at least 2 brackets. The number of brackets supporting each spear, will depend on its length;

Coins & medals – check accession numbers (see 'Number not marked directly...' p 12)

- gloves must be worn when handling coins & medals;
- coins & medals will be stored in unit trays within drawers;
- each unit tray will be lined with polyethylene foam (SPX 33, white, 5 mm thick), with another layer of foam (SPX 33, white, 5 mm thick) on top;
- coin shapes will be cut out of the top layer, and the coins will be recessed in the various 'holes';
- see 'Number not marked directly on an object', p 11, for procedures on how to number coins & medals.

Philately (Stamps) –

- **Need to find out more about numbering of stamp collections, which are currently stored in albums.**

Jewellery – check accession numbers (see ‘Number not marked directly ...’ p. 10)

- gloves must be worn when handling metal jewellery, in particular;
- the unit trays, lined with polyethylene foam (SPX 33, white, 5 mm thick) will be used to store the jewellery;

Silver & other fine metals – check accession numbers (see ‘Positioning of nos. ...’ p. 10)

- gloves must be worn when handling metal objects;
- line drawers with polyethylene foam (SPX 33, white, 5 mm thick) and place the small, 3-dimensional objects in them;
- line the shelves in the closed cupboards with polyethylene foam (Aerothene, 3 mm thick), and place the large 3-dimensional objects on the shelves. Correx boxes should be made for objects that are not able to stand on their own. The object will stand in the box and be chocked around the base/legs, with acid-free tissue. It is important to view the object easily, but make sure that the accession number is also written on the box.

Large objects, maritime material, ‘fridges, stoves, bicycles & tricycle, postal stones, gravestones, etc. – check accession numbers (see ‘Positioning of nos. ...’ p. 11)

- more heavy-duty leather gloves should be used when handling & moving all the above material;
- the large objects from the Maritime collection will be stored on heavy duty racking and pallets;
- polyethylene foam sheets (SPX 120, black, 50 mm thick), will be laid on the pallets as extra cushioning for the material;
- ‘fridges, stoves, bicycles & tricycle will be placed on pallets. It will be necessary to make some type of wooden frame for the bicycles, to prevent them from falling over. They must be supported by the frame in such a way that the wheels do not rest on the pallet;
- the gravestones will be stored on the open shelving, which will be lined with polyethylene foam sheets (SPX 200, black, 25 mm thick), to protect the gravestones from the hard metal shelves.

Smaller objects, maritime material, mixed collections (suitcases, typewriters, musical instruments) – check accession numbers (see ‘Positioning of nos. ...’ p. 11).

- open racking has been provided for the smaller maritime objects, as well as objects like suitcases & typewriters. Polyethylene foam sheets (SPX 200, black, 25 mm thick) will be laid on the racking shelves to protect the material from the hard metal surface;
- Wear cotton gloves when handling all the above material;
- As the racking is open, covers must be made of cotton cloth (calico) or Tyvek sheeting to protect the objects from dust and visible radiation.

Large, tall furniture, long case clocks, other clocks – check accession numbers (see ‘Positioning of nos. ...’, p. 11).

- large and tall furniture, like armoires, wardrobes, beds, tables, benches, etc., will be stored on pallets covered with polyethylene foam (SPX 120, black, 50 mm thick, or foam squares, cut-out for furniture feet);

- long case clocks will also be stored on pallets, covered with polyethylene foam (as above). A wooden framework must be made to support the long case clocks as they are not very stable;
- other smaller clocks will be stored on shelves, in closed cupboards. The shelves will be lined with polyethylene foam (Aerothene, white, 3 mm thick).

Small wooden pieces, and other 3-dimensional objects, including chairs, stools, headrests, spoons, pipes, mirrors, small tables, adzes, axes, sticks, etc. – check accession numbers (see ‘Positioning of nos. ...’ pps 10/11).

- preferable to wear cotton gloves when handling wooden objects that have a patina (see Appendix, ‘Glossary ...’, p. 7);
- chairs, stools & small tables will be stored on open shelving that is lined with polyethylene foam (SPX 33, white, 5 mm thick). Make sure that the shelves are not too crowded, and each piece of furniture is accessible for removal;
- store wooden vessels & headrests on shelves in the closed cupboards. Line the shelves with polyethylene foam (Aerothene, white, 3 mm thick);
- spoons and pipes can be stored in drawers lined with polyethylene foam (SPX 33, white, 5 mm thick). The spoons should lie in line with the front & back of the drawer, so that they don’t roll when the drawer is opened;
- metal mesh screens have been installed to accommodate objects such as adzes, axes, & sticks. They will be suspended vertically, by inserting foam strips, fixed with double-sided tape, between the screen and the object, at each point of attachment. The foam will protect the objects from the hard metal. Cotton tape will be used to attach the objects to the screen (see Appendix for illustration of storage method, p. 29).

Textiles – check accession numbers (see how to number textiles, ‘Positioning of numbers on ‘Clothing & Flat textiles’, p. 13)

The term ‘textile’ refers to a woven fabric, which is about the interlacing of two elements, one stationary, and one mobile. In the Social History (SH) textile collection, however, there are materials which are produced by other means, and include the interlacing of yarns or threads, such as *knitting*, *crochet work*, *lace-making* & *netting*. There are also *needlework techniques* worked through a woven base like *embroidery* and *tapestry*. Wash your hands thoroughly and often, before handling any textiles.

Textiles that may be found in the collections:

Clothing, including costume, uniforms & ecclesiastical textiles (worn by the clergy)

Headwear – hats and caps

Tapestries

Carpets & rugs

Dolls

Parasols (sun umbrellas)

Fans

Patchwork & appliqué

Flags & banners

Quilts

Needlework & lace

Curtains & upholstery, and

Non-woven ‘textiles’, such as felt & sometimes fur

Procedures for storing the variety of textiles

Flat textiles

- small flat textiles can be stored flat, interleaved with acid-free tissue, when a number of flat textiles are stored one on top of the other. Take care not to store too many on top of each other, and place the heavier textiles at the bottom;
- textiles that need to be folded – all folds must be padded out with crumpled acid-free tissue, or ‘sausages’ of bonded polyester in stockinet tubes. Padding is an important precaution, otherwise textiles will eventually split along the line of sharp folds or creases;
- larger and longer flat textiles should be rolled. Choosing the correct diameter roller is important to minimise curvature of the textile on the roll.

How to choose the correct roller:

Length of textile	Diameter of roller
Up to 1 m	not less than 100 mm
Up to 2 m	100 – 150 mm
Longer than 2 m	150 – 200 mm

The roller should be longer than the width of the textile, i.e. the ends of the roller are exposed. The edges of the textile are protected by the projecting ends of the roller. Cover the roller with acid-free tissue, unbleached cotton (calico), or Tyvek sheeting (see Appendix for Lists of Products & Suppliers, pp. 9 & 18), to protect the textile from acidic vapours and other damaging pollutants. If in doubt, cover the roll with a layer of aluminium foil, and the Tyvek or cotton covering, creating a buffer for any off-gassing. The roller covering also provides a softer surface on which to roll the textile

Rules for rolling textiles

- the front side of the textile should face away from the roller
- if the textile has a pile, like velvet, roll in direction of the pile which faces out
- fringes or tassels should be kept straight in the rolling process. This can be done by sandwiching the fringe or tassels between acid-free tissue, before rolling begins
- always roll along the warp (along the length)
- roll evenly, but not too tightly
- interleave with acid-free tissue
- pad out any raised parts, like embroidery or folds that form along side edges, with acid-free tissue, or ‘sausages’ of bonded polyester in stockinet tubes, so that the textile fibres below are not damaged by pressure from decorative parts
- wide textiles need 2 people to roll it up evenly

The rolling process

- Lay the textile face down on a clean, flat surface, cover the textile with a layer of acid-free tissue (from roll of acid-free tissue), taking care not to crease it. Leave approximately 100 mm of acid-free tissue protruding beyond the roller and the textile, so that it can be used to start the rolling process.

- Place the covered roller on the protruding end of the tissue (see point above), and start rolling. Use a firm pressure so that, as the textile is rolled onto the roller, it remains straight and firm.
- Some flat textiles are not quite 'flat', because of the weaving technique, or they have stretched out of shape. As they are rolled, the folds must be padded out, where necessary, with 'sausages' of bonded polyester in stockinet tubing.
- Cotton tape ties will be tied at several places along the length of the rolled textile, taking care to not tie the tapes too tightly, as they will make grooves in the textile, and ultimately damage the fibres. The number of ties used, are proportional to the length of the rolled textile.
- Once the longer textiles are fully rolled, cover them with unbleached cotton (calico), or Tyvek sheeting (see Appendix for Lists of Products & Suppliers, pp. 9 & 18), and secure the rolls using Velcro, or cotton tape ties, at several places along their length. The longer textiles will be 'threaded' on steel rods, and stored on open racks, so covers are necessary to protect the textiles from light, dust & atmospheric pollution. A numbered cotton tape label is stitched to the cover of each textile for easy identification. It is advisable to standardise the place that the number tape is sewn on to each cover.

Costume

Apart from very heavy or fragile garments, many can be stored on padded hangers, e.g. shirts, bodices, jackets, some dresses, skirts. (see Appendix, for 'Making a padded hanger', p. 29).

Storing garments in drawers

- Line drawers with acid-free tissue or Tyvek sheeting.
- Garments must be padded out with crumpled acid-free tissue, along the fields, on side seams, shoulders and sleeves. All creases and folds should be adequately padded to minimise stress on the fabric.
- Do not store too many garments in one drawer, because the weight of the upper ones, will crush the garments below. Always place the heaviest garment/costume on the bottom.
- Wherever possible keep all parts of one costume together.

Storing accessories

- It's best to store umbrellas & parasols slightly open, and gently padded inside with rolled acid-free tissue, or 'sausages' of bonded polyester in tube stockinet. They should be hung if possible, and each should be wrapped in an unbleached calico (cotton) cover.
- Store accessories, such as ties and scarves flat in drawers lined with acid-free tissue or Tyvek sheeting.

Ceramics & Glass – check accession numbers (see ‘Positioning of nos. ...’, p. 9).

Ceramics and glass objects are easily damaged or broken if they are not handled properly. Store them so that they will be protected from physical damage. Never wear gloves when handling glass or ceramics.

- Closed & glass-fronted cupboards will store particularly fragile objects, and the shelves will be lined with polyethylene foam (Aerothene, white, 3 mm thick).
- Large ceramic objects will be stored on open shelving that is lined with polyethylene foam (SPX 33, black, 5 mm thick).
- Various depths of drawer units will be used to store the smaller, fragile objects. The drawers will be lined with polyethylene foam (Aerothene, white, 3 mm thick).
- It is best not to store drinking glasses upside down. The rims of wine glasses, for example, are more vulnerable to damage than their thicker foot rims.
- Ceramics and glass will be stored in closed cupboards to protect them from dust and dirt. This also means that they will not have to be cleaned too often.
- The storage cupboards should not be subject to vibration or shock. Do not stack objects unless absolutely necessary. Line the cupboard shelves with polyethylene foam (Aerothene, white, 3 mm thick).
- Ceramic or glass objects that cannot stand safely on their own must be supported so that they cannot move, for example, a top-heavy object can be placed on its rim rather than its base; or with polyethylene foam (Firex, grey, 75 mm thick) can be used to make a concave support for a round-bottomed vessel.
- All ceramics and glass objects should be easily accessible and visible, so that handling is kept to a minimum.

Guidelines for cleaning stored glass and ceramics:

- Ceramics and glass objects in good condition can be cleaned to remove surface dirt. Examine carefully each object before washing.
- Washing glazed ceramics is usually a straightforward procedure. Before washing a piece, check for repairs, and any evidence of restoration. Check that the glaze is not flaking off, that any painted, gilded or printed decorative bits are not coming off, or are not soluble in water. Note any form of deterioration.
- It is not advisable to immerse antique ceramics or glass in hot water. The water temperature should be lukewarm or cooler.
- Do not use household detergents, rather wipe the pieces with a cloth that has been ‘squeezed out’ wet in warm water. Washing with tap water is acceptable, but distilled or deionised water (see Appendix, ‘Glossary ...’ p. 6) is preferable.
- Use a plastic container if it is necessary to submerge a piece in water, and line the bottom with a flat piece of polyethylene foam (SPX 33, white, 5 mm thick). Avoid metal containers or sinks. This is a precaution taken to protect any fragments or old repairs which may come apart during the washing process.
- Ceramics & glass should be dried in air, very slowly. Do not ever use heaters to reduce the drying time. Advisable not to dry them by hand, in case the handling causes damage to the more fragile pieces. Avoid rapid fluctuations of

temperature or RH, as this causes uneven expansion and contraction, resulting in cracking or breaking.

