Appendix J: Curatorial Care of Paper Objects

List of Figures

APPENDIX J. CURATORIAL CARE OF PAPER OBJECTS

A. Overview

1. *What information will I find in this appendix?*

This appendix discusses the physical character of paper objects and provides guidance for their long-term preservation. The types of paper objects included in this discussion are:

- archival and manuscript materials (documents, letters, field notes, reports, and project data)
- prints and drawings
- maps
- architectural records

> ***Note: Archival and manuscript materials make up the largest part of NPS museum collections, so most NPS paper objects are part of an archival collection. Be sure to have your park's archival collections surveyed and appraised by an archivist before you give attention to individual items within a collection. This will help you set preservation and treatment priorities. See Museum Handbook, Part II: Museum Records (MH-II), Appendix D: Archives and Manuscript Collections, for additional information.***

The main topics covered in this appendix are:

- the nature of paper
- agents of deterioration
- preventive conservation (collections maintenance, handling, storage, and exhibition)
- working with a conservator when treatment is needed
- emergency procedures for paper objects
- glossary of terms used to describe condition

This appendix does not address the care of photographs (see Appendix R: Curatorial Care of Photographic Collections) or books (see *Conserve O Gram* 19/2, "Care and Security of Rare Books").

2. *Why is it important to practice preventive conservation with paper objects?*

The role of preventive conservation is to avoid, block, or minimize the ***agents of deterioration***. This practice will decrease the need for costly and time-consuming conservation treatments and irreparable harm to objects.

Poor environment, storage and exhibit techniques, and careless handling easily damage papers. Once the object is stained, embrittled, torn, or creased, it becomes even more fragile. Conservation treatment cannot reverse all damage to an object. Treatment can be expensive. It is unlikely that your park can afford to treat all objects, especially those with little exhibit or monetary value. Preventive conservation is cost effective because care is provided for the collection as a whole, rather than object-by-object.

3. *How do I learn about preventive conservation?*

Read about the agents of deterioration that affect paper objects so that you can create a preventive conservation plan. These agents are discussed in more detail in Section C. Understanding how to protect your collection from the agents of deterioration will lengthen the life of your paper objects. See Chapter 3: Preservation: Getting Started, and Chapter 4: Museum Collections Environment, for a complete discussion of the agents of deterioration.

4. *Where can I find the latest information on care of these types of objects?*

There are a variety of sources for up-to-date information about paper:

- Read the issues in the NPS *Conserve O Gram* series relating to paper.
- Review the references in the bibliography.
- Look up the World Wide Web sources that are listed at the end of this appendix.
- Consult a paper conservator.
- Consult a curator or archivist of a paper/archival collection.

5. *What should I know about the history of papermaking?*

Collections may contain a variety of papers that have been used in many ways to produce records and other paper objects. Objects predating the mid-19th century are fairly uniform in character. Paper objects produced after this period vary widely in structure and composition as well as in permanence. *Papermaking* by Dard Hunter provides an excellent history of the technology of papermaking (see Section K. Selected Bibliography). In short:

- Paper was invented in China more than 2,000 years ago. It was made by hand from naturally occurring plant fibers, and was for centuries a scarce and expensive commodity. Because the process was a closely guarded secret, papermaking technology was not imported to Europe until the Middle Ages.
- The first American paper mill was established in the late 17th century. By the early 19th century, there were almost 200 mills in the United States making handmade paper from rag fibers.
- Advances in technology during the Industrial Revolution made abundant, inexpensive paper possible. Handmade paper was replaced

by mass-produced, machine-made paper. The demand for fiber was met by adding wood pulp to rag fibers. The cheapest paper, made entirely of groundwood pulp, was used for printing newspapers, broadsides, and other commercial products. Groundwood pulp paper is inherently unstable chemically.

- Higher-quality machine-made papers include more extensively processed fiber and/or some rag fiber. Some applications, like photography, require truly high quality paper made entirely of rag fibers.

6. *What is the difference between paper and a paper object?*

Paper itself is only part of a paper object. It is often referred to as the *support*. Equally important are the media used on the paper to form a paper object, such as:

- inks
- graphite
- colored pencils
- wax crayon
- pigments and binders (watercolor, pastels)

These are hand-applied media. Media also can be applied mechanically or reprographically. Mechanical processes of reproduction using the medium of printer's ink include:

- letterpress
- engraving
- wood block
- etching
- lithography

Some modern reprographic processes are:

- mimeography
- xerography

Each one of these use a wide variety of inks, pigments, and binders.

B. The Nature of Paper Objects

1. *What is the structure of paper?*

A sheet of paper is actually a web of fibers held together by their physical entanglement and weak chemical bonds between the fibers. The fibers in paper are primarily cellulose. Materials are added to the fiber to control the properties of the paper, such as absorbency and smoothness. Those

additional materials include:

- **Sizing**. Chemicals added to paper to make it less absorbent so inks will not bleed. Acidic sizings, such as alum-rosin, can cause paper to deteriorate.

- **Fillers**. Materials like clay are used to create very smooth and shiny surfaces for high quality illustration, such as glossy art book paper.

2. *What is cellulose?*

Cellulose is the basic chemical polymer of all plant fibers. The molecules have a long chain-like structure that is both strong and durable. At the same time, the structure is moisture-sensitive and vulnerable to acidic deterioration.

3. *What fibers have been used historically to make paper?*

Many different fibers have been used to make paper. These can be grouped into three types according to the source of the fiber:

- cotton and linen rags

- bast (flax, Japanese paper mulberry, hemp)

- wood

The common element of these fiber sources is cellulose.

In early paper, **cotton and linen fibers** were used to make paper by hand. As the need for paper exceeded the supply of fibers, recycled plant fibers were obtained from cotton and linen rags. The term "rag" paper applies to any paper made solely from cotton or linen cloth fibers. European-style paper objects dating from before the mid-19th century almost always are made of rag paper.

Other fibers like **grass** are quite rare, and are unlikely to be found in NPS collections.

Wood-pulp paper (or groundwood paper) is the most prevalent paper in NPS museum and archival collections dating after the mid-19th century, when technology was developed to extract fiber from lumber. This process made paper inexpensive and abundant. However, the **paper made from groundwood pulp is highly acidic and inherently unstable**.

4. *What causes groundwood paper to be unstable?*

Groundwood paper contains cellulose as well as other materials that occur naturally in wood. One of these, *lignin*, is a plant protein which is inherently unstable and generates acid as it deteriorates. Acid generated by the deteriorating lignin breaks the cellulose chains, making fibers shorter and weakening the paper. Groundwood paper begins to deteriorate as soon as it is made.

Some groundwood pulp is chemically treated to remove all but the cellulose fibers. This "chemical woodpulp" paper is not as strong or stable as rag paper because the fibers are short. However, it is not self-destructive like the groundwood paper because the acid-generating properties have been removed.

