

IMPLEMENTING AN ARCHIVAL PRESERVATION PROGRAM

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Goal and Objectives

Goal: Impart information about establishing an effective preservation program for your organization

Objectives:

- ✓ Teach the basic parlance and concepts of Archival Science while emphasizing preservation
- ✓ Outline the steps you may take to implement a preservation program
- ✓ Introduce basic information about the chemistry of archival materials
- ✓ Introduce basic information about causes of deterioration and creating a proper environment
- ✓ Teach about proper handling and storage methods, including security while providing access

Main Sources for the Presentation

Buckner Higginbotham, Barbara and Wild, Judith W. The Preservation Program Blueprint. Chicago: The American Library Association, 2001.

Council on Library and Information Services, Internet website at: www.clir.org/pubs/reports/pub121/sec5.html

DePew, John N. A Library, Media and Archival Preservation Handbook. Santa Barbara, CA: ABC-CLIO, 1991.

Miller, Fredric M. Arranging and Describing Archives and Manuscripts. Chicago: Society of American Archivists, 1990.

Ritzenthaler, Mary Lynn. Archives & Manuscripts: Conservation. Chicago: Society of American Archivists, 1983.

Ritzenthaler, Mary Lynn. Preserving Archives and Manuscripts. Chicago: Society of American Archivists, 1992.

Schellenberg, T.R. The Management of Archives. Washington, D.C.: National Archives and Records Administration, 1964.

Jargon and Main Concepts

Archives: The word archives is an ubiquitous term with three meanings: [1] a record-keeping agency, [2] a set of records or [3] a building where such records are housed. Traditionally, archives were public records created by governments

as opposed to historical records generated by a person or private sector group [Schellenberg, p. xxxv]. In modern usage, archives and records are used interchangeably.

Archives versus Books: books are easily identified by a title page, author's name and verso page information, and each book contains its own hypothesis, arguments and conclusions or its own plot. Books are meant to be comprehensible as a unit; whereas, archives are unpublished and are a by-product of human activity. Archives are not comprehensible individually, but may only be understood in groups or record sets.

Archival Science versus Library Science: It is generally accepted that in the modern era, archival science, as a separate discipline, arose in the 1890s from the discipline of Library Science.

Descriptive Tools is another term for Finding Aids. Finding aids are tools offered to patrons to describe holdings. The most important and often used finding aid is the collection inventory that offers a series-based arrangement to the folder level. Finding aids offer intellectual control and physical control. All finding aids undergo continual refinement [Miller, p. 79].

Intellectual Control versus Physical Control: As one might suspect, intellectual control means knowing the content of records [including provenance and organic activity] sufficiently to provide access effectively, and physical control means understanding the material nature [chemistry] and ordering of a record set sufficiently to keep order while providing access efficiently. Physical control has also been used to describe taking custody [accessioning] of a record set.

Continual Refinement or Progressive Refinement refers to the periodic updating of finding aids to improve content, readability and align information with other finding aids. Continual refinement often occurs because of new acquisitions [called accretions] or because of changing technology or to link several descriptive tools. Linking of descriptive tools is also called alignment. [Miller, p. 79]

Material Nature refers to the chemical composition of an archive, artifact or book. An archive may be textual, electronic, film, or, photographic. Cartographic materials are maps and are sometimes considered a separate group, but most maps are textual. The word medium is sometimes used to describe the material nature of archives.

Textual records are paper records. They were originally defined as typescript records—paper records created with a typewriter or a printing process.

Electronic records are those generated by a computer and are accessed and stored by using appropriate computer software and hardware.

Films are thin, flexible and transparent and multi-layered sheets of cellulose nitrate, or acetate, or polyester with a light-sensitive layer composed of silver salts that are used to capture images with cameras that control exposure of the film to light.

Photographic records are all forms of photographs, from the Daguerreotype invented in 1839 to modern color photos.

Cartographic is an adjective used to describe maps of all shapes and sizes. The textbook definition of maps is: information depicting, in a planetary surface, information that relates geography in a graphic nature.

Preservation is defined as: “(1) The basic responsibility to provide adequate facilities for the protection, care, and maintenance of archives, records and manuscripts. (2) Specific measures, individual and collective, undertaken for the repair, maintenance, restoration, or protection of documents.” [Ritzenthaler, 1992, p. 1, quoting the Society of American Archivists]

Preservation and conservation are often used interchangeably with preservation being the most widely used term. Technically, preservation activities are “preventative” and conservation activities are “remedial” or “restorative.” Also, preventative preservation activities are directed to all holdings of the institution, and therefore, may be termed “strategic.” Remedial conservation activities are “tactical” because they are directed to specific holdings [e.g. a famous document, photograph, painting or artifact]. Also see the description of “Preservation Function” below.