Art collections – check accession numbers (see ‘Positioning of nos...’ p. 9).

Art collections fall into the following categories – Framed paintings, Un-framed works (with or without backings) on paper, and 3-dimensional artworks (sculptures in different media).

Framed paintings – check accession numbers (see ‘Positioning of nos....’ p. 9), consist of easel paintings (egg tempera, oil); works on paper; & other media. Pull-out, metal mesh screens will be used to store the framed paintings. Devices for hanging paintings from the metal mesh screens, must be strong and rust-proof (see Appendix, for methods of attachment to the mesh, p. 29). Paintings can hang on both sides of a single screen. Cover the paintings with Tyvek sheeting, to protect them from dust, insects, and fluctuations in environmental conditions. Always wear gloves when handling or transporting framed paintings, especially if they have gilded frames.

Structure of paintings:

Paintings consist of at least two layers: the support layer, which can be canvas, wooden panelling or Masonite; and after the canvas or support layer has been stretched, a size layer and a ground layer are applied to the support layer. The surface will then be ready to accept the paint layer.

It is important to note that paint is a mixture of pigment and medium, pigments being ground powders and a medium being a colourless liquid which binds the pigments together, dries, and forms a hard durable film.

Linseed oil is most commonly used as the medium. The oil painting is then coated with a film-forming substance or mixture known as varnish. Ideally this layer is applied to the work after it has dried for between 10 – 12 months.

Causes of deterioration to paintings in storage

As soon as a painting is completed, it starts to deteriorate. Deterioration is mainly caused by physical and chemical damage.

Physical damage includes tears and breaks, as a result of staff working near paintings that are unprotected, and accidentally putting the handle of a broom, or a ladder through the canvas. This kind of damage is not uncommon, even in stored collections.

Cracking of the varnish and paint layers, because of movement of the support, due to:

- vibration during handling and travel;
- impact when a painting is dropped, knocked, or falls off a wall; and
- fluctuations in relative humidity (RH), & consequently temperature, causes the canvas, or support layer, and wood to take up and release moisture as the relative humidity fluctuates. This results in uneven expansion and contraction of the various layers of the painting, and can lead to cracking of the paint and

varnish layer (see Appendix, Agents of Deterioration, RH & Temperature, Light, pp. 38 - 40, 47, for suitable conditions in storage & on exhibition).

- Separation of the different layers of the painting structure. This can be caused by fluctuations in RH and/or impact.
- Softening of the varnish layer in high temperature conditions. The varnish can become sticky and any dust or dirt on the surface may become permanently attached to the painting.
- Warping of the stretcher due to extremes and fluctuations in RH, and lack of proper support in storage, or on display.
- Wooden stretchers can be attacked by wood borers, and the canvas and cardboard supports are vulnerable to silver fish.
- Dust & dirt can distort paintings if allowed to collect between the lower stretcher bar and the canvas, which can lead to distortion of the canvas.
- Chemical deterioration includes:
 - colour change and fading of pigments when exposed to light and UV radiation, in spite of the fact that oil paintings are often considered to be stable in light. Some pigments and glazes are particularly susceptible to light damage;
 - the varnish may become discoloured, which may be due to exposure to light and UV radiation, or because of the natural ageing of the particular varnish.
- Deterioration of some components of the painting where poor-quality materials have been used, or where the painting has not been properly constructed.
- Reactions between incompatible components of the painting, which is more likely to occur when the painting is made up of a combination of paint and a number of other materials.
- Cracking or movement of paint layers can be a result of the unstable nature of one or more of the components of the painting.
- All components of paintings are vulnerable to mould attack in high humidity conditions.
- Changes due to the action of atmospheric pollutants are:
 - colour change in pigments;
 - the breaking down of structural components leading to loss of strength; and
 - alterations in solubility characteristics of paint and varnish layers.

Un-framed works (with or without backings) on paper, including Rock art copies & tracings.

The un-framed, flat works on paper will be stored in drawer units, interleaved with acid-free tissue paper. Do not stack too many on top of one another, and remember to store the heavier works (particularly those with backing boards) at the bottom. All drawers will be lined with acid-free tissue until it is possible to purchase polyethylene foam (SPX 33, white, 2 mm thick).

Do not wear gloves when handling artworks on paper, but make sure that your hands are always clean – wash them frequently.

What is paper?

Paper is made from cellulose fibres (see Appendix, 'Glossary ...' p. 3). Cellulose consists of long ribbon-like molecules held together in tightly-packed layers to form bundles of microfibrils. Many bundles go to form the paper fibre.

The fibres are suspended in water in the proportions of approximately 5% cellulose fibres to 95% water. The fibres are picked up on a mould (hand-made) or web (machine-made), which are like sieves in structure, allowing the water to drain away, leaving a felted sheet of paper. This process of paper-making has not changed since the first sheet of paper was produced in China around 200 BC.

The most common types of damage to paper in storage:

Paper is vulnerable to physical and chemical damage.

Physical damage includes:

- tears; paper losses; dog-eared corners; dents and punctures;
- creases & folds – paper can split along creases and folds if the paper is brittle or if it is folded and unfolded repeatedly;
- insect attack – paper, sizes and adhesives/glues are good food sources for some insects like fish moths. Mice and rats will also eat paper;
- abrasion and general wear and tear from excessive or careless use;
- distortions caused by fluctuations and extremes of relative humidity and temperature (see Appendix, Agents of Deterioration, RH & Temperature, pp. 33 - 40)

Chemical deterioration includes:

- faded colours and discoloured paper – from exposure to UV radiation and high light levels;
- from the age of the paper item or the other objects with which it comes into contact;

- mould attack – mould digests the materials that it grows on; brittle paper – from acids produced by the paper, or the objects it comes in contact with;
- damage from atmospheric pollutants.

3-Dimensional art works: sculptures in different materials, like wood, metal, as well as composite works, made of a variety of organic and inorganic materials (see Appendix, p. 87).

Gloves must be worn when handling 3-Dimensional works that are made of patinated wood or metal, but for most other 3-D works made of organic & inorganic materials, make sure that your hands are clean and are washed frequently when handling this material.

Most of the 3-D works will be stored on shelves in closed cupboards. The shelves must be lined with polyethylene foam (Aerothene, white, 3 mm thick). Those works that cannot stand on their own, must be well-supported, using polyethylene foam (Firex, grey, 75 mm thick). To learn more about achieving a stable environment around the 3-D art works, refer to the Appendix, Agents of Deterioration, Temperature, Humidity, Light, pp. 33 – 50.

Beadwork (clothing & ornament) – check accession numbers (see ‘Positioning of nos....’, p. 10)

Clothing and ornaments made entirely from beads, need to be stable in storage. Beads are made from many different materials, such as glass, metal, clay, seeds, wood, horn, ivory, ostrich eggshell, with cloth, fur, feathers, skin and plastic being used as backing materials to which the beads are attached or threaded.

Because of its ‘floppy’ nature, beaded fabric has to be well-supported in storage – laid out in drawers lined with cushioning material (bubble wrap or polyethylene foam sheets (15 mm thick)), so that there can be little or no movement when drawers are opened and closed. The drawers should not be too deep. It is preferable to have only one layer of beadwork per drawer, but if space becomes limited, a second layer is permissible.

Trays are cut from sheets of light, flame-retardant Styrofoam, each one smaller than the size of the drawer, or more, that will sit side by side, depending on the size of the drawer. Make sure that the lightest and smallest pieces are reserved for the Styrofoam trays. In this way the beadwork underneath will not be crushed or damaged. Irrespective of the height of the drawers, only one extra layer is allowed.

Method of attaching beadwork to the trays:

Spread the lighter, more fragile pieces out on the Styrofoam trays, and secure them with cotton tape, pinned to the tray with short, stainless steel or brass pins, pushed in at an angle (see Appendix for illustration of tray with beadwork attached, p. 29).

Objects with short handles like adzes & axes, longer thin objects like sticks & clubs – check accession numbers (see ‘Positioning of nos.’, p. 9).

All the above objects will be stored on metal mesh wall screens, attached at top and bottom, with undyed, cotton tape. Pieces of polyethylene foam are sandwiched, top & bottom, between the wall screen and the object to protect the objects from the hard metal of the wall screen (see Appendix for illustration of storage method, p. 29).

Headwear – check accession numbers (see ‘Positioning of nos.’, p. 13).

Headwear, e.g. hats, caps, headdresses, will be stored in deep drawers or on shelves in closed cupboards. It is important that hat brims should be held off the base of the drawer or cupboard shelf. Cut cardboard tubes so that they are tall enough to prevent brims or other parts of headwear from resting on the base of the drawer or shelf. Cover the top third of each piece of tubing with calico over a layer of bonded polyester. This padding will help to support the headwear (see Appendix, ‘A simple storage method for Headwear’, p. 31, Fig. 11).

Objects that are made of, or incorporate materials that are most vulnerable to insect attack: feathers, fur, partly-dressed skins, ivory, tortoise shell – check accession numbers (see ‘Positioning of nos.’, p. 11).

Objects with materials, listed above, should be stored in a ‘cold store’, where the temperature is constantly stable at around 14° - 15°C, with corresponding RH to be kept at 55% (see ‘Agents of Deterioration’, pp. 33 – 40).

The cold room is furnished with open, stainless steel shelving. Most of the objects will need to be stored in clearly-marked boxes, without lids, and placed on the shelves.

Canoes & other small boats, sledges, etc – check accession numbers (see ‘Positioning of nos.’, p. 11).

Specially-designed, metal brackets will have to be made for those boats or sledges that do not already have suitable supports. The brackets will be fixed to walls in the appropriate stores. All the metal brackets will be lined with polyethylene foam (SPX 33, black, 5 mm thick, self-adhesive strips), to protect the objects from the hard metal.

Musical instruments – check accession numbers (see ‘Positioning of numbers’ p. 11)

Possible categories and types of instruments in museum collections:

Aerophones are instruments in which the sound is produced by the vibration of air, and include flutes, horns, bull-roarers & panpipes.

They will be stored, lying flat in drawers, lined with polyethylene foam (SPX 33, white, 20 mm thick). Shallow grooves should be cut for the flutes to rest in, in line with the back and front of the drawer. This will prevent them from moving when the drawer is opened and closed. Choose only drawers that are deeper than the highest instruments, like horns. They should be supported with foam pieces where necessary.

All *Idiophones*, like xylophones, rattles, pellet bells and *mbiras* (thumb pianos), will be laid in drawers of appropriate height, so that they sit comfortably without any movement when drawers are opened and closed. These instruments are made of naturally sonorous (making a sound) material, sounded in a variety of different ways.

The xylophones have been packed in custom-made boxes with lids, and will be stored on the open racks provided.

The drawers will be lined with polyethylene foam (SPX 33, white, 20 mm thick), and the instruments placed so that they don't touch one another.

Membranophones are instruments in which the sound is made by the vibration of a stretched membrane, or a skin. Most of the membranophones are drums of various kinds.

Small drums can be stored on shelves in the closed cupboards. Cover or line the shelves with polyethylene foam (SPX 33, white, 20 mm thick). Large, heavy and unwieldy drums will be stored on open racking, lined with polyethylene foam (SPX 33, black, 25 mm thick). They will be protected from dust by Tyvek sheeting covers (see Appendix for 'Lists of products & suppliers, pp. 10).

Chordophones are instruments in which the sound is made by the vibration of strings, and include musical bows, harps, zithers, guitars, goras and pianos. The oldest and simplest of these is the musical bow.

The best storage for the stringed instruments is in drawers, deep enough to accommodate the type and height of the instruments to be stored in them. Polyethylene foam (SPX 33, white, 20 mm thick) will be used to line the drawers.

The attachment of the calabash resonator to the musical bow is often not very strong, so special care must be taken, to ensure that the resonators are properly supported in the drawers, to reduce the risk of damage.

The goras must be stored so that the fragile quills attached to the strings are not at risk of damage. It is advised that grooves be cut out of the foam for the bows to rest in without moving. This will prevent any pressure on attachment of the strings to the quills.

Pianos and other large musical instruments will be stored on pallets, together with other large, tall pieces of furniture and long case clocks.

Tools – check accession numbers (see 'Positioning of nos.', pp. 9 & 11).

Tools come in many different shapes and sizes, and are often in sets, e.g. chisels, planes, etc. Metal and wood are the main materials used in their manufacture. Gloves must always be worn when handling tools, and those commonly used are cotton, leather, suede, or nitrile.

Pallets, covered with polyethylene foam (SPX 200, black, 50 mm thick), for storage of the heavy-duty machine tools & work benches. Drawer units should be used for individual, and sets of smaller tools. Line the drawers with polyethylene foam (SPX 33, white, 25 mm thick).

In some cases it will be necessary to store more delicate or fine sets of tools in boxes within the drawers. Boxes will be made from Correx board (see Appendix for 'Lists of products & suppliers' pp. 9 & 13).