5. *How is paper quality judged?*

The quality of paper is determined by its durability and permanence. The degree to which paper retains its original strength during its history is called

durability. The degree to which paper remains chemically stable and resists deterioration is called *permanence*. See Section C.10 for a discussion of permanence related to acidity and pH.

6. *How does the nature of some paper objects affect their preservation?*

Every paper object is a combination of fibers, adhesives, and media. If any of these elements are unstable, the paper object will be inherently unstable and will deteriorate. Common examples are:

- manuscripts with iron gall ink on rag paper sized with gelatin. The gelatin size originally served to control absorption of the watery ink, preventing the ink from bleeding into the paper. As the size degrades, any water applied will be quickly absorbed into the paper. Iron gall ink can contain sulfuric acid that eats into the paper, most severely where it was thickly applied. The iron gall ink also fades from its original black to brown. Although the rag paper is sturdy and durable on its own, the deterioration of the ink compromises the stability of the object.

- pencil drawings on tracing paper. Some tracing paper is rendered transparent by an impregnating resin. Over time, the resin oxidizes, darkens, and causes the paper to become brittle. The graphite is chemically stable, but may be lost by abrasion, rubbing, or smudging.

Even when all the paper object's elements are stable, they may not respond positively to environmental changes. Two examples are:

- a tightly framed print. The print paper may be a high quality rag paper and the printing ink a stable one composed primarily of carbon. However, if the print is housed in poor quality framing materials, it will be damaged. Wood backing boards can discolor the print. If the print is held tightly in the frame without a window mat to allow expansion and contraction of the paper with changes in humidity, wrinkles and even tears can result.

- paper repaired with a paper patch. Paper expands and contracts as the relative humidity rises and falls, usually more so in one direction than the other. This can be due to the *grain* of the paper. The dimensional change is less in the direction of the grain rather than across. If the grain of the paper patch is not parallel to the grain of the paper object, the patch and the object will expand and contract in different directions. Over time, this results in *cockles*, or warping of the paper object.

C. Agents of Deterioration

1. *What causes paper to deteriorate?*

The deterioration of paper may result from:

- inherent conditions (poor quality pulp, bleaching residues, unstable sizings, acidic inks)

- external conditions (fluctuating temperature and relative humidity, light exposure, air pollution, pests, contact with acidic materials, careless handling, improper storage, natural disasters, accidents)

Inherent and external conditions often reinforce each other to promote further deterioration. See Chapter 4: Museum Collections Environment for a discussion of the impact of external (environmental) conditions on

museum objects, and Chapter 5: Biological Infestations for a discussion of pests.

Paper is fragile and susceptible to deterioration caused by ***inherent vice***. The nature of the materials and sometimes methods of manufacture, cause deterioration that may not be treatable. Good preventive conservation practice can minimize the effects of inherent vice and extend the useful "life" of a paper object.

2. *How does temperature affect paper objects?*

High temperatures cause brittleness, particularly in groundwood paper. Most of the chemical reactions that cause paper to deteriorate proceed twice as fast with each 10°F increase of temperature. Gelatin adhesives shrink and relax as temperature fluctuates.

3. *How does relative humidity affect paper objects?*

Cellulose is ***hygroscopic***—it has a physical attraction for water, making relative humidity (RH) one of the critical factors for paper preservation. Paper contains water within its chemical structure and water is also bound loosely to its surface. The water in paper is in equilibrium with the water (humidity) in the air. As the relative humidity (RH) drops, paper gives up water to maintain this equilibrium. It contracts physically, becoming smaller as it loses water.

Paper gives up the loosely bound surface water first. Once the surface water is gone, the paper is forced to give up structural water. While surface water can be regained after the humidity rises, the loss of structural water is permanent. This desiccation causes embrittlement. Some media, such as inks and gum-based watercolors, are similarly responsive to changes in RH.

Paper requires a certain amount of moisture to be flexible. Desiccated or brittle paper is:

- less flexible and more subject to damage from handling
- more easily torn during unrolling
- more easily broken when flexed

High relative humidity (above 68%) encourages insect infestation and mold growth. Fluctuating relative humidity:

- causes stress from continual expansion and contraction (particularly damaging to objects composed of more than one material)
- damages materials that are constrained (such as a tight binding, adhesive repair, or fastener)
- causes buckling and cockling to materials that are partially constrained (such as repairs or mounts)

4. *What are the appropriate temperature and humidity levels for storage of paper objects?*

Store paper objects in a stable environment at a constant temperature between 60°-65°F (+/-3°) and a relative humidity of 40% (+/-3%). Photographs should be stored at slightly cooler and drier levels. See Figure J.1. below.

	T (+/-3°)	RH (+/-3%)
Paper Objects and Human Occupants	65°	40%
Paper Objects Storage	60°	40%
Photograph Storage	50°	35%
Isolated Color Photograph Storage	40°	35%

These numbers are based on NISO TR01-1995 "Environmental Guidelines for the Storage of Paper Records."

Figure J.1. Suitable Temperature and Humidity Levels for Paper Storage

5. *How does light affect paper objects?*

Both visible light and ultraviolet (UV) radiation cause serious damage to paper objects. The degree of light-sensitivity depends on the nature of the materials and media. For example:

- Groundwood paper quickly turns brown and brittle because the damage from inherent acidity is accelerated by light exposure.
- Rag fibers are fairly stable, but may be stained or bleached by light exposure, depending on the properties of the sizing.
- Colored materials made of dyes (colored papers, colored pencils and crayons, ballpoint and felt-tip pen inks) fade quickly.
- Watercolors are particularly sensitive because the medium contains little dye or pigment.
- Certain photographically produced images (blueprints, sunprints) fade quickly with light exposure.

6. *How do I protect paper objects from light?*

To protect paper objects from light damage:

- Eliminate all sources of UV from exhibition, storage, and curatorial work areas.
- Keep exhibit area light levels below a **maximum** of 50 lux (5 footcandles).
- Control duration of exhibition to a **maximum** of 6 months. After a paper object has been exhibited for a total of 6 months, consult a conservator before each additional proposed exhibition. If the object is fragile, consult a conservator before the initial exhibition. See Section G. for alternatives to exhibiting original objects

  Note: Use the Exhibits Associated Module in ANCS+ to track the periods of time that an object is exhibited. You can then calculate the total time that the object has been exhibited. You will need to check individual loan records to determine whether an object was exhibited while on loan.

- Keep lights off in storage areas when they are unoccupied.

- Turn off lights when no one is in exhibit areas for extended periods of time.

Some design media are very stable when exposed to light. These include pure minerals such as:

- graphite
- most black printing inks

Where these media were used, the preservation of the object depends on the quality of the paper. For example, an 18th century broadside composed of black ink on rag paper can be exhibited using the maximum conditions stated above.