Provenance and Original Order [discussed below in *Primary Principles of Archival Science*]

Processing means arrangement and description that are two separate archival functions that are most often combined. Processing also refers to re-housing that is an element of the preservation function. Re-housing is divided into three tasks: re-foldering and re-boxing and labeling.

Record type describes either the material nature of an archive or classes of archives based on intellectual content. When referring to material nature, archivists discuss photographic, film, electronic or textual types. Each of these may be subdivided. For example, there are sub-types of photographs, or films or computer applications, and examples of textual materials include newsprint, acid-free paper or outsized record books. When referring to the content, archives are traditionally divided into three sub-types:

- 1) Corporate Type: invoices, accounts ledgers, abstracts
- 2) Government Type: minutes, proclamations, pardons
- 3) Personal Type: diaries, letters, genealogies, memoirs.

[Schellenberg, p. 124]

Record set usually means a “collection” but may also mean any other assembly of records such as a group of series or sub-series. Most often these days, the term “record set” refers to a set of electronic data resulting from a query of a data base or spreadsheet computer application.

Record Unit / File and Folder Level / Item Level: A record unit is a box or book [a.k.a. volume] or any unit that fits on a shelf. Files and folders are the same thing and fit inside a record unit. An item fits inside a folder or file and is also called a piece or a document.

SRCA = New Mexico State Records Center and Archives

HVAC = Heating, ventilation and air-conditioning

Intrinsic Values are the values of any record or collection and may be divided into categories such as legal or evidentiary, historic, permanent, instructional, administrative, and informational.

Organic activity: Records are a byproduct of human [organic] activity. Organic activity is divided into two categories, public and private. Public correlates to the activity of the public sector--the government, and private activity correlates to the private sector--business, academic or truly private endeavors.

Archival Functions

The archival functions are an outline of the archival profession. They form a concise list of all the work that archivists do. These functions are Appraisal, Accessioning, Arrangement, Description, Access, Outreach, Preservation, Security, and Management.

Appraisal is the action of determining the values of records for a profit or to formulate and justify future decisions. For public agencies, the primary reason for conducting an appraisal is to determine if a record set should be accessioned to your agency based on your agency’s mission and the content of the record set.

Accessioning is the “formal” process by which a repository [library, archives, museum, etc.] takes physical custody and accepts legal control over a collection.

Accretion is the term used to describe the normal subsequent additions to the original accession of a collection.

Arrangement and Description –The most concise definitions for arrangement and description are: arrangement is “ordering” and description is “listing.” They are two separate processes executed upon every record set and at all levels.

Preservation is the function of protecting records and artifacts from decay, injury or loss and anticipating circumstances that may cause such damage. Preservation is primarily accomplished by controlling relative humidity and temperature. Preservation includes conservation efforts that are deliberate and planned to preserve, protect or restore books, archives and artifacts.

Security is the constant function of protecting the people, buildings, and resources and archival materials from the danger of loss or damage. Everyone thinks differently about security after 9/11 and the Murrah Building attack in Oklahoma City. There is a much higher awareness of building security, but to specifically protect archival materials, agencies institute procedures that require patrons to place bags and bulky clothing in lockers before handling materials. Access is allowed under strict circumstances that protect loss or damage of records.

Providing Access is the function of making records available to the public-at-large or selected constituencies. Archivists are responsible for making records available and promoting the use of holdings by the public. The function is also called the reference service.

Outreach is the function of promoting the use of archival holdings by engaging the public through promotional enterprises.

Management and Governance – In the public sector, elected officials and agency administrators establish a strategic plan and related goals and objectives that impact all lower-level decisions. In the private sector, owners and managers establish goals based on the profit motive or an altruistic reason.

Primary Principles of Archival Science

Provenance

Provenance concerns the origins of a collection in three aspects:

- 1) Its creator
- 2) Chain of custody
- 3) Its purpose relative to organic [human] activity

For artificial collections the creator is the compiler. Chain of custody is often not fully known. Organic activity is that human activity that caused the records to be created.

Provenance is the most important principle in Archival Science. It compels archivists to separate collections based on who created or compiled the each collection. In all cases, intermingling collections of different creators is “not” permitted. All descriptive tools [finding aids] created during the appraisal, acquisition, and arrangement and description stages must relate records to their respective creator.

If series within a collection have their own provenance, they should not be intermingled with other series.

The concept of provenance was discussed as early as 1632, in the work De Archivis by Baldassare Bonifacio [Schellenberg, p. 92], and two hundred years later, during the post-Napoleonic era, the French government dubbed the concept “respect des fonds,” where collections pertaining to political subdivisions [called bureaux] of conquered countries and of France were described and arranged with respect to the record creator and organic activity. The principle was quickly adopted throughout Europe and in the United States.