Horse trappings – check accession numbers (see 'Positioning of nos. ...', p. 10).

Horse trappings include saddles, bridles & bits, reins & girth straps. The saddles should be placed over pole supports. To prevent friction and movement of the saddles, polyethylene foam (SPX 33, black, 5 mm thick) should be placed between the saddle and the pole support as a cushioning layer.

The rest of the horse trappings, e.g. bridles & bits, reins & girth straps, will be laid out as comfortably as possible in drawers which must be lined with polyethylene foam (SPX 33, black, 20 mm thick).

Archaeological material – check excavation & accession numbers (see ‘Positioning of nos. ...’, p. 11, & information written on labels, p. 12).

The goals for suitable storage of Archaeological material are:

- to re-store collections in more appropriate storage cupboards, drawers & shelves;
- to improve environmental conditions in storage;
- to alleviate serious overcrowding and lack of accessibility; and
- to create new space for growth of collections.

Methods of storing archaeological material safely:

Cardboard boxes of excavated material from the Pre-Colonial & Historical collections, will be stored on open racking, so that clear, neat labelling is visible at all times.

Storage of the contents of the boxes, is as follows:

- small finds can be stored in polyethylene, Ziploc bags. Do not seal the bags completely, in order to prevent a micro-climate developing inside the bags; but it is preferable to store them in shallow, Correx board boxes (see Appendix for lists of Products & Suppliers, pp. 9 & 13), within the cardboard box;
- larger artefacts of stone, bone, shell & pottery, will be stored in shallow boxes made of Correx board, within the cardboard box. Secure artefacts by partially embedding them in polyethylene foam (SPX 33, white, 25 mm thick, see lists of Products & Suppliers, pp. 11 & 20), or laying them on a foam base layer of at least 10 mm, and immobilising them with un-dyed, cotton tape and 15 mm-long stainless steel pins (see Appendix, p. 33, Fig. 14). The Correx boxes should have lids in order to accommodate a double layer of boxes inside the cardboard box.

Special & fragile finds will be stored in drawers, lined with polyethylene foam (SPX 33, white, 25 mm thick, see above). Create ‘cut-outs’ in the foam so that the artefacts are comfortably embedded, to prevent them moving when drawers are opened and closed (see Appendix, pp. 31, 32, Figs 12a + b).

Artefacts not stored in conventional cardboard boxes may be stored in smaller foam-lined boxes (as above, but 10 mm thick), within drawers. This will allow assemblages of stone, bone, shell & pottery, to be kept together, and safe from movement damage.

Rock paintings & engravings will be stored on open shelving or racking that has been provided. Shelves/racks should be lined with polyethylene foam (SPX 200, black, 25 mm thick, see above). In order to protect the rocks from dust and mechanical damage, as well as to facilitate accessibility, it will be necessary to make a 'lid' for each rock, using Correx board (3 mm thick). Each lid will be made at least 2 cm larger all round, than the rock, for easy removal. A colour image of each painting or engraving, must be attached to the lid, so that the paintings won't have to be exposed more often than necessary (see Appendix, 'Protection of rock paintings & engravings from dust', p. 32, Fig. 13). Mark the relevant accession number on the lid, alongside the colour image.

GUIDELINES FOR HANDLING, PACKING & TRANSPORTING COLLECTIONS

It is important to make sure that the cultural heritage of the country is preserved for the long-term, so a careful assessment of each object must be carried out before being packed and transported off-site.

General

Be aware of the types of materials to be packed and transported and how vulnerable to damage they are.

Examples of materials and the various levels of vulnerability:

- Most vulnerable: textiles; household objects & ornaments made of metal, particularly silver, copper & brass; furniture; ceramics & glassware; works of art on paper, photographs, books & documents; paintings & sculpture;
- Not as vulnerable: archaeological material (pre-colonial, historical, maritime);
- Least vulnerable: heavy tools & machinery.

There is the risk of damage when objects are transported over long distances. They are particularly susceptible to damage from:

- vibration;
- fluctuations & extremes of temperature & relative humidity (RH);
- repeated handling;
- physical loading & unloading from trucks and other vehicles;
- heat/infra red (IR) & ultra-violet (UV) radiation;
- insect pests & pollutants;
- theft or getting lost.

Methods of packing used should minimise the risk of damage by ensuring:

- full support for each object;
- protection from vibration & shock;
- protection from environmental influences as stated above.

Preparations for packing

- Prepare the path and the packing area before moving any objects. The risk of objects being damaged must be reduced as much as possible.
- Gloves (cotton, vinyl or nitrile), must be worn where appropriate, for example, when handling objects made wholly or partly of metal.
- Assess each object carefully, particularly if it is fragile, very large, or awkwardly-shaped, in order to decide how it should be packed. If you are not sure how to pack it, please ask conservation staff to assist you.
- If you find loose bits which clearly belong to the object being packed, wrap all fragments or pieces individually in acid-free tissue paper. Each bit must be numbered. Mark each tissue paper parcel with the accession number of the object and pack them carefully into lidded containers (this applies only to objects packed to move internally, and not out on loan).



- Make sure that each object is clearly numbered, either on it and/or with a paper tag. The number must be written on both sides of the tag (see below).



- Objects can be made up of many parts that may be detachable. **Do not try to force them** if they do not come apart easily, as this can cause unnecessary damage to the object. If an object can be dismantled, always wrap each part separately in acid-free tissue or newsprint, mark each part with the number of the object, and then pack the parts together in a box. Include detailed instructions on how to reassemble the object. This is particularly important if the person to unpack & reassemble it is not the person who packs it.
- **Do not be in a hurry when packing.** All material must be packed carefully and securely to avoid any movement of objects in transit. Do not overfill a box with objects that could be damaged by crowding. Rather use suitable packing material to pad out the spaces left. Pack boxes so that they are well balanced to facilitate carrying, and don't make them too heavy.

Packing a box

- Line box with one layer of **bubble wrap (b w)** with bubbles down, to prevent the object sticking when placing it in the box or when taking it out. The b w should be much longer at both ends so that it can be flapped over the contents of the box before the lid is put on.
- Where necessary wrap individual objects in suitable kinds of packaging **paper (acid-free (a-f) tissue, toilet tissue, newsprint)**, or b w, provided. Sometimes individual objects will not need to be wrapped, only nested in paper or b w, in the box (see below).



- If objects don't fill the box, or can move around, pad out with either newsprint or b w.
- Mark each parcel with its number: use **pencil** on tissue or newsprint paper.
- Boxes must be clearly marked on top and at the short side with:
 - i. type of material, e.g. **Ceramics, Tools, Textiles**; and
 - ii. the **accession number/s**;
 - iii. **every box must be numbered**. The marking & numbering system used on each box must be written on both the box & corresponding lid;
 - iv. lists must be made, in duplicate, of the contents of each box, one is put into the box and the other kept as a record;

v. all boxes will either be taped with **buff tape** or strapped with **plastic strapping material** (see below).



Packing guidelines for specific collections

Art collection made up of: works on paper, unframed; works on paper, framed, with glass; works on paper, unframed; oil paintings framed, without glass.

Handling

- Prepare the path and the work surface where packing will take place before moving any art works.
- Carry only one work at a time.
- **Never** carry paintings by the top of the frame or stretcher:
Large: carry with one hand beneath and one hand at the side;
Small: carry with one hand at either side.
- **Never** carry or handle paintings with gilded frames without gloves (cotton, vinyl or nitrile);
- Large paintings must be moved by at least two people.
- The painted surface should be facing the person who is carrying the painting.
- Check the frame for strength and any loose pieces, before picking up a framed work.

- Be careful not to touch the painted surface of an oil painting (framed, without glass), with hands or packaging material.
- Check the surface of oil paintings (framed, without glass), to see if the paint is loose or flaking. If there is flaking paint, the painting must be packed and transported in such a way to avoid further paint loss from the unstable painted surface.
- Paintings should be stacked back to back and face to face with similar-sized works together. Do not stack too many together, as this will put pressure on the painting at the back of the stack (see A below).
- A painting must always be stacked right side up, as storing it upside down or on its side will cause stress and subsequently damage to the canvas.



A

Artworks stacked on foam off the floor/ back to back and face to face

The collection is divided into two groups:

- **works on paper;**
- **paintings on canvas and/or board.**

Works on paper need a different storage environment from paintings on canvas.

The two groups above are divided further into three sub-groups:

- **un-framed;**
- **framed, with glass;**
- **framed, without glass.**

Each sub-group needs to be packed differently.

How to pack paintings without glass

- The size of the work table will be determined by the size of the painting/s to be packed.
- The painting must be wrapped with a-f tissue paper like a parcel.
- Cotton tape must be tied across the frame twice, i.e. horizontally & vertically. It must not touch the canvas and should be firm, but not too tight, so that there is still some play in the tape (see 1 & 2 below).
- For the smaller paintings that will not be individually crated, it is best to cut a piece of Correx to the outside dimensions of the frame. This will act as a barrier to prevent any damage in transit.
- Place bubble wrap (b w) on the table (bubbles facing down). Place the cut Correx on the b w. The wrapped painting is placed face down on the Correx to protect the painted canvas surface. Parcel the wrapped painting with b w and secure with buff tape (see p. 40, Figs 3 & 4 below).

How to pack artworks framed with glass

- The size of the work table will be determined by the size of the painting/s to be packed.
- Tape glass with masking tape in a star-shape without the tape touching the frame. Small framed paintings – one strip tape vertically down centre of glass, one horizontal strip, and one strip on each diagonal. Larger paintings will need more.
- Cover the glass surface with a-f tissue paper and use the magic tape to fix it. The tape must be stuck to the glass and not the frame.
- If the painting is edge-to-edge in the frame, **Correx board** must be cut and layered to the same height as the depth of the frame. The board is held on with cotton tape.
- Lay the framed work on b w with the bubbles facing away from the painting (bubbles on the outside).
- Wrap the painting from top to bottom in b w and tape it with **buff tape**, leaving the sides open.



Fig. 1



Fig. 2



Fig. 3



Fig. 4

1 tissue paper, 2 cotton tape, 3 Correx, 4 bubble wrap

Special packing methods for fragile and/or awkwardly-shaped objects

Custom-made boxes

- Boxes were made to comfortably contain a single, or several objects.
- Coruplas (Correx board) was found to be the most suitable and safe material for box-making, as it is made from polypropylene granules, is chemically & biologically inert, and is impervious to water and resistant to grease.

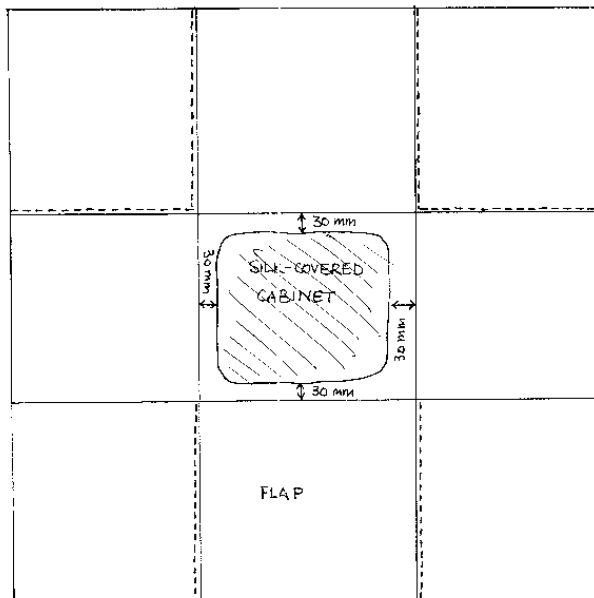
To demonstrate the suitability of the Correx board, a box was made for a fragile, deteriorated, silk-covered cabinet, and is illustrated below.



Lid off, flap down, ready to remove



Cabinet packed into Correx box



To make up:

cut along dotted lines, score along solid lines;
staple sides leaving flap down to pack cabinet easily;
tape-up flap to complete box, make lid and close box.

RETRIEVAL PROCEDURES

Before an object can be removed from a collection store, the appropriate conservation documentation must be completed, and the object must be recorded photographically.

Condition Reporting

The condition of an object will depend on two important factors – its material composition (what it's made of), and the conditions to which it has been subjected during its life.

Condition reports are carried out prior to Accessioning objects into the collection, Conservation treatment, Exhibition, or Loan, and the detail contained in a condition report will depend on the whether it is intended for any of the above. Condition reports need to be clear and concise.