> ***The effect of light on paper objects is cumulative and irreversible. Do not exhibit original papers for more than six months (cumulative), except in consultation with a conservator. Maintain light levels at 50 lux (5 footcandles) maximum.***

7. *How can I tell if a paper object has been damaged by light?*

If a paper object has been exposed uniformly to light, fading or discoloration may be uniform and difficult to identify. If the object has been partially covered by a mat, check underneath the mat where the object has been protected, to see if the color is different.

Note: If the cover mat was of poor quality, the mat might have stained the paper object. It may be difficult to determine whether deterioration is a result of light damage, staining from the mat, or a combination of factors.

8. *What is the impact of gaseous pollutants on paper objects?*

Sulphur dioxide, nitrogen dioxide, and ozone are the primary gaseous pollutants that adversely affect paper collections (Wilson 1995). They are especially damaging when RH, temperature, and light exposure are high.

Oxides of nitrogen and sulfur combine with moisture from the atmosphere to form acids. Groundwood papers are especially vulnerable to acid attack (see Question 11. below, for sources of acid deterioration).

Other gaseous pollutants that may impact paper collections include:

- Acids
- Formaldehyde (used in plywood, particle board, certain foams and synthetic materials)
- Hydrocarbons
- Sulfides

Note: Most gaseous pollutants can be eliminated through the use of air purifiers (Wilson 1995). See *Tools of the Trade* for additional information.

Pollutant	Volume in parts per billion
Sulphur dioxide	5-10
Nitrogen Dioxide	5-10
Ozone	5-10

These recommendations are based on numbers from NISO TR01-1995 "Environmental Guidelines for the Storage of Paper Records."

Figure J.2. Suggested Maximum Levels of Major Gaseous Pollutants

9. *What is the impact of particulates on paper?*

Particulates come from several sources and can damage paper in many ways. For example:

- Sharp particles (sand, dirt) abrade paper and design media as they are dragged across the object's surface.
- Oily particles from engine exhaust, cigarettes, or cooking smoke may become embedded in paper fibers soiling the paper and providing food for mold and insects.
- Dust that is acidic or contains metal particles accelerates the chemical deterioration of paper.
- Dust contamination can cause irreversible deterioration because paper is fibrous and absorbent. Surface dust can usually be reduced, but rarely removed completely.
- Dust fibers can hold moisture in contact with objects and facilitate mold growth.

10. *How do I protect paper objects from dust and gaseous pollutants?*

Where practical, locate collections in storage and on exhibition away from:

- roadways
- loading docks
- parking lots
- outside doors
- photocopy machines
- woodworking and maintenance shops, and other sources of on-going pollution

DO....	*DON'T....*
remove paper from locations being painted	return paper to newly painted storerooms or exhibit cases until paint is thoroughly dry and fumes are gone
control dust through filters in ventilation systems, vacuuming, and dusting.	move dust around with brooms or redistribute dust by using vacuums that don't retain the dust in a filter

11. *What impact do acids have on paper objects?*

Acids are the primary cause of paper deterioration. They cause paper to become weak, brittle, and stained. The source of acids in paper include:

- materials used in the papermaking process, especially from 1850 to the present, such as alum-rosin sizing and lignin groundwood pulp
- residual bleaching chemicals, unstable iron gall ink, air pollutants
- direct contact with acidic materials (file folders, adhesives, mat boards, wood, unstable plastic sheeting)
- exposure to acidic vapors from closed document boxes or wooden storage drawers

Acids move from acidic materials (such as wood) to objects of reduced or no acid (such as rag paper). The rate of this *acid migration* is dependent on the moisture present. It is accelerated in humid conditions.

The concentration of acid is measured on the pH Scale, with numbers ranging from 0 to 14. The number 7.0 on this scale is neutral. All numbers below 7.0 indicate an *acidic* condition. All numbers above 7.0 indicate a basic or *alkaline* condition. The pH scale is logarithmic—a paper object with a pH 3.0 contains 10 times as much acid as an object with a pH 4.0, and 100 times as much acid as paper with a pH 5.0. **A desirable pH range for paper is 6.5 to 8.5**.

12. *How do molds and pests ffect paper objects?*

A complete description of the biological agents that affect museum objects can be found in Chapter 5: Biological Infestations.

Molds normally thrive in damp environments (RH levels over 65%) with still air. Molds:

- feed on fibers, sizings, coatings and adhesives
- grow on any material that provides moisture and organic nutrients
- destroy the sizing in paper

- cause patches of staining or discoloration
- leave paper structurally weakened and chemically altered

Insects consume parts of paper and leave damaging waste products on the surface. The types of insects that damage paper include:

- **bookworms** (the larval stage of the drugstore and cigarette beetle). Powder and small round holes in book covers or text block indicate an active infestation of bookworms.
- **silverfish** often eat partially through paper. Damage from silverfish can be found particularly in non-design areas of prints and watercolors.
- **cockroaches** feed on the ragged edges of paper and cardboard. Cockroach excrement also causes damage.
- **the common fly** seeks shelter in books or framed paper objects. Their acidic excrement is damaging to paper.

Mice can damage or destroy large collections of unprotected papers. Look for their nests by observing the concentration of droppings.

Your park should have an Integrated Pest Management (IPM) Plan, as well as a Housekeeping Plan and/or a Preventive Conservation Plan. These documents will provide you with important preventive conservation information for paper collections. In addition to regular monitoring, be sure to:

- inspect and isolate all incoming collections
- periodically monitor inside boxes, storage cabinets, exhibit cases, and other closed containers for evidence of pests and mold

D. Collections Maintenance

The park curator has primary responsibility for preventive care of museum collections. In addition to monitoring and controlling the environment, and recognizing symptoms of deterioration of collections, the curator needs to know appropriate techniques for:

- collections maintenance
- handling
- storage
- exhibition
- transportation of collections

1. *What is appropriate collections maintenance or a paper collection?*

The goal of preventive maintenance is to stabilize the collection and minimize the effects of deterioration. There are many non-interventive treatments that curatorial staff can undertake for preservation. For example:

- Remove dust from an item using an air bulb syringe.

- Use a soft artist's or cosmetic brush to gently remove loose dust before handling or storage of paper objects.

- Replace soiled or acidic folders with new, archival folders (acid-free or buffered depending on paper object). File names and other labels must be carefully copied onto the new folders. Retain old folders that contain any annotations that cannot be transcribed, such as sketches.

- Do not overfill folders.

- Remove original fasteners including staples, paper clips, string ties, rubber bands, brads, and straight pins (consult *Conserve O Gram* 19/5, "Removing Original Fasteners from Archival Documents"). Maintain the order and relationship of documents when removing fasteners. If a multi-page document cannot be feasibly stored without fasteners in its own acid-free folder, consult *Conserve O Gram* 19/6, "Attachments for Multi-Page Historic Documents."

- After removing deteriorated rubber bands from rolls of drawings, store the rolls in an acid-free tube. If the sticky residue from the rubber bands does not readily come off, interleave or cover the area with silicone release paper to keep it from sticking to other papers or the storage container.