Quotes re: provenance from T.R. Schellenberg’s The Management of Archives:

“The principle serves to protect the value of evidence in archives.” [p. 92]

“The principle enables an archivist to deal with records collectively.” [p.94]

“The principle facilitates the arrangement of records.” [p.95]

“An archivist should observe the principle of provenance in arranging all organic records regardless of their origin.” [p. 95]

The archivist “...should keep each group and subgroup intact and treat it as an integral part.” [p. 95]

The archivist “...should not disperse records, from a particular group or subgroup, among subjects or other kinds of classes.” [p. 95]

Having introduced provenance as sacrosanct, there have arisen arrangement situations that might be construed to be exceptions to provenance. For example, some “outsized” documents like maps may be housed together in a map cabinet, and photographs may be housed together by an arrangement that focuses on the image of the photograph, rather than the photographer, collector or donor.

Even though these exceptions exist, provenance is maintained because each item carries enough information to undo the artificial arrangement. It is an important concept to understand that documents comprising one collection may be in separate stacks, even separate buildings, but they are made whole by one inventory, and adherence to provenance is preserved. Frederic Miller states, “Arrangement by provenance is independent of the physical proximity of records.” [Miller, p. 58]

Original Order

Original order strongly suggests that a collection should retain the arrangement or filing structure established by the creator in order to preserve working relationships between subdivisions that were created during the organic activity.

This original order “most often” accurately reflects organic activity that gave rise to the collection.

Original order is not as absolute as provenance. The order of a collection may be modified if the change brings more “usability” to the collection. That means any re-ordering must express more logic and contribute more to the understanding of organic activity than the original order. [Schellenberg p. 105]

Provenance versus Original Order during Arrangement

Miller uses the term “filing structure” synonymously with original order. He contrasts arrangement by provenance versus arrangement by filing structure on page 60 of his book.

Arrangement by provenance is based on information about creator(s) of the records, and arrangement by filing structure is based on the content of records and/or their record type [either material nature or content]. Miller says this is analogous to cataloging books based on the author versus cataloging based on the content of the author’s book. [Miller, p. 60, 79-80]

The following are examples of the two methods described by Miller.

1. The provenance method is guided by information about the creator(s) of the collection when creating a finding aid. The following is an example:

Organization is based on post where records were created.

Grand Army of the Republic, NM Division

- Carleton Post: Santa Fe
- Custer Post: Albuquerque
- U.S. Grant Post: Silver City
- Isaac Post: Lincoln
- Kearny Post: Farmington
- Sherman Post: Deming
- Sheridan Post: Roswell

2. The content method considers the record type and its content as the principal guide to organizing a finding aid. The following is an example:

Organization is based on human activity.

Anthony Albert Papers

- Legal Papers
 - Civil Cases
 - Criminal Cases
- Military Papers
 - Correspondence
 - Orders
- Personal Papers

Four Principles for Success of a Preservation Program

“The degree to which an archival conservation program will be successful will depend largely upon acceptance of four principles:

- (1) Conservation is a management responsibility of the highest administrative level.
- (2) An appropriate share of each annual budget must be allocated to the conservation program.
- (3) A conservation program is diverse. It consists of actions and activities that include storage and handling, temperature and humidity control, security, and disaster preparedness as well as routine in-house preservation treatments and such other conservation procedures that may require special facilities and high technical competence. Acquisition, processing research use, and exhibition are also integral components.
- (4) Conservation must be the legitimate concern of all members of the staff at every level; it is not merely a technical matter to be relegated to a workshop of some remote specialist.”

[Edward R. Gilbert. “A Conservation Primer: The Preservation of Library Materials in Tropical Climates.” *Bulletin of the Florida Chapter, Special Libraries Association* 14:110 (July, 1982), as quoted in Ritzenthaler, 1983, p. 7]

Establishing Preservation Priorities

When establishing priorities of a preservation program, first address problems that have the broadest impact on the largest group of holdings.

[Ritzenthaler, 1992, p. 6]

To determine what the broadest impact is, analyze the strengths and weaknesses of the following components of your preservation program:

- 1) Environmental Controls
- 2) Storage and Housing
- 3) Handling and Usage
- 4) Duplication and Reformatting
- 5) Security Measures

Also, when establishing priorities, the following factors must be weighed:

- 1) Budgetary concerns
- 2) Value of each collection [or item]
- 3) Needs of each collection [or item]
- 4) Usage of each collection [or item]
- 5) Availability of Trained Staff [Ritzenthaler, 1992, pp. 9-12]

When establishing your program, many questions will arise:

What is the most good I can accomplish with the available budget?