Tools/equipment needed to carry out a condition report:

pencil & paper;
soft measuring tape & callipers or a plastic ruler
small magnifier/thread counter (8x or 10x)
camera

Contents of a Condition Report:

- Materials that objects are made of (see Appendix, p. 87, for Organic & Inorganic materials found in museum collections). It is sometimes difficult to determine precisely the materials of which the object is made, so it is advisable to indicate where you are not certain;
- Condition of the object/s – Is it damaged in any way and how is it/are they damaged (see Appendix, p. 88, for Types of damage to collections);
- Terminology used when doing condition reports (see Appendix, pp 87/88, 'Organic & inorganic materials...' & 'Types of damage to collections');
- Measurements of each object in millimetres, in the following order:
 - Height
 - Length
 - Diameter
 - Width
 - Depth (thickness)

The measurements must be kept simple, i.e. just the Height or Length, unless the shape of the object dictates differently.

- A photograph and/or drawing is an important part of the condition report, primarily to record the condition of an object/s before an exhibition or loan. The photograph or drawing should be marked to show damaged or vulnerable areas. A photograph also serves to show up any changes that occur to the condition of objects after they have been on exhibition or loan.

Recommendations will be made for acceptable environmental conditions on display, for example, acceptable temperature, relative humidity (RH) and light levels, as well as precautions to be taken with regard to handling objects, for example, with or without gloves, or the correct way to support a fragile object during preparations for exhibition. This information will be supplied after completion of the condition reports (see Appendix for types of Condition reports, pp. 85, 86).

EXHIBITIONS

General conservation procedures for exhibitions:

- Conservation assessments of objects selected, and subsequent condition reports, including recommendations for acceptable environmental conditions, will be done. The reports will determine their suitability for exhibition (see Condition Reporting, pp. 43/44);
- Preparation of the material for exhibition: ensure that accession numbers are marked on objects, or tie-on card tags; a photographic record is made; any basic conservation work is done, such as repair or consolidation; the making of mounts where necessary;
- Packing and transporting exhibition material will be done according to the highest conservation standards, particularly when the exhibition venues are situated nationally or internationally (see Appendix, 'Packing & Transportation', pp. 98 – 103);
- Check lists of all material to go on exhibition will be made by conservation staff;
- Conservation staff must always be involved with the installation of material on exhibition, wherever they may be, locally, or in other locations, to ensure that mounts and mounting methods do not have a detrimental effect on the objects being exhibited.
- It is often necessary for conservation staff to act as courier to accompany material loaned to international or national exhibition venues.

Exhibition location:

- external environment – trees & gardens, birds, guttering, roof, fumes & vibrations from traffic;
- internal environment – even, sealed & load-bearing nature of floors, sealed & waterproof nature of walls & ceilings, suitable width/height of entrance/exit to move largest material in and out.

Display cases:

- wall cases should buffer objects from an unstable environment in the museum, but should not be completely sealed to avoid setting up a micro-climate;
- if cases are made of wood, seal the wooden surfaces of them completely to prevent damage from acidic fumes;
- free-standing cases must be securely fixed to the floor, to prevent any movement or vibration that can damage collections;

- safety glass should always be used in fixed wall cases, but thick Perspex can be used in smaller free-standing cases, to protect collections from theft.

Display materials (See Appendix, Atmospheric pollution, pp. 74 - 79):

- glass is better than Perspex as it isn't electrostatic, i.e. attracts dust to the surface of objects;
- if materials such as 'superwood', chipboard, or other composite boards are used for mounts or shelves, make sure they are well-sealed to protect objects from acids (acetic, formaldehyde);
- use neutral materials to cover mount boards or plinths, as some, like velvet and felt also give off sulphides, which tarnish metals like silver;
- use neutral padding/cushioning material for hanging or supporting clothing and other textiles.

Lighting (See Appendix, **Light: Recommended light levels for collections on exhibition**, p. 47):

- lighting should always be outside display cases, unless LED lights are used, or your museum has a budget that allows fibre optic lighting;
- light levels must be adjusted according to the sensitivity of material being displayed.

Other environmental & biological factors:

Temperature & Humidity (RH) (See Appendix, pp. 35/36, Combined effects of Humidity & temperature, Table I, High RH, low Temperatures) – suggested optimum levels: 18° - 22°C, with minimal daily fluctuations, and flexibility over seasonal levels;

Humidity (RH) & temperature (See Appendix, pp. 36/37, Combined effects of Humidity & temperature, Table II, High Temperatures, low RH) – suggested optimum levels: 50 – 55%, with minimal daily fluctuations, but with flexibility over seasonal levels;

Dust & pollutants – cleanliness is critical, inside and outside cases. Regular cleaning programme must be in place: public galleries – general museum cleaning staff; inside cases – curatorial and/or conservation staff;

Pests – Integrated Pest Management (IPM) programme (sticky traps, non-toxic methods of pest control), and a separate system for public galleries and inside cases.

Display methods for some materials:

Books: supporting cradles made from Perspex, polyethylene foam, bonded polyester/cotton cloth; Mylar, or mellinex strips to keep books open without damage.

Photographs/unframed works on paper: Mylar photo corners/strips to attach photographs to mounts; acid-free mounting boards.

Mounting flat textiles: white cotton flannelette as environmental buffer & padding for textile; support fabrics should be of similar fibres to textile and chemically inert; acid-free board like Foam Cor; acid-free PVA adhesives;

Framing flat textiles: Plexiglass should be used for framing as it is safer than glass, and also filters UV;

Hanging flat textiles: Velcro hook & loop tape method; heading cloth method only for lightweight textiles in very good condition;

Historic costume: mannequins must be the right size and shape for the costume – existing mannequins can be modified using tubular stockinet & bonded polyester; mannequins can be made using galvanised chicken wire & a wooden framework & stand (sealed with polyurethane sealer), bonded polyester, acid-free tissue, tubular cotton stockinet.

LOANS

General conservation procedures for all loans:

- Ensure that the Facility Report (see Appendix, Form 5, p. 94 - 97), is filled in by the Borrower to the satisfaction of both the Lender and the Borrower.
- The conservator, conservation & other responsible staff, will examine the requested material carefully to assess whether it is robust/strong enough to be loaned.
- A condition report will be done on each object requested for loan – the amount of detail included will depend on the type of loan (see Appendix, Condition reports for Loans, a – e, pp. 85, 86).
- Preparation of loan material will be done at this point, and includes conservation treatment if necessary; packing of loan material according to type of loan, e.g. parcelling, boxing, crating (see Appendix, 'Packing & Transportation', pp. 98 - 103).
- Development of design and/or manufacture of exhibition mounts.

PROCEDURES FOR THE CARE & CONSERVATION OF HISTORIC COLLECTIONS ON OPEN DISPLAY, AND THE BUILDINGS THEY ARE HOUSED IN.

Good housekeeping is the day-to-day activity through which the agents of deterioration are controlled.

Introduction

- The term 'housekeeping' is used to describe the care of historic collections and interiors, and is designed to keep them in good order and to sustain their useful existence for as long as possible.
- 'Housekeeping' is deliberately used to demonstrate that modern methods are rooted in traditional practices.
- Housekeeping 'care' includes all activities relating to **handling, moving, display, use, storage, transport & first aid treatment**.
- Preventive maintenance is also used, i.e. **monitoring, cleaning, & surface protection** of interiors and objects or collections on open display or in use.
- Housekeeping also includes the care of interiors and collections during **events** and **building work**, as well as use by **researchers**.
- Housekeeping that is part of a preventive conservation strategy, is distinguished from domestic housekeeping, by **reducing treatment, emphasising inspection** and adopting the principles and ethics of professional conservation practices through the guidance of conservators.
- A conservation principle that is of particular relevance for historic houses, is to **understand the significance of each interior and collection** before any practical work takes place.
- '**Significance**' is understood as the '**historic context**', '**spirit**' or '**sense**' of place, as well as the '**integrity**' and continuing function of interiors and objects.
- Significance can only be realised, however, if the public has access to it. An ongoing dialogue is required between curators, those responsible for housekeeping, and conservators. This might also include consultations with members of the community that have a vested interest of special knowledge regarding objects in the collection.

Housekeeping programme for interiors and collections in historic houses and buildings.

- Good housekeeping in historic houses and buildings requires careful planning.
- Frequent dialogue & regular meetings are encouraged, between curators, conservation & collections staff, as well as front-of-house staff, to ensure agreement on how housekeeping can best maintain the significance of each building, house, room and object.
- The regular meetings may be brief, but they allow everyone to catch up with what has been achieved, and to plan what needs doing next.
- Enough time should be allocated during a week, for routine cleaning to take place.
- It is also critical that the front-of-house staff are thoroughly trained in their cleaning tasks. Front-of-house staff should be aware, and able to understand the important role that they play, working as 'part-custodians' of the collections on open display in each of the historic buildings or houses.
- In order to determine whether the contents of an historic house, or building, are stable and can tolerate continued display and routine cleaning, or are deteriorating and require specialist treatment, a fixed point must be established against which to measure changes.
- **A condition report/survey may be done by experienced conservation staff, and should include diagrams or photographs of areas of concern for each fitting/fixture or object.** It shall also include a specialist's view as to whether current or future display could cause damage to particular interiors or objects.
- **Floor plans of collections, as they are placed in the rooms of houses or buildings, will be extremely useful when compiling condition reports of each collection object or fitting/fixture** (see Appendix, pp. 107, 108, for an example of a floor plan).
- The floor plans will also facilitate the work of collections management staff, when drawing up the necessary inventories of collection objects on display in historic houses or buildings.
- A tradition of **preventive maintenance** needs to be established, where tasks are undertaken annually. The principle of preventive maintenance is that cleaning should be carried out only when necessary, and not as a matter of routine. Necessity is driven partly by the desired standards of presentation for each room, and partly by the condition of its contents, as this will dictate the frequency with which cleaning can be carried out without causing damage.

- Routine environmental monitoring will be carried out by conservation staff, and can be incorporated into programmes which will be devised to suit the needs and circumstances of each historic house/building, its collection, and the team looking after it.

Housekeeping equipment

General requirements for a store room:

- It should be equipped with shelves, cupboards & racks to ensure all materials and equipment are **visible, easily accessible**, and the store is kept **clean & tidy**.
- A check list for all equipment & cleaning materials should be kept.

Equipment requirements for housekeeping team:

- Each member of the team must have his/her own set of **brushes, cloths, masks & gloves** (protective clothing & equipment), for which each member has sole responsibility, i.e. to **clean & care for**, to use sparingly but to best effect.
- The team must have access to a set of general tools which are to be kept in the housekeeping equipment store.

General equipment:

- Vacuum cleaner (with all appropriate nozzles & extension pipes, & a soft bristle brush)
A wet/dry vacuum cleaner is preferred as a domestic, dry vacuum cleaner will allow some of the dust to be exhausted back out into the air. The one drawback is, however, that the wet/dry vacuum cleaner is considerably more expensive than the domestic dry vacuum cleaner.
- Flat mop (see Appendix, p. 33, Fig. 15)
The flat mop handle can lie flat so that the mop can slide under furniture on exhibition in historical houses/buildings. Cover the lower part of handle with thin foam to avoid damage to the bottom edges of the furniture.
Conventional brooms are not to be used anywhere near collections in storage, as they spread the dust & dirt, which re-settles in the area just swept. It is important to obtain at least 2 or 3 flat mop covers so that a cover can be washed after each use.
- Dust pan & short-handled, soft broom can be used to collect up the dust & dirt gathered by the flat mop.
- Dusters
Micro-fibre cloths make the most suitable dusters, as they are smooth textured, soft, lint-free and a decent size. They are easily obtainable at supermarkets. Traditional 'yellow dusters' are generally of poor quality, i.e. they do not last long, are not lint-free, and have become a third of their original size.
It is advisable to obtain 2 or 3 dusters, so that a duster can be washed after each use.

Feather dusters are forbidden in stored collection areas, because, like conventional brooms, they scatter and spread the dust into the air, until later when it re-settles over the dusted areas. The feather tendrils are likely to catch on loose or raised pieces of veneer or marquetry on furniture. They also tend to scratch furniture surfaces.

See Appendix for *Procedures for safe cleaning routines*, pp. 104 – 105.

Integrated pest management

- A regular pest control programme must be established, at least 3 times during the year, to renew the environmentally friendly products to control insects & rodents (see Appendix, p. 52 – 54, for procedures around Pest Control programme);
- Sticky insect traps should be set in various undisturbed corners of the exhibition areas in order to identify the insect pests that are likely to cause damage to the collections;
- Cockroach traps, discreetly placed in open display areas, must be checked regularly;
- A housekeeping programme should also be part of integrated pest management, which monitors general cleanliness, the use of food & drink near areas where collections are housed, and the removal of garbage & other waste material.

Preventive maintenance care for vulnerable collections on open display at historic houses and buildings.