- Remove stained prints from acidic mats. ***Note***: Do not attempt to remove the print if it is glued to the mat. Removing materials that are adhered to an object goes beyond stabilization. A paper conservator should treat this condition.

- Protect documents from acidic newspaper clippings. If the clippings must be left in place:

  – sleeve the clipping in a stable polyester folder (see Figure J.4., Types of Polyester Enclosures), or

  – interleave between the clippings and other documents with buffered paper

  If you can safely remove the clippings, photocopy the clippings onto archival paper and place the photocopies with the other documents. Store the original clippings separately. Some archives do not retain unannotated original clippings because of their acidity. The curator should make this decision based on the significance of the clippings, the park's storage capabilities, and other preservation and interpretive requirements, in consultation with the regional/SO curator.

- Unfold papers, such as correspondence, and store flat. Flat storage is preferable to rolling for all papers small enough to fit in map case drawers. Refer to *Conserve O Gram* 13/2, "How to Flatten Folded or Rolled Paper Documents."

Note: This procedure requires great care. If the papers are damaged or brittle, and in danger of cracking, request the assistance of a paper conservator before attempting to unfold and flatten them.

You may sometimes need to separate objects, such as dissimilar materials that have different storage requirements. For example, photographic prints and negatives often are removed from a series of papers and stored with other prints and negatives in individual sleeves. In this case:

- Complete and insert an *Archival Separation Sheet* (see Figure J.6) in place of the removed item. Archival Separation Sheets are available in ANCS+.
- Enclose a photocopy on archival paper of the photographic print in place of the original
- Note the original and new locations of negatives and prints in both locations

You can isolate incompatible materials with barriers (sleeves, interleaving sheets), or by planned rearrangement, for preservation reasons. With careful notations, you can preserve the papers' proper relationships.

E. Handling Paper Objects

1. *What are appropriate handling guidelines for paper objects?*

Historic paper objects often are in fragile condition and require more than ordinary care to handle them safely. Require all collection users, be they outside researcher or park/center staff, to receive proper handling guidance before they are allowed to access collections. Review procedures in Chapter 6: Handling, Packing, and Shipping, and *Conserve O Gram* 19/17, "Handling Archival Documents and Manuscripts." **Damage from mishandling is preventable**.

To prevent mishandling of collections, be sure to:

- Prohibit food, drink, and live plants from all collection areas.
- Prepare a written set of procedures for handling (see the example in Figure J.7).
- Enforce the procedures; they only work if you consistently enforce them.
- Require all users to have clean hands and wear clean, white cotton gloves at all times while handling collections.
- Limit handling, and limit the number of people who handle objects.
- Provide a clean and uncluttered workspace.
- Provide each object with appropriate support.
- Ensure that staff with collections responsibility supervise handling by other staff and outside researchers.

- Use facsimiles or duplicates in place of rare or fragile originals (see *Conserve O Gram* 19/4, "Archives: Preservation Through Photocopying").

  The light and heat from repeated photocopying can damage original documents. Limit photocopying to the minimum needed for preservation, exhibit, and other use.

DO....	***DON'T....***
Wash your hands, remove all jewelry, and wear clean, white cotton gloves at all times	Hold an object by one corner
Always use both hands.	Grasp a rolled object; it can be crushed easily
Allow the weight of the paper or roll to rest in your hands	Flex the paper when placing it onto a support
Place the support on the same level as the object and slide the object onto the support	

2. *What are appropriate supports for handling paper objects?*

The types of supports necessary for safe handling depend on the format and condition of the paper object. The purpose of the support is to relieve the object of the strain of its own weight. **Always handle the object by its support**. Supports may be:

- **long-term**, such as housing or storage enclosures
- **short term**, such as a rigid sheet of paperboard to move the object from one location to another

Examples of appropriate supports for specific situations include:

- an acid-free folder for a manuscript letter on rag paper in good condition
- polyester encapsulation for a fragile architectural plan on tracing paper that has undergone conservation treatment and the pH is stable

Following are additional considerations for handling supports:

- Lightweight, rigid materials, such as archival corrugated cardboard are useful for moving single paper objects by hand.

- Closed supports (archival folders or portfolios) provide more protection than single sheets of cardboard, or open trays.

- Closed supports, such as boxes or portfolios on rolling carts, are good methods of transporting paper objects some distance, particularly if there are any tripping hazards or tight fits

3. *How do I handle rolled paper objects?*

Do not attempt to unroll brittle or desiccated papers. These require treatment by a conservator before viewing. Flexible rolls can be viewed even if the edges tend to curl. Small weights, such as squares of polished glass, weight bags (available from various archival supply companies), or 35mm film cans filled with lead shot can be used to hold down the object's edges. The weights must be smooth and clean to prevent damage to the paper.

If the object is too long for the available table space, it can be "scrolled." To scroll through a rolled object:

- Unroll only as much as can be supported by the examination surface.

- After examining the exposed part, re-roll from the free end (this gives you two rolls).

- Shift the position of the object carefully so that more can be unrolled.

- Proceed this way until the entire object has been viewed.

- Work slowly and cautiously. The edges of tears tend to spring apart and can cause the object to be torn further.

4. *How do I insert or remove an object from a polyester nclosure?*

Objects being inserted into or removed from polyester enclosures are extremely vulnerable to tearing because of the static charge on the polyester film. To insert a limp or very lightweight object into a polyester enclosure:

- Use a sheet of 20 lb. acid-free paper as a temporary support.

- Hold the enclosure open and insert the object on its support.

- Allow the enclosure to close, and lightly rub the film with a lint-free cloth (such as cheesecloth) to build up a charge directly over the object. The static charge should help keep the object in place. See also *Conserve O Gram* 13/3, "Polyester Encapsulation."

When removing an object from a polyester enclosure:

- Watch carefully and go slowly.

- Cut through the polyester if the enclosure is sealed on four sides. The least strain is placed on the object if the seals are cut.

- Remove the top layer of polyester by rolling it up if the enclosure is open on 3 sides.

- Separate the top sheet of polyester by lifting its free corner if the enclosure is sealed with an L-seal.

- Cut a second side, then separate the sheets of polyester on a single-opening enclosure by inserting a microspatula or other flat tool.

- If possible, insert a piece of acid-free paper under the object for support as you remove the object from the enclosure.

The static charge that holds the paper object in the polyester enclosure is a disadvantage when you want to remove the enclosure. If the paper does not release easily from the polyester, gently slide a microspatula between the paper and enclosure, following with the acid-free support paper. If the edges of a torn paper adhere to different sheets of the polyester film, also use the spatula to release one edge and hold that edge in place while you remove the film.

F. Storing Paper Objects

1. *What are the guidelines for storing paper collections?*

See Chapter 7: Museum Collection Storage, for standards and requirements, assessing needs, and planning spaces. You can find information on storage supplies and equipment in Chapter 7, *Tools of the Trade*, and *Conserve O Gram* 4/1, "Museum Storage Cabinets." For archival storage and handling information, consult *Conserve O Grams*:

4/1 "Museum Storage Cabinets."
19/15 "Storing Archival Paper-Based Materials"
19/16 "Housing Archival Paper-Based Materials"
19/18 "How to Care for Bound Archival Materials"

Like many other items, paper objects require housings for protection and safe handling in storage cabinets and on shelves. Within the storage environment, housings and enclosures provide the most immediate protection for paper objects. The purpose of the housing system is two-fold, it:

- facilitates the physical organization of the collection

- provides an environment that is as chemically and physically stable

Enclosures are in prolonged and direct contact with objects so it is critical that enclosure materials meet certain specifications. Products of this type are usually called *acid-free*, or *archival.* Scientists at the National Archives and Records Administration (NARA) and Library of Congress are actively engaged in developing standards and testing materials to be used near paper objects. The NPS Museum Management Program acts as a clearinghouse for information on appropriate museum collections storage materials. *Tools of the Trade* and the *Conserve O Gram* series provide updated information on appropriate materials. New developments are also posted to various conservation web sites (see Section L. below).

2. *What are acid-free and archival materials?*

Acid-free and *archival* are general names applied to a variety of plastic and paper products designed for use in proximity to museum objects. When used for the sleeves, boxes, and folders that store paper objects, these products must be free of acid, lignin, alum, and sulfur. The four most commonly used terms are as follows:

- **Archival quality** is a generic term indicating that the product is appropriate for use in contact with your collection objects.

- **Acid free** is also a general term indicating that the product is free of acids, or has a pH of approximately 7.0. This term is often used incorrectly to describe materials that contain alkaline buffers.

- **Alkaline-buffered** products contain an alkaline compound (such as calcium carbonate) designed to neutralize any acids that are present, or retard the evolution of acids in the future. Alkaline-buffered products are often used to interleave between paper objects that might transfer acids to surrounding objects, and generally are in the pH 8.5 range.

- **Unbuffered** or **nonbuffered** products have no alkaline reserve. Generally, they are a neutral pH (7.0) or acid-free material.

- **100% rag** paper products are made exclusively of cotton fibers. Although of good quality, 100% rag paper products do not meet the standards of permanence necessary for the long-term storage of museum collections.

- **Lignin-free** and **pure alpha-cellulose** are terms used to describe some manufactured storage papers, boxes and cardboards. These are made from woodpulp fibers that remain after the lignin is chemically removed.

Two other terms you may see are **neutral** and **inert**. *Neutral* applies to materials that have a pH of around 7.0. You may find this term applied to both paper and plastic materials. The term *inert* is most often applied to materials like polyester film and acrylic sheets like Plexiglas®. It means that the material will not react chemically with your paper objects.

3. *How do I know which archival paper products to use with the various types of paper objects?*

Buffered paper can prolong the life of an enclosure, and absorb excess acidity from the papers contained inside. Be sure to periodically check buffered enclosures and interleaving papers for acidity. Acids can migrate back to the original documents if you do not replace old enclosures and interleaving papers when necessary. Use a pH testing pen to test acidity levels of enclosures and interleaving papers.

Note: Alkaline buffering damages some paper objects. For example, the buffer alters blueprints.

The following chart lists various paper objects paired with appropriate enclosure papers. Contact a paper conservator for assistance if you are uncertain about appropriate products to use with your collection.

Store Using *Buffered* Materials	Store Using *Unbuffered* Materials
Flat documents	Leather albums and collages with wool or silk components
Manuscripts	Blueprints
Maps	Hand tinted materials (may include some maps, prints, and drawings)
Most papers (see exceptions under unbuffered materials)	Diazo reproductions
Posters	Friable media (especially charcoal and pastel) should be stored in shallow boxes
Prints and drawings (see exceptions under unbuffered)	Watercolors and photographs

Some products are not available in unbuffered form except by special order. Buffered stock can be lined with polyester film to prevent the object from contacting the buffered paper. *Tools of the Trade* contains information on many of the typical products used in NPS museums for storing paper objects.

4. *How do I know which plastic products to use with the various types of paper objects?*

All plastic materials used for collection storage must be chemically inert. Acceptable plastics are free of powders, coatings, plasticizers, and other additives. Information on the exact composition of plastics should be available from the distributor. See *Tools of the Trade*, Chapter IX: Equipment and Supply Sources, for a listing of vendors.

Common Plastic Products	
Use...	***Avoid….***
• stable polyester • polyethylene • polypropylene	• polyvinyl chloride (vinyl, PVC) • polystyrene

Archival polyester film is the housing material most commonly used for paper collections. It is one of the most dimensionally stable and chemically inert plastics available. However, this and other plastics can develop a static charge that can attract loose media. Do not use plastic housings for objects with:

- powdery or friable media (charcoal or pastel)
- drawings or documents in graphite pencil
- objects with cracking or peeling media
- very deteriorated iron gall ink

5. *Are there any other situations when I should not use plastic products for storage?*

Do not encapsulate papers or house them in polyester sleeves if you cannot maintain proper environmental levels in your storage and exhibit areas. An improper environment can cause moisture to become trapped inside polyester enclosures. Such moisture can damage the object.

6. *What are diazotype reproductions and how should I store them?*

Diazotype reproductions are the familiar white paper with blue print used to print plans, maps, and similar oversized documents. Diazotypes off-gas ammonia that can damage other documents; **be sure to store diazotypes separately in their own cabinet**.

7. *What specific types of enclosures are available for paper objects?*

There are a wide variety of commercially available enclosures for paper objects. See *Tools of the Trade* for descriptions and vendors. While commercial products will be appropriate for most materials in your collection, you may need to make custom enclosures for oversized or oddly shaped objects, and those in very fragile condition. Figure J.3. lists common enclosures, their uses, and cautions about their uses.

Figure J.3. Types of Enclosures

Enclosure type	*Sizes*	*Typical Uses*	*Cautions*
10 point paper folders	Standard (10" x 12") Legal (10" x 15")	Small, flexible objects in good condition	Do not use if paper object is brittle
20 point paper folders (map folders)	Sizes over 20" x 24"	Small to medium sized objects requiring more support than 10 point folders offer	
20 lb. paper folders	Standard and legal	Light-weight folders used within 10 point folders to protect fragile documents stored vertically in document boxes	These folders are suitable only for single sheets and sets of sheets in good condition
20 lb. paper interleaving sheets	Letter size (8 ½" x 11") Legal size (8 ½" x 14")	Placed between objects in a folder; segregating paper objects in good condition from newspaper clippings	
Polyester enclosures (also see Figure J.4., Types of Polyester Enclosures)	Various sizes; several weights and thicknesses (1, 3, 5 and 10 mil)	Housing fragile or torn objects that can be kept together by the static attraction of the enclosure	Can tear fragile paper if not opened carefully; not appropriate for powdery or flaking media (charcoal, chalks, pastels, desiccated paint and inks)
Matboard enclosures	Can be made to size (see *Conserve O Gram* 13/1, "Window Mats for Paper Objects"), 2, 4, and 8-ply thickness	Appropriate for objects being framed for exhibit; added support for objects in polyester sleeves; use thicker types as supports for carrying objects	Thinner boards are flexible and not appropriate for brittle objects; avoid covering edges or face of fragile media with matboard
Corrugated paperboard	Single or double-walled construction; available in sheets 24" x 48" and larger	Similar uses to matboard; very strong. Use to make customized supports, crease and fold to make wedges to fill space within document boxes	Single-walled boards tend to warp in larger sizes
Enclosure type	***Sizes***	***Typical Uses***	***Cautions***
Boxes (See also Figure J.5, Types of Boxes)	Variety of sizes and designs for vertical and horizontal storage	Appropriate for housing multiple objects in enclosures (mats, folders); three-dimensional objects	Do not overfill or allow to become too heavy to handle easily