Ceramics, including all types of pottery

General

- Ceramics should be handled as little as possible.
- Plan your strategy carefully and in advance of any work involving handling or moving ceramics.
- Cotton gloves should not be worn when handling ceramics, as they don't allow you to hold a piece securely.
- Check for repairs or broken-off bits, before lifting ceramics.
- Always use both hands to pick up an object:
 - ❖ support from underneath if a bowl or plate shape;
 - ❖ support with one hand underneath and one round neck if a vase, jug or canister;
 - ❖ if there is a cover or lid, remove it and put down safely, before picking up the object;
 - ❖ never pick up an object by the handle/s, a plate or bowl by the rim – cradle it in both hands;
 - ❖ figurines, or 3-dimensional objects with bits sticking out should be picked up by supporting the base and the body with both hands.
- Be sure to put objects down gently in case there are hairline cracks that you haven't noticed.
- Never reach over one object to pick up another.
- Do not get distracted when handling ceramics – accidents happen very quickly.
- If when moving ceramics around and doors need to be opened, there should always be another person there to assist you – one to carry and one to open and close doors.
- Sturdy (preferably wicker) baskets are best for carrying ceramics. Line them with felt, bubble wrap or thin polyethylene foam sheets. Use plenty of tissue paper for padding.
- Do not overfill the basket if several pieces have to be moved – never try to squeeze in one extra object to save a trip.
- When dealing with ceramics that are very heavy, and are of awkward size, or have been extensively repaired, be sure to have enough padding material. You

can also ask another person to help you, who can walk ahead to alert anyone in the way, or open and close any doors along the way.

- Ceramic objects placed on wood or marble surfaces should have protective felt mats under them.
- Each piece should be examined carefully before deciding how it should be handled or cleaned.

How to care for ceramics

- Before any cleaning is attempted, identify the kind of ceramic/pottery you are dealing with:
 - ❖ low-fired pottery, porous, and fragile;
 - ❖ high-fired pottery or stoneware that is non-porous;
 - ❖ soft-paste 'imitation' porcelain that is porous and fragile; and
 - ❖ hard-paste 'true' porcelain that is not porous;
 - ❖ ceramics with any flaking areas, repairs, breaks, or parts that might have sharp points, or protrusions.
- Porous and soft-paste ceramics should never be immersed in water, as dirty water will be absorbed through the base and can cause staining. Use moistened swabs of cotton wool to wipe them down.
- Never wash pots that are white and unglazed because dirt becomes engrained, making it difficult or even impossible to remove.
- Any ceramic with gold decoration should not be immersed in water. Dusting or brushing could also remove the gold so keep well away from it when pottery is cleaned.
- Never use household detergents or bleaches on ceramics.

Washing:

- As it is sometimes difficult to see old repairs or hairline cracks, do not immerse those ceramics in water. Stand on a table and wipe down with moistened cotton wool swabs. A soft, bristle brush will get to the intricate parts.
- Always support an object with one hand during the washing process.
- Work from the top down, rinsing off as you go, using cotton wool swabs squeezed out in clean water.
- Wash ceramics in plastic basins, suited to the shapes and fragility of the ceramics, and make sure you are near running water. Cover the work surface

with polythene and over that place a sheet of thin foam on which to place the vulnerable ceramics.

- If the room used for washing ceramics is part of the museum, protect the floor with cotton dust sheets – polythene sheeting becomes very slippery when wet.
- Start with lukewarm water to which is added a suitable detergent. Rinse with clean water.
- Never use ordinary household detergents, which contain harmful additives like bleach, or soap which could leave smears on the object.
- Very dirty objects should be washed in a sink so that the dirty water can drain away. Wrap the taps round with cloths in case the object knocks against them accidentally. Line the bottom of the sink with foam. The washing water should be lukewarm. A written record of the process should be made.

The drying process:

- Lay the ceramic piece down on another table covered with a thin foam sheet (in case the object falls over).
- Dry gently with a soft, linen tea towel, taking care not to put pressure on any one area.
- To dry figures or pots with pieces protruding (sticking out), use a hair dryer set on cold.
- If an object comes apart (adhesive becomes brittle with age), or an accident occurs, finish washing the pieces, dry them thoroughly and wrap each piece separately in tissue paper or paper towel. Inform the curator &/or staff member responsible for the care of the ceramics.
- If you notice that there is greasy dirt on a piece of glazed pottery, report to the appropriate staff member, who should call in a conservation specialist to remove it.

The process for removing greasy dirt from glazed pottery is as follows:

- ❖ A solution of 50/50 white spirits and water, together with 1 teaspoon of neutral detergent, can be used.
- ❖ Shake well before use and apply with damp cotton-wool swabs.
- ❖ Do not use often, and only on glazed pottery.

Glass

- As glass is lighter and not as easily seen as ceramics, never place glass objects near the edges of surfaces like tables where they can easily be knocked over.
- **Never** pick up a glass using finger and thumb on the rim. Cup the bowl in one hand and where possible support the base with the other hand to prevent breakages.
- **Never** try to carry more than one glass object at a time.
- Use a basket to carry several glasses, making sure that they are well-padded with tissue paper.
- Do not stack glass objects.
- When you are placing glass objects down, concentrate on what you are doing as it is easy to misjudge the distance of the base of the object from the table top/surface.
- Early glass, or glass that has been painted, or has gilded decoration, should not be touched as the decoration comes off quite easily.
- Glass is sensitive to light, damp and temperature.
- Glass should be handled as little as possible, and then only by the conservator.

Washing:

If glass needs washing, examine each piece carefully before immersing in water. The washing procedure is similar to ceramics (refer to the section on 'Washing ceramics'). Other points to note when washing glass:

- Glass that has been repaired should not be washed, as often a water-soluble adhesive is used.
- Do not make the water too soapy otherwise you won't be able to see the glass in the plastic basin.
- Never put more than one glass object at a time in the basin.
- Never leave anything in the basin if you are called away, in case someone puts in another glass object, which could result in damage.
- Be careful not to put pressure on the rim of the bowl of a glass object.

Draining & drying:

- Always cover the working surface with plastic sheeting and lay paper towel down to prevent glass from slipping. The paper towel will also help to absorb the excess water as the glass drains.
- Keep spaces between glass objects to avoid breakages. The slightest knock is enough to break glass, particularly if it is old.
- Use a soft cloth (tea towel) to dry glass, taking care not to put too much pressure on any one area, like the rim or the bowl. Never hold a glass by the stem when drying, as it could snap under pressure – support it by cupping one hand under the bowl.

Mirrors

Cleaning:

- Mirrors that are attached to the wall should be checked beforehand to see how they are attached. If the mirror is large it would be safer for two people to be present when cleaning it, so that one person can steady it while the other one cleans.
- Examine the frame before any cleaning is done. Many mirrors are gilded, using either a water or oil method of gilding. If the frame is water-gilded, even a damp cloth will remove the gilding.
- A little methylated spirits on swabs of cotton wool is probably the safest way to clean the glass, and thereafter buffing up can be done with a clean, dry chamois leather cloth. Methylated spirits must never be allowed to get near to oil gilding.
- **Never** use household window-cleaning liquids on mirrors.

Chandeliers

The cleaning and washing of chandeliers made of glass, should only be done by specialists.

Cleaning:

- Before dismantling a chandelier, a photographic record should be made to show where each piece belongs.
- Plenty of wicker baskets, or strong cardboard boxes, will be needed in which to put the pieces as they are dismantled.
- While the chandelier is down, check the chain and ceiling fixtures to make sure there are no weaknesses.

- Keep a written record of when a chandelier that has been dismantled and checked.

Washing:

- Each piece should be examined for damage and those pieces should be set aside to avoid careless handling or washing.
- Not only should the glass pieces be examined, but also the metal hooks and connections, for signs of weakness or corrosion. Damaged or corroded bits should be replaced by new ones where necessary.
- The glass can be washed in lukewarm water to which a little neutral detergent has been added.

Drying:

- Make sure that every piece is dry before reassembling, particularly the metal attachments. This will ensure that the metal won't corrode.
- The best way to dry the pieces is to use a hair dryer set on cold.

Caring for metals on display

Metal objects most commonly found in museums are made from silver, copper and brass. A small number of objects made from bronze, pewter and phuktong (also known as 'Chinese silver'), are also found.

General

- We all have a responsibility to look after the collections as if they were our own.
- Approach all metals with caution, when handling, cleaning or displaying them.
- Metals are at their best in a dry, clean environment, i.e. in a closed display case. Many of the metal objects in our museums are displayed out in the open, exposed to damp and dust. They can be protected by coating them with a layer of wax (see p. 61, point 7)
- Do as little as possible, but regular maintenance is very important to preserve metals for future generations.
- Metal objects should be clean and protected from agents of deterioration (see Appendix, Humidity & temperature, pp. 34 – 41, Atmospheric pollution, 74 – 79, and; see section: Preventive Conservation ..., pp. 67 - 69), and if this produces 'shiny' in the process that's fine. 'Shiny' is not always appropriate, because to achieve that stage could be damaging to the metal surface in the process.
- Understand that copper is quite soft and can easily be worn away, although not as easily as silver. Copper and silver are both **pure** metals, but brass is made up of copper & tin, and is called an **alloy**. An alloy is stronger and more robust than any pure metal.
- There are other types of 'silver', e.g. pukhtong, also known as 'Chinese silver', and is made up of some copper, nickel, zinc and iron.
- The surface coating on a metal is known as a patina, and it is important not to destroy it. It can be the natural result of how a metal ages, or it can be artificially applied. The patina serves to improve the look of metal objects, and also protects them from the harmful effects of the environment.
- Learn how to recognise the difference between a patina and dirt/dust.
- We give off acids through the skin, in perspiration, which are damaging to metals and will cause them to corrode. Always wear gloves (thin, white cotton or vinyl) when handling metal objects for any reason. The gloves should be thin so that you can feel properly.
- Think before picking up any metal object and support from underneath or in several places, especially when moving large or awkward metal objects from place to place – prior to examination, or cleaning.

- Take care not to touch or knock into metal objects, as they are easily scratched and worn away. Remove watches and other jewellery likely to damage metals.
- All metal work should be kept in dry conditions, because most metals are unstable in a damp atmosphere and will corrode.
- Never rub hard when dusting metal objects, because dust is abrasive and will cause scratches. Use a very soft, bristle brush to lightly flick the dust off the surface.
- Polishing of metals should not be done more than once a year, and then only if it is really necessary.
- Before polishing of metal objects is done, cover the work surface with a layer of neutral foam which will protect the metal from scratches and dents.
- Once metal objects have been polished, be particularly careful to wear cotton or vinyl gloves, as the acids in your skin will tarnish (see Glossary ...p. 8) the metal.
- All metals on open display will be cleaned, including hinges, escutcheons, door & drawer handles, as part of pieces of furniture.
- Examination:
 - to determine their condition before metal objects are cleaned, look for any areas of corrosion (rust);
 - decide whether active (corroding as we look at them), or stable (rate of corrosion has slowed down because it's in a stable environment);
 - active corrosion will be identified by the colour of the corrosion product/deposit:

To help you identify corrosion on different types of metals look for the following:

- ❖ Ochre/brown corrosion on iron;
 - ❖ Green corrosion on copper, brass & bronze;
 - ❖ Black corrosion on silver; and
 - ❖ White corrosion on pewter & phuktong.
- If you notice that there are bright green spots on copper and brass that doesn't look like polish residue, it means that the corrosion is active and this is called bronze disease (see Appendix, Glossary ..., p. 3). Only a specialist metal conservator may treat the corrosion.

Caring for different metals

Silver

- *Lightly tarnished, plain, solid silver* that is lightly tarnished can be washed in warm water to which a little neutral liquid soap has been added.
- Dry thoroughly using old, soft, linen tea towels.
- Once it is absolutely dry, polish with **a suitable and available silver polishing cloth (Goddards Long term Silver cloth)**.
- *Heavily tarnished silver* requires **a suitable liquid silver polish (Goddards Liquid Silver Polish is preferred, but has to be imported; Town Talk Silver Foam & Wright's Silver cream are acceptable, and are locally available (see Appendix, List of Suppliers, p. 15))**.
- Apply with cotton-wool swabs, following the manufacturer's instructions.
- Rinse off under running water very thoroughly.
- Dry with mutton cloth and then polish with **a suitable and available silver polishing cloth (Goddards Long term Silver cloth)**. If it is a large object, clean a small area at a time.
- Do not re-use the silver dip indefinitely as it becomes over-charged with silver and this will be deposited back onto the surface of objects as mat silver. Pour silver dip out from the main supply from time to time and **NEVER** dip anything into the main supply.

Tooled silver

- Use only a soft brush, but not a toothbrush or paint brush, as their bristles will scratch, or abrade (see Glossary... p. 3) the surface of the silver object.
- A soft brush should be kept for cleaning silver only.
- If it is necessary, make cotton wool buds, using a wooden cuticle stick (sharpened at one end) and cotton wool (**How to make cotton wool buds will be demonstrated when we deal with silver**).