Figure J.4. Types of Polyester Enclosures

Type	*Description*	*Uses*	*Cautions*
Folders	Sealed on one side (usually lengthwise)	Temporary housing for fragile single sheets being processed; protect single sheets during handling by researchers	Use care to prevent the document from sliding out the unsealed sides
L-seal pockets	Sealed on two adjacent sides	Appropriate for thin pamphlets, single sheets in fragile condition, single sheets of groundwood paper	Use care to prevent tearing the object as it is inserted into the folder

Type	*Description*	*Uses*	*Cautions*
Sleeves	Sealed on two opposite sides (usually lengthwise)	Used in conjunction with supports for thin objects that cannot be flexed (placecards, photographs)	
3-seal pockets	"Open-short" or "open-long", depending on which one of the 4 sides is left unsealed	Appropriate for thick pamphlets and bulky objects; used with rigid inserts for objects that cannot be flexed	Open-short format provides more support than an open-long pocket
Multi-pocket sheets	Various sizes with pockets that vary in size depending on the number per sheet	Minimize storage volume for smaller objects such as advertising cards, baseball cards, small photos	Only appropriate for single sheets in reasonably good condition
Encapsulation (see *Conserve O Gram* 13/3, "Polyester Encapsulation")	Enclosure sealed on 4 sides with ultrasonic or heat seal, or 3M Scotch Brand Double-coated Tape No. 415®	Used for fragile, brittle, or torn objects and objects subjected to frequent handling	Acidic papers should be treated by a conservator before encapsulation to avoid accelerated deterioration, or add a buffered sheet

Figure J.5. Types of Boxes

Type	*Description*	*Uses*	*Comments*
Document	Sizes from 3" x 5" to 10" by 15"; hinged lids	Used to store groups of objects in enclosures, such as folders; objects are removed by lifting the enclosures up and out	Do not use handles that protrude into the interior of the box that can catch on the enclosures and objects inside the box.
Card	Sizes range from 3"x3"x5" to 8"x5"x10" and may have hinged or separate lids	Prints, computer discs, postcards, stereocards	
Solander or Clamshell (also called Portfolio)	Sizes range from 8"x10" to 20"x24"; clamshell boxes are hinged and open completely flat	Used for horizontal storage of paper objects, usually in mats or folders; suitable for works of art on paper	Store objects of different dimensions in standard sized enclosures sized to the box to prevent shifting or sliding in the box
Garment, quilt, oversized	Lidded boxes ranging in size from 13"x15"x10" to 16"x58"x6" and made of heavy corrugated paper or polyethylene board	Suitable for oversized objects or groups of smaller boxes; can be fitted with compartment dividers	Do not overfill
Archival Records Storage	10"x12"x15" boxes with hand holes cut into either end for carrying; lift-off lid; corrugated paper or polyethylene board	Generally used for vertical storage of papers in good to fair condition that are housed in folders	Do not use to hold fragile archival materials or those of high intrinsic value

When choosing any of these products, keep the following in mind:

- have a modular system of standard sizes
- be sure that housings fit snugly inside boxes and drawers so that objects cannot shift or slide

- when storing paper objects together in boxes or drawers, house them in the same size enclosures. Choose the size of the enclosure based on the size of the largest object

8. *What kinds of equipment should I use to store collections of paper objects?*

Be sure to utilize appropriate storage equipment to physically support paper objects in their enclosures. Use storage equipment to:

- protect the collection from abrupt environmental changes
- protect objects from pest infestations
- maximize the available storage space

Only use storage equipment that is constructed of chemically inert materials. Modular storage units afford the most efficient use of space and retrieval of objects. Refer to Chapter 7: Museum Collection Storage and *Tools of the Trade*, for further guidance.

The most commonly used types of storage equipment for paper collections are:

- **map cabinets** (also called flat files)
- **shelving units**

Only store documents vertically in file cabinets if they are in very good condition and are well supported in their enclosures.

Use **flat files** or **map cabinets** to store objects too large for boxes.

- All objects should be in enclosures.
- Map cabinets with shallow drawers are more efficient than those with deeper drawers. Store objects of varying sizes in uniform folders that are the size of the drawer.
- Fill empty spaces with blocks of polyethylene foam.
- Separate stacks of enclosures or rolled papers within a drawer with dividers made of archival cardboard.

Stack objects in piles of 1" or less in flat file drawers.

Use **shelving** to store objects in boxes. Use adjustable shelves and place shelves close enough together that boxes cannot be stacked. Roll oversized paper objects around archival tubes and store on end supports.

G. Exhibiting Paper Objects

It's difficult to find an acceptable balance between the benefits of exhibiting original paper objects and the resulting damage. For objects of high intrinsic value, there is no level of loss that is acceptable. For other objects (duplicates, objects of no intrinsic value), there may be a level of loss that is acceptable, such as fading that is imperceptible to the human eye.

To ensure preservation of papers on exhibit:

- **Obtain a copy of the CD-ROM publication *Exhibition Conservation Guidelines: Incorporating Conservation into Exhibit Planning, Design and Fabrication***, available from the Department of Conservation at Harpers Ferry Center. This resource contains a wealth of guidance on developing preservation-responsible exhibitions.

- **Do not exhibit papers for more than six months** (cumulative). Six months of cumulative exposure to controlled, low light levels (50 lux or less) is the maximum exhibition time for original paper objects. Consult a conservator before exhibiting original objects for longer than six months. **Only facsimiles are appropriate for "permanent exhibits."** Be sure to distinguish between facsimiles and duplicates as follows:

  – Facsimiles are new copies of the original objects.

  – Duplicates are multiple originals, such as lithographs and blueprints.

In some collections there may be several identical copies (duplicates) of an object, such as a lithograph map. In some instances, it may be appropriate to treat one of the duplicates as a facsimile for exhibition purposes. It is not appropriate to take this approach if those objects have acquired unique characteristics. For example:

- blueprints (originally printed in multiple copies) containing annotations documenting plan changes made during construction

- the only extant copy of an object originally made in multiples

1. *How can I limit the risks of exhibiting paper objects?*

Do the following:

- Control temperature, relative humidity, pests, and air pollution.

- Eliminate all sources of ultraviolet light.

- Limit light intensity to 50 lux or less.

- Use appropriate display materials in formats that properly support the object.

- Limit the duration of exhibit and/or rotate specific objects to and from storage.

2. *Which formats are appropriate for displaying paper objects?*

Paper objects on exhibition require special protection. The exhibit mount must provide physical support to avoid mechanical damage. It also must protect the objects from direct handling. The exhibit case protects objects from vandalism.

Paper objects are exhibited in frames or display cases.

- Frames are appropriate for single sheet objects that are strong enough to be displayed upright in a mat, such as:
  - prints
  - drawings
  - manuscript materials
- Cases are required for objects that cannot be housed safely in a mat, such as:
  - multi-sheet objects
  - oversized objects that can't be framed
  - thick, or heavy objects like books

Be sure that exhibition mats and mounts are larger than the object to fully protect its edges. NEVER FOLD OR TRIM AN OBJECT to fit into a housing enclosure.

3. *What guidance is available for matting and framing paper objects?*

Consult *Conserve O Grams* 13/1, "Window Mats for Paper Objects" and 13/4, "Exhibit Mounting Variations for Objects on Paper," *Matting and Framing Works of Art on Paper* by Elizabeth Kaiser Schulte, Hilary A. Kaplan, and Chris Foster, available on the web at: <http://aic.stanford.edu/treasure/matt.html>, and *Caring for Works of Art on Paper*, on the web at: <http://aic.stanford.edu/treasure/paper.html>.

If you hire a commercial framer, request references of other museum customers and be sure to include a scope of work that specifies their adherence to the guidance listed in these publications.

H. Working With a Conservator When Treatment is Needed

Care of NPS museum collections is based on a preventive conservation approach to preserve objects. Sometimes, however, preventive measures are inadequate, and conservation treatment is necessary to preserve an object. Review Chapter 8: Conservation Treatment, for detailed guidance. See Section J, Glossary of Terms Used to Describe Condition, for definitions of paper condition to aid in discussing the needs of your collection with a conservator.

Conservation treatment is active ("hands-on") work to preserve and/or restore objects. Only trained conservators who have specific expertise should treat paper objects in your collection. If conservation treatment is required, park staff must ensure that:

- objects receive the most appropriate treatment for their preservation and use
- treatment is appropriate (consider the object's condition, history, significance, and use)
- treatments are performed by skilled, experienced conservators and documented properly

1. *How do I know which objects require conservation treatment?*

It is easy to determine treatment needs if objects are extremely fragile, or damaged in such a way that they cannot be displayed. However, it is important to have an overall plan for dealing with the preservation of your entire collection. Therefore, it is important to have a Collection Condition Survey completed by a paper conservator to identify the entire range of problems, and develop priorities for treatment. A survey also will identify housing issues, and minimally interventive treatments that you can undertake to better preserve the collection.

2. *What is stabilization versus treatment?*

Sometimes stabilization is as simple as removing a paperclip or using buffered paper to prevent acid migration. Stabilization of a torn document may be accomplished through encapsulation, or through mending.

The goal of stabilization is to allow the object to be researched, exhibited, and handled without damage. Work with a paper conservator to determine the amount of stabilization required to meet that goal.

Conservation treatment can actually change the chemical or physical stability of a paper object.

3. *What restoration treatments are appropriate for paper objects?*

Restoration treatments are intended to return objects to a known or assumed former state, often through the addition of non-original material. Keep the following points in mind to determine if restoration is an appropriate option:

- Restoration treatments should be undertaken only if absolutely required for exhibition or research purposes.
- There must be sufficient data about the object's earlier appearance to enable accurate restoration.
- Restoration must not modify the object's known original character.

- Restoration should be accomplished using the techniques and materials that will least modify the item.
- Restoration materials should be removable at a later time with minimal adverse effect.
- Restored areas should be distinguishable from original material upon careful examination.
- Restoration and the use of added materials must be well documented.
- All restorations will preserve significant evidence of use and other historical evidence.

4. *What cleaning techniques are appropriate for paper objects?*

You can remove dust from stable media with an air bulb syringe, a soft artist's brush, or a cosmetic brush. Refer all other treatments to a paper conservator.

> ***Note: Some computer-generated documents may have ink/toner that didn't properly bond to the paper originally. Do not use a brush to clean such papers, as you could remove toner from the page. Consult a paper conservator.***

5. *Can acidity be removed from paper to prolong preservation?*

Yes. A paper conservator often can use a water-based treatment to reduce paper acidity. There also are various treatments to neutralize acids. However, certain pigments, dyes and inks may fade or change color, and some papers darken with these treatments. A paper conservator will be equipped to determine if these treatments are appropriate.

6. *Are deacidification sprays appropriate for use on aper collections?*

Only a paper conservator should determine whether any form of interventive treatment is appropriate for your collection. These sprays may irreparably change the character of a paper object. **Use only under the guidance of a qualified conservator.**

I. Emergency Procedures For Paper Collections

Your collection is unlikely to be damaged by floods, hurricanes, or tornadoes. However, no park is immune from the threat of emergencies. A broken pipe can do untold damage to a paper collection, causing sheets to stick together and media to run and stain adjacent objects. Both a disaster plan and recovery plan are critical to ensuring the collection's preservation. Review Chapter 10: Emergency Planning for guidance. Make sure that:

- Collection needs are addressed in your park's Emergency Operations Plan
- Local authorities are aware of the special needs of your collections and are familiar with the layout of your exhibition and storage areas
- Sufficient recovery supplies are readily available (see *Conserve O Gram* 21/2, "An Emergency Cart for Salvaging Water-Damaged Objects")

Also review *Conserve O Gram 21/4*, "Salvage at a Glance, Part I: Paper Based Collections."

J. Glossary Of Terms Used To Describe Paper Condition

Abrasion: surface loss caused by friction

Accretion: deposit of extraneous material on the surface of an object

Brittleness or Embrittlement: loss of flexibility causing paper to break or disintegrate when bent

Cockling: buckling or waving of the paper caused by expansion and contraction under changing atmospheric conditions

Crease or fold: line or mark made by bending or folding the paper

Dent: concave defect in the surface

Deterioration: breakdown of the paper caused by added ingredients or by natural aging

Discoloration: changes in color, such as darkening or fading

Dog-ear: term commonly used to describe a diagonal crease across the corner of a page

Fading: discoloration seen as a loss of color and sometimes with a change of hue

Flaking: lifting and sometimes loss of flat areas of the surface layer

Foxing: brown or reddish-brown spots caused by mold or the oxidation of iron particles in the paper support, mount, or backing

Insect damage: holes, surface loss, or organic residue from insect infestation

Gouge: defect in the surface caused by a blow where material has been scooped out

Loss: missing area or hole

Mold: group of small fungi that grow under warm, moist conditions on organic substrates causing the breakdown of the substrate

Mount: materials to which paper objects are attached for additional support

Substrate: the paper itself

Surface dirt: dirty material either loosely distributed on the surface of an object (dust) or firmly ingrained in the surface (grime)

Tear: linear break in paper resulting from tension or torsion

K. Selected Bibliograpy

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). "Chapter 20: Museums, Libraries, and Archives." In *Heating, Ventilating, and Air-Conditioning: Applications. ASHRAE Handbook*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, 2003.