Bronze

- We will only remove dust from bronze objects. Once or twice a year bronze can be dusted lightly. Because dust is abrasive, the surface should not be rubbed when dusting.
- Never use water or methylated spirits on bronze.

- Never wash bronze because of the possibility of salts being deposited on the objects and causing corrosion. The worst form of corrosion that can form on bronze objects is called bronze disease and is shown as a bright green deposit.
- If you notice bright green corrosion on any object, report to your supervisor and record it in the logbook. A metal specialist should be called in to treat it.

Brass & copper

- Dusty brass & copper needs only a light brushing with a very soft bristle brush.

Polishing procedures for brass & copper:

- Choose a brass or copper object to clean.
- Remove it to a separate, clean area.
- Place on a table or other suitable work surface, which has been covered with 3 mm-thick, neutral foam. This will protect the metal objects from damage.
- Wear vinyl or nitrile gloves, and support/hold the object firmly with one hand while working.
- Dusting: use a very soft, bristle brush to lightly flick dust off the surface, while supporting the object with the other hand. Do not use a duster, as you will be inclined to press harder, and this will cause the dust particles to scratch the surface of the metal.
- Apply the polish evenly, and not too thick, using a damp sponge. Clean off the polish with a clean, damp sponge (re-moisten sponge often). Rub up with a dry, clean, soft cloth, to prevent watermarks forming. Buff up the object with another similar cloth (be firm, but careful).
- Waxing: it is advisable to wax, and not lacquer metal objects on open display, as an added protection, especially if they are exposed to an unstable environment (city pollution, and/or a marine environment). A micro-crystalline wax (Renaissance) may be used (see Appendix, 'List of Suppliers', p. 18) to coat metals that are not stored or displayed in closed cabinets. Unlike lacquer, a wax allows the metal to breathe, thereby preventing an environment to develop which would cause the metal to corrode. Metals cannot breathe if covered in a layer of lacquer, and the slightest damage to the lacquer surface will result in corrosion of the metal at the point of the damage.

Apply the wax sparingly with a soft cloth, and buff gently with another soft cloth. The wax dries very quickly so it is necessary to work quickly. It does not show finger marks.

Pewter

- Do not attempt to clean pewter except to dust it lightly with a soft, dry cloth or chamois leather.
- Keep a look-out for 'pewter disease' which is a white powdery substance. It causes flaking and peeling off of small areas of the metal.
- Pewter must never be in contact with untreated or unseasoned wood, especially oak, because of the emission of acidic vapours.

Conservation of historic collections and interiors: principles, practice & ethics

The definition of conservation as it relates to historic houses is about the careful management of change, as well as revealing and sharing the significance of places to ensure that their special qualities are protected, enhanced, understood and enjoyed by present and future generations.

This section of the manual will explain the important position of housekeeping in the broader field of conservation and the ('roles played by specialists and non-specialists', i.e., about Conservation & Front-of-house staff, as well as other outside specialists). A framework is set out for the conservation of collections in historic houses, in which housekeeping is part of preventive conservation. The theory and practice of preventive conservation is considered to be central to collections care.

Importance of context: the guiding principles for the management of each historic house are expressed in a **conservation plan**, which starts with a statement of significance – what is important about the house, garden, the collection, or all three, and sets the property within its historic context.

Change can record facts about historic interiors and collections, and can provide evidence of previous use and appreciation. Conservation therefore aims to maintain the **cultural value** of the heritage, as well as its **physical evidence**, and to keep the rate of change to a minimum.

The overriding, ultimate aim of conservation is thus to ensure sustainable access, **an aim often described as finding a balance between access and preservation**. This will be to ensure that interiors and collections enjoyed by the present generation of visitors, are managed in a sustainable way so that future generations can also enjoy them.

To maximise physical access to interiors and collections, whilst reducing deterioration, conservation makes use of risk management, for example, to manage the risk of light damage, protective measures such as curtains or blinds over windows may be recommended. However, the impact on visitor experience has to be taken into account when implementing such protective measures. Each historical site is different and requires its own individual solutions to risk management.

Not only does preservation affect access, access also affects preservation, particularly in terms of the impact of the number of hours that an historic house is open to visitors. A further complication is whether that access should include the continued use of objects like chairs, carpets, working clocks or the occasional playing of a musical instrument, as this kind of access will obviously cause deterioration of those objects.

Finding a balance between access and preservation then requires complex decisions, a challenge that usually requires creative and lateral thinking.

To preserve aesthetic and historic integrity, all conservation interventions involve removing the least possible amount of deteriorated or de-stabilising matter, or addition of new material. This principle of '**minimum intervention**' underpins all conservation.

Intervention can be minimised further by reducing the number of occasions on which an object is treated. This is done by reducing the rate of deterioration of collections and interiors to a minimum, and is the work of ‘**preventive conservation**’, **the most important contribution that conservators can make to sustainable access in an historic house.**

The importance of interpreting conservation in historic sites

- Explaining conservation work in historic sites can increase the public’s understanding and appreciation of the interpretation of those buildings, for example, why some metal objects are not polished until they are shiny bright.
- Interpreting the conservation work also raises awareness of what it takes to keep an historic house open to visitors, for example, why so much care is taken to keep light and heat levels low. Such explanations add value to a visit and give visitors more reasons to return.
- Raising awareness of the importance of conservation also helps colleagues to understand relevant issues like allocating resources, including funding for conservation work.
- Interpretation can be in the form of a guided tour, lecture or presentation, leaflets, an exhibition, or other media such as film or a performance.
- Interpretation is an important branch of museology and there is much written and relevant to historic houses, but interpretation has to be particularly sensitive to the ‘spirit of place’ in an historic house.
- Conservation is not sustainable without public support, and to be encouraged to support it, the public needs to be given opportunities to understand it, i.e. important to explain how precious resources are being spent.
- The more precisely defined the aim of the interpretation, the more successful it will be – it must be clear, focused and manageable.
- Identification of visitor audiences is important, and successful interpretation is dependent on communicating the right ‘conservation’ message, in the right way, at the right time, in the right quantity and of the right quality.
- Probable public audiences for the interpretation of historic house/site conservation are: **individual visitors and families; non-visitors; education groups (read pp 747,748, NT Manual of Housekeeping, 2006).**

Individual visitors & families: will arrive with their own knowledge, interests, assumptions & beliefs; must be aware of special needs, e.g. wheelchair users, audio guides, leaflets in large print, translation of labels.

Non-visitors: as social inclusion is a concern for heritage organisations, it is important to know why some sections of the population do not visit historic

houses; can be redressed through 'outreach' activities such as off-site lectures to local groups, newspaper & magazine articles, television & radio interviews, and the internet. An entertaining and interactive internet site can convey conservation messages very effectively.

Education groups: conservation work in historic houses provides many opportunities for both formal & informal education; it can be of particular interest to those teaching science, history or design & technology.

- Other audiences: in order to increase visitor appreciation of conservation, it is important to familiarise **colleagues**, not directly involved in conservation & housekeeping, with the relevant issues and activities in historical houses/sites.
- **Of key importance in the interpretation of conservation is the number of housekeeping staff working at an historic house/site and their level of skill and experience. This knowledge can be used as a basis for the interpretation of simple preventive care.** – needs much discussion & planning, for this to be implemented in South African historical houses/sites
- **The most effective carriers of conservation messages are well-informed staff, front-of-house personnel & volunteer guides.** It is mostly they who have to answer questions about low light and temperature & humidity levels, or deal with baby prams or wet umbrellas at reception points.
- There are more formal ways of interpretation that can be useful for conservation work in historic houses/sites, like **hands-on activities, exhibitions, printed matter, demonstrations and 'conservation in action', & lectures, presentations and guided tours.**

The important ones for South African historical houses/buildings to work towards are: printed matter, demonstrations & 'conservation in action', lectures & guided tours.

It is concluded that without understanding there will be little support for conservation and without support there will be no funding. **Understanding of conservation through interpretation works best when it is seen as the responsibility of everybody involved in opening historic houses/sites to the public.** However, **for an effective result, it does require clear objectives and a realistic assessment of resources.**

Preventive conservation in historic houses

Begin by establishing whether interiors and collections in historic houses are threatened with deterioration through environmental problems, lack of good housekeeping, insect pests, or custodial neglect. Our aim is to 'prevent', or at least reduce the rate of deterioration of the collections and the interiors of our historic houses and sites by using preventive conservation.

Risk management begins with identification of the risks to collections causing their deterioration (within assessment of risks to collections, or precautions taken to protect collections from deterioration). In order to manage the risks to collections it is helpful to have a framework for preventive conservation. A framework will be described, based around the agents of deterioration, and how it can be used.

One of the keys to successful preventive conservation is to ensure that decisions about acceptable levels are agreed by all interested stakeholders: preventive conservation should not only be the province of conservators, but should also involve collections management staff, curators, front-of-house staff, volunteers and visitors.

Types of deterioration:

- Catastrophic, which includes fires, earthquakes and floods. These are relatively infrequent events, which is fortunate since the outcome is often the destruction of entire interiors and collections;
- Severe, breakage of individual objects, e.g. ceramics & glass, and can be avoided by implementing good preventive conservation;
- Cumulative, which builds up over time, e.g., the fading of colour when exposed to light. The more a sensitive, coloured material is exposed to light, the more it fades.

To summarise, preventive conservation involves the following stages:

- Observe and monitor deterioration of objects/collections;
- Identify agents of deterioration;
- Measure level of exposure to agent of deterioration;
- Control agent of deterioration where found to be above acceptable levels.

The agents of deterioration

- Fire
In addition to the damage caused by the fire itself, there is almost always damage associated with the water used to extinguish the fire. As fire is a catastrophic agent of deterioration, it is critical that measures are put in place with regards to prevention, or detection and limitation, to reduce the risk of damage to the collections (see pp. 73 – 81, 'Identifying potential risks ...' & to collections in historic houses and buildings, in order to reduce damage & deterioration.').
(for more details of Precautions & Extinguishers, study Ch. 58, 62, The National Trust Manual of Housekeeping)
- Loss
A stolen object is as lost as one that is destroyed in a fire. The approach to prevention of such loss is through 'risk management' (see pp. 73 – 82, 'Potential risks...' & 'Identifying risks to collections in historic houses and buildings, in order to reduce damage & deterioration.').
(for more details study Ch. 6, The National Trust Manual of Housekeeping)
- Water
Water damage as a result of fire; poor maintenance (leaking pipes, rising or penetrating damp into a building; poor building methods or porous building materials). Condensation, spills and splashes are other common ways in which water can find its way onto historic surfaces (see pp. 73 – 82, 'Potential risks...' & 'Identifying risks to collections in historic houses and buildings, in order to reduce damage & deterioration.').
(for more details study Ch. 7,10 & 12, The National Trust Manual of Housekeeping)
- Physical
Causes of physical or mechanical damage can be divided into three types: major forces like earthquakes, subsidence and building collapse; accidents that are a more common force; and the third type of mechanical force results in cumulative physical damage known as wear-and-tear. Not all wear-and-tear or dirt is considered 'damage', i.e. what is dirt and wear to one culture may be part of the history of an object to another. Historic dirt can provide valuable information about the history of an object.
(for more details study Ch. 6, The National Trust Manual of Housekeeping)
- Chemical
Chemical agents of deterioration include gases (pollutants), liquids and solids. These chemicals react or interact 'aggressively' with materials and cause changes in their composition, nature or appearance. These agents may come from the atmosphere, from local surroundings, from people, cleaning products and even other artefacts (see pp. 73 – 82, 'Potential risks...' & 'Identifying risks to collections in historic houses and buildings, in order to reduce damage & deterioration.').
(for more details study Ch. 7, The National Trust Manual of Housekeeping)

- Biological

Biological agents of deterioration include insects, rodents, birds and micro-organisms such as viruses, bacteria & fungi. They mainly damage organic materials (paper, textiles, wood, leather, etc.).

Organic materials can also be damaged by excrement staining, or physical attack, such as the chewing of woodwork by rats & mice. Chemical by-products (pollutants) can also damage some inorganic materials, by causing corrosion of metals and deterioration of stonework. **(for more details study Ch. 8, The National Trust Manual of Housekeeping)**

- Light

Adequate lighting is needed to see the interiors of historical houses or buildings, but **all light causes damage** and general deterioration of objects. The effects of light damage is cumulative, i.e. damage continues even if the light levels are greatly reduced. The main sources of light used in historical houses are daylight (sunlight) and artificial lighting (spot lights, fluorescent lighting). Direct sunlight causes the most damage to the surfaces of objects, in the form of heat and ultra-violet (UV) radiation (see pp. 73 – 81, 'Identifying risks to the collections in historic houses and buildings, in order to reduce damage & deterioration.'). **(for more details study Ch. 10, The National Trust Manual of Housekeeping)**

Environmental

- Relative humidity (RH) & Temperature

People are much less aware of the humidity (amount of moisture) in the air than its temperature, but, unlike people, many objects are not really affected by temperature, but undergo quite dramatic changes as the RH changes. Thus temperature is extremely important in determining the level of RH and can be regarded as an agent of deterioration in its own right. An example of RH as an agent of deterioration, is where the ambient or surrounding RH is fine for metals (no corrosion), but too dry for wood (causing warping & cracking). Temperature can adversely affect objects or materials which normally have plastic characteristics, become brittle and break when cold (see pp. 73 – 81, 'Identifying risks to collections in historic houses and buildings, in order to reduce damage & deterioration.').

The monitoring and control of RH and temperature levels has advanced in the past twenty years, with the introduction of electronic equipment.

(for more details study Ch. 10, The National Trust Manual of Housekeeping)

Refer to Appendix for:

More detailed information about 'Agents of Deterioration', affecting social history collections in storage and on exhibition, pp. 34 – 84.

Procedures to reduce risks to collections in historical sites: appropriate information to be filled in for historic house museums, & buildings in South Africa.

GUIDELINES INTENDED TO PROTECT SOCIAL HISTORY COLLECTIONS FROM LOSS OR DAMAGE, DURING BUILDING WORKS AT MUSEUMS AND HISTORICAL BUILDINGS.

The guidelines are based on the fundamental principle that all museum collections are irreplaceable and are to be treated with extreme care and respect required by their historical, cultural, natural and/or scientific significance.

These guidelines are intended for building, and other contractors to follow, in order to ensure the safety and security of the collections, movable & immovable, at all times during building operations.

In order for these guidelines to be effective it is crucial that collections and conservation staff, as well as front-of-house staff, be informed well in advance of any building work taking place, so that preparations can be made for protecting collections in-situ, or packing up and moving them to another secure space in the building, or off-site.

These guidelines should also serve to make museum management, government service departments and contractors more aware of the responsibilities involved with regard to any building or renovation work done on historical houses/buildings.

Introduction

Building works increase the risks to collections as follows:

- Theft due to objects being out of their normal place; greater unsupervised access being permitted; security systems being suspended during change over; additional access being provided by ladders & scaffolding.
- Risk of fire, due to type of work carried out, e.g. dust is generated which can set off smoke detectors; use of oxy-acetylene & other gases.
- Mechanical damage from traffic of contractors too near to vulnerable collections/objects, as well as when equipment and materials are being carried through the building.
- Disruption of environmental control during protracted building work.
- Dust & dirt produced by drilling, sawing, sanding floors, chasing in electrical cables, etc.
- The fabric of an historical building can be irrevocably damaged by insensitive treatment that has not been carefully thought through.

The following guidelines will assist in reducing the risks mentioned above:

- ❖ All relevant collections, conservation and front-of-house staff should be consulted and briefed well in advance of the proposed work to be done, to enable appropriate measures to be taken to protect collections. The curator responsible for a specific historical building, should liaise, and be in constant contact with the contractor throughout the building works, in case there is any doubt as to the appropriateness of the contractor's actions.
- ❖ All activities of contractors and sub-contractors have to comply with conservation requirements and security procedures, as well as emergency evacuation procedures of the museum. Contractors and sub-contractors should also be briefed on the specifics of working in a museum environment, as well as any special precautions that they should take in order to minimise risks to collections and buildings.
- ❖ Relevant collections, conservation and front-of-house staff should be supplied with a list of names of all sub-contracted employees, as well as the names and after-hours contact details of a responsible representative. Contractors & sub-contractors should be identifiable at all times.
- ❖ Contractors should be allocated a dedicated area, approved by the appropriate staff member (curator, site manager, maintenance manager, etc), as a site office and storage space for materials, tools and equipment. The storage of any combustible materials, or materials of a volatile nature such as paint and thinners, could only happen in consultation, and with the approval of the appropriate staff member (see above). The site office should be equipped with its own independent communication system.
- ❖ Loading and unloading of materials must preferably be done in the morning before the museum or historical site opens, to avoid putting at risk visitors and staff. Contractors will have to consult with the management before any activity can take place beyond normal working hours.
- ❖ Contractors must be informed that museum security staff can conduct random inspections of tool boxes, storage lockers, etc.
- ❖ Rubble from the building site should be disposed of by the contractors according to agreed procedures.
- ❖ If any 'wet work', welding, soldering, brazing and cutting, has to be done at a particular museum or historical site, an area must be allocated, well away from collection storage or exhibition areas. Safety measures will apply and must be strictly adhered to, particularly when potentially damaging work is done in an area where there are vulnerable collections, for example, hand-held fire extinguishers should be easily accessible when carrying out electrical work in a collections area.
- ❖ Collections will be moved by designated collections & conservation staff only. Contractors should anticipate the need for moving collections, and give proper notice to the relevant staff. If access is required to collection areas, contractors must always be accompanied by a collections or conservation staff member.

- ❖ Contractors should take measures to minimise dust spreading into areas beyond the immediate work area, and take additional precautions to protect the collections and the original fabric and structure of the historical building.
- ❖ Contractors should prevent equipment from leaving marks on, or damaging historical floors and tiles. The site, or building manager and conservation staff must be informed of any equipment producing vibration or shock that could pose a risk to the collections on open display.
- ❖ Contractors should inform the site/building managers of any utility cuts (water, gas, electricity) at least 48 hours in advance, so that temporary measures can be taken to reduce disruption as a result of the cuts.
- ❖ Upon completion of work, contractors must do a thorough clean-up of the site.
- ❖ Copies of drawings of building work, and operating manuals must be handed to the client on completion of the contract.

It is sometimes difficult to comply with the law without interfering with the integrity of a building to, for example, create fire-escapes and disabled access, but lateral thinking and innovation can usually achieve a suitable result.

(Include a basic agreement document between the Museum management & the Contractor).

PLANNING FOR DISASTER MANAGEMENT & CONTROL

Introduction

Physical disasters affect museums and libraries because they endanger the cultural collections housed in them. These collections are extremely vulnerable to even a minor accident, as it can have disastrous results for the materials in those collections. Collections of cultural and natural material are the primary reason for the existence of museums. It is critical, therefore, that adequate contingency plans are made by museums & libraries to prevent emergencies from becoming disasters.

A dictionary definition of an *emergency* is 'a state that calls for immediate action' and a *disaster*, as 'a sudden calamitous event bringing great damage, loss or destruction: a sudden misfortune'. What we should understand from these two definitions is that all disasters are emergencies, and emergencies that get out of hand become disasters.

Good planning and preparation can prevent an emergency from turning into a disaster, however, and a disaster from turning into a tragedy. Because of the need to preserve collections for as long as is physically possible, the range and nature of disasters that can occur in museums is much greater than for most other institutions.

When a situation develops in a museum that does not threaten life, staff can remain in the building, or at least have access to it. It is their responsibility, in that case, to limit and isolate any damage, and control the cause of the problem. It will then be necessary to recover and stabilise any collection material that has suffered damage during the time of the incident.

If life is threatened, however, public emergency services will be called in and will assume control. Emergency services, such as the police, rescue and fire departments, primarily exist to protect life, and then property, i.e. the collections. It is normally assumed that protection of that property includes the buildings, particularly historical buildings. Access to the buildings will be denied until the threat has passed and appropriate investigations have been completed.

However, the emergency services are not trained or equipped to protect movable cultural property, and will not be aware that the contents of museums - the collections, are more valuable than the buildings. Once the emergency services have completed their job, they will leave the museum on its own to rescue its collections with any resources that it can muster.

The museum is now confronted with a potentially disastrous situation where:

- staff have little or no experience;
- the museum lacks the proper expertise and materials to cope, and is unprepared for serious and urgent adjustment of its priorities to cope with the situation as it should;
- management does not act quickly and positively, the chain of instruction may fail, and the result will be unauthorised initiatives or bureaucratic delays;

- communications may break down and confusion will arise regarding responsibility and priorities;
- staff may act impulsively and probably without adequate knowledge or preparation, causing more damage to collections;
- there will be competition for limited resources, or failure to share those that exist; and
- collections that have already suffered damage will deteriorate further, unless the correct stabilising action is taken;
- an unrestricted public might have access to valuables, and thus looting might occur.

It is always possible that management could lose control in such a situation. Although it is critical that the damaged collections need to be stabilised, this could not be achieved until the museum is geared to do so.

Whatever the size of the institution, full cooperation and support of the management & staff is required, with a considerable amount of re-organisation of responsibilities and resources. Always remember that the disaster situation cannot be resolved by creating an isolated or separate emergency plan. Any temporary change in the authority systems should be accepted by everyone, to enable the existing organisation to move smoothly and efficiently into a pre-planned 'emergency mode'.

Potential risks to social history collections

Few museum disasters have a single cause, many are the result of a combination of failures, human, natural and structural, and we could face disastrous situations from a combination of:

- the effects of climate, resulting in flooding;
- fire, caused by faulty electrical equipment, building operations, or a lack of regular maintenance of building structures;
- inefficient internal services;
- a lack of procedures;
- abuse of hazardous materials;
- human activity, e.g. impact of visitors, poor handling of collections, custodial neglect ; and biological consequences, such as insect infestation or mould attack.

The domino effect

Very often a minor system malfunction or structural weakness can trigger off a series of events which could ultimately lead to serious damage. The most common cause of one of the events in the chain of incidents, is usually because supervision and maintenance are inadequate or considered unimportant. **No detail is too insignificant for attention.**

Another common feature of one of these 'domino' incidents, is that the result is often due to the failure of a system or procedure that is unnecessarily complicated. The fewer elements in a system of disaster management, the more likely it is to succeed. Remember that **simplicity is strength.**

STAGES IN DISASTER CONTROL PLANNING: IDENTIFYING POTENTIAL RISKS TO THE COLLECTIONS, AND STEPS TAKEN TO REDUCE OR PREVENT DISASTROUS SITUATIONS.

Checklist to identify potential risks to the collections:

IDENTIFYING THE RISKS

The first step in disaster planning is to identify and carefully analyse all the potential risks to museum collections in storage or on exhibition.

The checklist of questions below will help management and staff to develop a programme of disaster management and control.

Bear the following points in mind when you go through the questions:

1. If the questions are answered thoughtfully, other questions should arise to deal with any special circumstances.
2. Few disasters have a single cause – most of them are the result of two or more causes.
3. While you answer each question, try to relate it to questions in other sections, as well as to the section under which it is listed.

Climate

Temperature:

- Is the area in which your museum is located, subject to extremes or sudden fluctuations of temperature?
- How quickly will the temperature in your museum building/s reach unacceptable levels in an uncontrolled environment?
- Do you know which materials in the collections are the most sensitive to extremes or fluctuations of temperature together with the resulting changes of relative humidity (RH)?
- Are the outer walls of the museum/s of double-skin construction, and are there windows to prevent penetration of heat?
- Is thermal insulation provided above the ceilings?

Relative Humidity (RH):

- What are the RH levels like in the area in which your museum/s is/are – are there extremes or sudden fluctuations?

- How quickly will the RH reach unacceptable levels, too high or too low, in your building/s if there is an uncontrolled environment?
- Are there materials/objects that are sensitive to extremes or fluctuations of RH, and if so which ones are they?

Rainfall:

- Is your region subject to heavy or prolonged rainfall?
- Is flooding a possibility?
- Are the drains adequate and well-maintained?
- If you are in an area of exceptionally high rainfall, how would it affect access to the museum/s, essential services or communications?
- What is the pitch of the roof like, or has/have the museum building/s got a flat roof?
- Are the eaves sufficiently wide enough to allow overflowing water to fall clear of the building/s?

Storms:

- Is your area subject to severe electrical storms or extremely high winds?
- Could a severe storm interrupt your access, essential services or communications?

Topography

Rivers:

- Is your museum located in a flood-plain?
- Is the basement (if there is one) above flood level?
- Is/are the museum/s above the water table?
- If the museum/s is/are close to a river close to the coast, is it tidal? Could spring tides cause flooding?
- Could heavy run-off from rainfall cause flooding, if the museum/s is/are situated higher up the course of the river?
- Have you ensured that the authorities will warn you of possible flooding or of any manipulation of water levels?

Gradient:

- Is/are your building/s on or beneath a steep slope? Could landslides occur after heavy rains or as a result of earth tremors?
- Could your access routes be cut off if the above situation occurred?
- Is the water pressure adequate for fire-fighting?

Trees & birds:

- Could a forest fire threaten the museum/s and /their access routes or services?
- Are there any trees, close enough to fall on the museum building/s?
- Are all the gutters and roof drains cleared of leaves, nests, dead birds or other obstructions?
- How often are the gutters cleaned out?
- Are birds able to roost on roofs or build nests under eaves? One dead pigeon can totally block a roof drain.