Appelbaum, Barbara. *Guide to Environmental Protection of Collections.* Madison, CT: Sound View Press, 1991.

Canadian Conservation Institute. *CCI Notes*. Ottawa: Canadian Conservation Institute, various dates.
- 11/1 Making Protective Enclosures for Books and Paper Artifacts
- 11/2 Storing Works on Paper
- 11/3 Glazing Materials for Framing Works on Paper
- 11/6 Removing Paper Artifacts from Their Frames

Cohn, Marjorie B. *Wash and Gouache: A Study of the Development of the Materials of Watercolor*. Cambridge: Center for Conservation and Technical Studies, Harvard University Art Museums, 1977.

Ellis, Margaret H. "Works of Art on Paper," in *Caring for Your Collections*. New York: Harry N. Abrams, Inc., Publishers, 1992.

Gascoigne, Bamber. *How to Identify Prints*. New York: Thames and Hudson, 1986.

Hamburg, Doris A. "Library and Archival Collections," in *Caring for Your Collections*. New York: Harry N. Abrams, Inc., Publishers, 1992.

Hatchfield, Pamela B. and Jane M. Carpenter. *Formaldehyde: How Great is the Danger to Museum Collections?* Cambridge: Center for Conservation and Technical Studies, Harvard University Art Museums, 1987.

Hunter, Dard. *Papermaking: The History and Technique of an Ancient Craft*. New York: Dover Publications, Inc., 1978.

National Information Standards Organization. *ANSI/NISO Z39.79 - 2001 Environmental Conditions for Exhibiting Library and Archival Materials*. Bethesda, MD: National Information Standards Organization (NISO), 2001.

National Park Service. *Conserve O Gram* series. Washington, D.C.: National Park Service, various dates.
- 4/1 "Museum Storage Cabinets."
- 13/1 "Window Mats for Paper Objects."
- 13/2 "How to Flatten Folded or Rolled Paper Documents."
- 13/3 "Polyester Encapsulation."
- 13/4 "Exhibit Mounting Variations for Objects on Paper."
- 19/2 "Care and Security of Rare Books."
- 19/3 "Use and Handling of Rare Books."
- 19/4 "Archives: Preservation Through Photocopying."
- 19/5 "Removing Original Fasteners from Archival Documents."
- 19/6 "Attachments for Multi-Page Historic Documents."
- 19/7 "Archives: Reference Photocopying."
- 19/9 "Caring for Blueprints and Cyanotypes."
- 19/15 "Storing Archival Paper-Based Materials."
- 19/16 "Housing Archival Paper-Based Materials."
- 19/17 "Handling Archival Documents and Manuscripts."
- 19/18 "How to Care for Bound Archival Materials."
- 21/2 "An Emergency Cart for Salvaging Water-Damaged Objects."
- 21/4 "Salvage at a Glance, Part I: Paper Based Collections."

National Park Service. *Tools of the Trade*. Washington, D.C.: National Park Service, 2002.

Northeast Document Conservation Center. *Preservation of Library and Archival Materials*, 3rd edition. Lowell, MA: Northeast Document Conservation Center, 1999.

Tétreault, Jean. *Airborne Pollutants in Museums, Galleries and Archives: Risk Assessment, Control Strategies and Preservation Management*. Ottawa: Canadian Conservation Institute, 2003.

Western Association for Art Conservation. *WAAC Newsletter* 22, no. 2 (2000).

William K. Wilson. *NISO TR01-1995 Environmental Guidelines for the Storage of Paper Records*. ethesda, MD: National Information Standards Organization (NISO), 1995.

L. Selected World Wide Web Resources

American Institute for Conservation of Historic and Artistic Works: <http://aic.stanford.edu>

American Society of Heating, Refrigerating and Air-Conditioning Engineers: <http://www.ashrae.org>.

Canadian Conservation Institute: <http://www.cci-icc.gc.ca/>

Conservation OnLine (CoOL): <http://palimpsest.stanford.edu/>

The Getty Conservation Institute: <http://www.getty.edu/conservation/institute>.

Library of Congress: <http://www.loc.gov/preserv/>

National Archives and Records Administration: <http://www.archives.gov>

National Information Standards Organization: <http://www.niso.org>

National Park Service *Conserve O Gram* series:
<http://www.cr.nps.gov/museum/publications/conserveogram/cons_toc.html>

Society of American Archivists: <http://www.archivists.org/>

US Department of the Interior
National Park Service

Archives and Manuscript Collections Separation Sheet

Document Type (map, newspaper clipping, photograph, etc.) Catalog/Accession Numbers

Document Description (Include collection name; dates; group organizational, personal, and place names; and topics [who, what, where, why, when, and how], etc.)

Item Originally Filed (Collection identifier: specific location, box #, folder #, drawer #, sequence in unit, etc.)

Item Now Filed (Specific location: room #, shelf #, box #, folder #, drawer #, sequence in unit, etc.)

Separated By: Separation Date:

NPS Form 10-645
July 1995

Figure J.6. Archival Separation Sheet (available in ANCS+)

US Department of the Interior
National Park Service

RULES FOR HANDLING ARCHIVAL COLLECTIONS

1. Researchers (NPS and non-NPS staff) must be accompanied by museum staff at all times while in the collection research area.
2. Smoking, drinking, and eating are not allowed in any museum areas.
3. Briefcases, folders, coats, hats, umbrellas, backpacks, or other similar items are prohibited from the research area.
4. All researchers must remove necklaces, watches, bracelets, rings, and other jewelry.
5. All researchers must wear a pair of clean white cotton gloves at all times when handling collections.
6. Keep hands clean even when wearing gloves. All materials and surfaces in contact with the item must also be clean.
7. Handle papers as infrequently as possible.
8. **Only pencils** are allowed when working with collections.
9. Handle every item as though it is irreplaceable and the most valuable in the collection.
10. Researchers are limited to one folder at a time and must sign it out in the receipt book.
11. When finished working with a folder return it to the staff. Circulation to other patrons is prohibited.
12. Save all information that is associated with an item (e.g., folders, tags, labels, notes, etc.).
13. Only staff members are authorized to photocopy original materials. If you require duplication services, notify the staff.
14. If you have any questions or if any problems develop, notify the staff immediately.

Figure J.7. Example of Procedures for Handling NPS Archival Collections