Adjacent structures:

- Would a fire, explosion or structural collapse in any adjacent building affect the museum/s, access route or services?
- Are any hazardous materials stored or used, or any hazardous activities conducted nearby?
- Is/are the building/s subject to vibration from traffic (road, rail or air), industrial or other activities?

Access:

- Is there suitable road access to the museum/s buildings and is it adequate for emergency services at all times? Large vehicles may have difficulty negotiating tight corners, narrow or low entrances, or steep slopes.
- Is this access route obstructed by private vehicles?
- Where are the nearest fire hydrants? Are they obstructed?
- Is there an alternative source of water for fire-fighting (lake or river) should it be necessary?

Coastal sites:

- If there are severe on-shore gale-force winds or exceptionally high spring tides, is the elevation of the museum enough to escape flooding?
- Is the museum's waterfront secure from erosion?
- Is/are any part of the museum/s, including docks and moored vessels, within range of wave-borne debris, such as logs?

Essential services

If the museum building/s is/are served by any of the following: electricity, oil, natural gas, other fuels, water, sewerage, septic tank, telephone, fire prevention, ask the questions below:

- Are these services regularly inspected, tested and maintained?
- Do you know which of them, for example, internal wiring and plumbing, are the responsibility of the museum/s?
- Are there plans that show exactly where they are in the museum/s and are they easily accessible in an emergency?
- Are the plans up-to-date and copies stored safely elsewhere?
- Do the management and staff know where to turn off services like water, gas and electricity as well as being familiar with the operating instructions?
- Are all these services separately identifiable and are stop-cocks and taps clearly marked?
- If any of these services fails for some reason, is there an alternative or back-up system?
- Are any of these services interdependent, for example, electrically-powered water or drainage pumps?
- Do any of them share common transmission routes, for example, electricity and telephones sharing common conduits?
- Are services, like water, electricity and drain pipes, routed through collection storage areas?
- Are the emergency telephone numbers for all essential services prominently displayed next to more than one telephone? Are they regularly checked and updated?
- What contingency plans has/have the museum/s made if the telephones in your area are not working?

- Have the museum/s special needs been discussed with the suppliers of essential services, including public emergency services?
- Does your museum have an alternative, suitable, and safe venue they can use, to relocate collection/s in an emergency?

Hazardous materials

- Have all the explosives (blasting caps, fuses, charges, flares, live ammunition, etc.) been removed from collections that contain such artefacts?
- Have all the fuel systems of internal combustion engines been drained and inhibited?
- Are any petrol-powered tools (chain saws, pumps, generators, outboard motors, etc.) stored or used in the museum/s building/s?
- Is any flammable gas-powered equipment (welding equipment) stored or used in the museum/s building/s?
- Are any cylinders of flammable or explosive gases stored in the museum/s building/s?
- Are any paints, varnishes or volatile solvents stored or used in the museum/s building/s?
- Does the local fire department know about them?

Building structure

- Have any of your museum buildings got flat roofs?
- Are skylight or roof-access doors really waterproof against high winds or heavy rain?
- Is the roof drained by external pipes (outside the main walls) or by internal pipes?
- Are all gutters and drains cleaned regularly?
- If the roof drains are internal, can they be traced through the building?
- Are their access points accessible? Do staff know where they are?
- Are workshop, laboratory and kitchen drains equipped with the correct grease or acid traps? Are they regularly cleaned?

- If there is a basement, is it secure against flooding? Are any collections stored there?
- Have the building structures been inspected recently?
- Are all repairs and maintenance up-to-date?
- Is there a regular cleaning programme throughout the museum/s?
- Has/have the building/s got an effective damp course (a barrier against rising damp from the ground)? Is there an effective water vapour barrier?
- Are collections stored in cupboards or on shelves that are built against outside walls?
- Are any collection objects or books stored on the floor? If not, what is their height above the floor?
- Are closed cupboards used for stored collections?

Internal services

- Is there a programme of regular inspection and maintenance?
- What steps have been taken to ensure that electricity, gas and water services are used correctly?
- Are current diagrams/plans of all internal wiring and plumbing readily available in the building? Are duplicates safely stored elsewhere?
- Are there overhead water pipes in any collection areas?
- If there are smoke detectors and fire alarms, have they been tested recently?
- Are working, battery torches located in key positions in the museum, in case the lights fail?

Procedures & people

- Does the museum have a plan for calling the fire department and evacuating the building/s if a fire breaks out? Has there been a fire drill recently?
- Has the Fire Chief inspected the building/s recently?
- Are the telephone numbers of all emergency services regularly updated and prominently displayed at several key telephones?

- Is the staff adequately trained in the use of potentially hazardous equipment and materials?
- Does management **really** know what goes on in the building/s?
 - are staff and visitors adequately supervised?
 - if another organisation uses part of a museum, or museum buildings, at any time, is there practical control over their activities?
- If your location is vulnerable to natural disasters, are marine weather forecasts, forest fire hazard alerts, etc. monitored?
- Is a battery-powered radio available?
- Has/have the museum/s special needs been discussed with the police & fire departments?
- Have weaknesses been checked for in the museum's/s internal reporting procedures?
- Is there a way to bypass bureaucratic obstruction in an emergency or a threatened emergency?
- Are there any staff members or others who are known to be unstable or to have malice toward the institution?
- Could the institution or its collections be a target for a protest group?
- Are political activities or demonstrations held in the vicinity?
- If there are windows, do they have impact-resistant glass in them?
- If the museum depends on contract employees or other organisations for services, like work help, security or cleaning and maintenance, are they honest and reliable individually/collectively? Is there suitable control over their activities?
- Has the museum identified and ensured access to sources of expertise and materials that may be needed in an emergency?
- Has the museum a disaster plan?

If these questions have evoked unsatisfactory answers, do something about it now!

Still to come: the document outlining procedures to reduce risks to collections, which will be drawn from the answers to the checklist questions, for each museum, archive or gallery.

GUIDELINES TO DEVELOP A DISASTER MANAGEMENT PLAN TO PROTECT SOCIAL HISTORY COLLECTIONS FROM A POTENTIAL DISASTER.

Preventive measures for protecting the collections from the threat of fire:

Many museum collections are stored and displayed in historical buildings, only a few of which were originally designed to accommodate collections and a constant flow of visitors.

Many museum buildings used for storage or exhibition, have many other functions. In addition to store rooms, exhibition galleries/rooms, laboratories, offices, vaults or libraries, they also have lecture rooms and classrooms.

Museums are complex in nature, making them susceptible to the threat of fire, which can be caused by not enforcing the 'no smoking' rules, not upgrading electrical wiring that is old, and not promoting the safe use of potentially dangerous equipment like blow torches, welding equipment and flammable liquids.

Consult the local fire department, and organise an inspection of the buildings for possible fire hazards, at least once a year. The fire department can help identify specific problems and suggest solutions for them, for example, the proper handling and storage of chemicals, safe power and cut-off procedures, temporary protection for objects susceptible to water and smoke damage.

At the same time, set up a programme of housekeeping and maintenance, to reduce any potential hazardous situations. All museum staff should become familiar with fire safety regulations and fire drills should be carried out on a regular basis. This must include safe evacuation of visitors. Make sure that exits are clearly signposted and emergency-exit doors, fire escapes and alternate escape routes from the buildings are provided and kept clear.

Emergency procedures charts should be posted near key telephones and should include procedures for the staff to follow. Fire detection/prevention and alarm systems should be installed, but at the very least, fire extinguishers must be part of the basic equipment for each building.

Every member of staff should know three things about fire extinguishers:

- their location;
- their class rating (what each is able to extinguish); and
- the correct way to use them.

Fire extinguishers are an important part of a museum's safety equipment, so they should be mounted where they are easily accessible.

The different classes of extinguishers and kind of fires they are able to extinguish:

Class A is used to put out fires of combustible materials like paper and wood; Class B extinguish fires involving flammable liquids, solvents, grease and oil; and Class C extinguishers put out electrical fires.

There is a fourth one – Class D, used to extinguish chemicals and metals (magnesium, phosphorus, sodium, etc.), that catch alight and burn, but this extinguisher is not commonly used in museums, archives, or galleries.

All staff should be trained to handle fire extinguishers – practical sessions can be organised and supervised by the local fire department. Try to obtain fire extinguishers that are not too heavy to pick up, but conversely they should not be so small that they are not effective.

In the event of a fire it is the water that causes the most serious damage, therefore the use of non-aqueous extinguishers is advised.

The four stages of a fire:

- Incipient stage – no visible smoke or flame has developed but combustion has occurred which generates particles that behave like a gas and rise to the ceiling. This stage develops over a long period – minutes, hours, even days. If it can be detected at this stage, it will be extinguished easily and cause minimal damage.
- Smouldering stage – collective mass of particles now becomes visible and we recognise this as smoke. There is still no flame or much heat and little irreparable damage is done.
- Flame stage – point of ignition occurs and flames appear causing an increase in heat.
- Heat stage – this stage produces a great deal of heat, flames, smoke and toxic gases, and becomes a full-scale raging fire. It takes only seconds to move from the third stage to this stage.

BEING PREPARED FOR A DISASTER

Important points to consider when drawing up a Disaster Control Plan:

1. Be prepared by drafting a written disaster control plan, and make sure that it is approved by Council and/or Management. They must fully accept and understand the hazards that threaten to destroy collections.
2. Disaster-preparedness can only work if the research and responsibilities for the project are developed through team work with an efficient communication network.
3. Develop a written policy which needs to be only a few sentences, stating that the museum, archive or gallery will develop, implement and continuously test a disaster control plan.
4. Identify potential hazards, or risks, including, and in particular, fires and floods that threaten the collections. Develop procedures for dealing with the hazards that threaten the museums and collections, which will reduce the risk of damage or loss before, during and after a disaster.
5. These preventive measures will include:
 - installing effective fire detection, or prevention systems – provide fire department with lists of hazardous chemicals & materials;
 - drawing up lists of people with basic conservation expertise; and
 - having funds readily available to buy equipment or to take on more staff needed to prevent further damage.

At this stage include information about a preventive strategy – schedules, procedures and persons responsible for routine testing and inspection, for example, fire equipment, electricity, building structures.

6. Conservation staff should identify, in advance, where to get services, such as packing, freezing, transportation, or materials like polythene and plywood. List these in the plan together with the following details: names of suppliers, services or materials (with technical specifications & trade names), their availability, terms of purchase, as well as contact people and telephone numbers.
7. Have available, floor plans showing controls for heating, ventilation, electricity, water, etc. and indicate where hazardous chemicals and other materials are stored, for example, quantities of recycled paper. They should also show passages, exits, windows, fire extinguishers, alarms, sprinklers, smoke detectors & water mains.
8. Keep supplies of basic emergency equipment (disaster boxes), for example, plastic sheeting, torches (with spare batteries), buckets, mops, gloves, to be used in the event of a disaster. Organise and maintain disaster boxes (see Appendix for contents of a disaster box, p. 109), that should contain everything that will be needed in an emergency. The boxes must be kept close to especially

- fragile, vulnerable and valuable collections. The boxes must be checked regularly to ensure that contents remain intact. Replenish stocks immediately after a disaster. The disaster box should also contain a checklist of procedures, or emergency information sheets, and a list of emergency contacts.
9. Compile a list of people who will be needed for implementation of the plan. Include the work, home & cellular telephone numbers of staff members, as well as numbers of essential services such as fire & police departments. An emergency information sheet should be drawn up and distributed – a one-page summary of immediate steps to be taken and individuals to contact.
 10. Identify objects in the collections that should be given top priority in an emergency situation. Consider requirements like crating, people-power and transportation for relocation should it be necessary. Be sure to identify alternative storage facilities if the nature of the disaster requires it. There also should be detailed, step-by-step instructions on all phases of the salvage operation, which covers vulnerable material in the collections, such as paper-based material & sound recordings.
 11. Make sure that the plan also includes:
 - accounting information with a description of institutional funds available in a salvage operation, and procedures to access them quickly;
 - insurance information explaining coverage, claim procedures, record-keeping requirements, restrictions on staff/volunteers entering a disaster area; and
 - location of keys with information about location of and access to keys for all areas of the museum/s concerned (collections, offices, laboratories, lifts, vaults, etc.);
 - duplicates of all information must be kept off-site, in a secure, but accessible place.
 12. Instructions for long-term restoration of damaged material should be provided detailing procedures for repairs, rebinding, sorting and re-housing, cleaning.
 13. Test the plan's effectiveness through team work, with regard to staff training, drills & critiques of the plan's performance. This is time-consuming but it is the only way to ensure that the plan really works. It also provides information which allows changes to be made that will improve the effectiveness of the plan. Also consider approaching other institutions in your geographical area, about formulating a mutual assistance agreement. Indicate in the agreement types of help available, how it should be achieved, who is in charge, and who pays and when.

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