This question employs the guiding precept [underlined above] and factors the reality of money constraints against the current status of the preservation program. Ritzenthaler states that 10 to 15 percent of any archival budget should be allocated for preservation, and this funding should grow yearly until a “mature” program is established.

A subsequent question would be:

What worthy collection is most endangered and therefore deserving of resources and effort?

Collections, and individual items for that matter, are appraised based on intrinsic values.

Recall the following definition from above: *Intrinsic Values are the values of any record or record set and may be divided into categories such as legal or evidentiary, historic, permanent, instructional, administrative, and informational.*

Some collections or items may have added values. For example, the following objects may be irreplaceable and priceless: a diary of a famous person that explains great events; rare photographs; original oil paintings or gems and jewelry. All therefore may be deserving of special conservation treatment and preservation considerations.

Preservation Program: Core Elements

- 1) Policy Formulation
- 2) Planning
- 3) Staff and Researcher Training
- 4) Holdings Maintenance
- 5) Environmental Control and Monitoring
- 6) Disaster Control
- 7) Preservation Duplication
- 8) Conservation Treatment

These core elements are meant to insure that preservation activity is incorporated into all functions that impact the use and life of collections, including their acquisition, exhibiting, processing and use by patrons. [Ritzenthaler, 1992, pp. 5-6]

Initial Guidelines and Activities for Implementation and Self-appraisal of Your Preservation Program

- 1) Implementation should be methodical, and planning should include time-table, with specific reporting dates for interim and final reports.

- 2) Goals statement should be developed. It should provide a philosophical framework and convey the institutions commitment to preservation and state areas of concern and may be updated periodically.
- 3) Data must be gathered on needs and current activities. See information re: institutional and collection level surveys below.
- 4) Methods of communication and chain-of-command must be clear to best facilitate all functions and their component activities.
- 5) If consultants or volunteers, docents or others are to have a role in preservation and other activities, their degree of involvement must be clear.
- 6) The implementation and methods must be understood by all.
- 7) Once sanctioned, the plan must be supported in the budget. [Ritzenthaler, 1992, pp. 7-8]

Preservation Survey of the Institution

- 1) What type of materials do you hold?
 - a. *Survey of paper, photographs, film, artifacts*
 - b. *Are priceless materials given needed protection*
 - c. *Nitrate film issues*
 - d. *Identify severely damaged items*
- 2) What are your current environmental conditions and issues?
 - a. *HVAC system*
 - b. *Insects, molds, mildews*
 - c. *Air Quality, particulates: fumes, dust, radon*
 - d. *Cleanliness of shelving, boxes, floors*
- 3) What type of housing and equipment do you presently have?
 - a. *Shelving [wood or metal]*
 - b. *Equipment, such as carts, ladders*
 - c. *Acid-free boxes and folders*
 - d. *Photos and housing conditions*
 - e. *Moving films and housing conditions*
 - f. *Maps and housing conditions*
 - g. *Artifacts and housing conditions*
- 4) Are there persistent, recurring problems with the building?
 - a. *Door and windows*
 - b. *Handicapped accessibility*
 - c. *Lighting*
- 5) What are your present security measures?
- 6) What fire detection, prevention and suppression systems are in place?
- 7) Is there a water detection and alert system?
 - a. *Consider outdoor drainage away from the building*
- 8) Do you have a disaster preparedness plan and when was it last updated?
- 9) Are researchers monitored at all times?
- 10) Does staff know proper methods for storing and handling materials?
- 11) Does you institution presently have a trained preservation staff and how is the preservation staff organized?
- 12) What is your annual preservation budget?

- 13) What percentage of staff time is devoted to preservation activities?
- 14) Do you presently have conservation activity performed by staff or by contractors? Are these activities evaluated on a regular basis?
- 15) How are documents, photos, CDs and other mediums duplicated and are there preservation and security concerns?
- 16) Are original materials exhibited and what security and preservation concerns arise? [Ritzenthaler, 1992, pp. 9-12]

Preservation Survey of Collections

Survey forms or checklists are the best method to collect data regarding the status of each collection and/or group of collections. Staff members recording the information must possess at least intermediate-level knowledge of the parlance used by the agency and archival community at-large and therefore must be able to identify the material nature of holdings and related problems of each record type.

Along with basic descriptive information about each collection, the following listed types of information should always be collected and the “physical needs” of each should be emphasized in the exposition of the survey:

- 1) Type of materials: What formats and media are found within the collection?
- 2) What are the intrinsic values of the collection? [monetary, historical, legal, educational, *etcetera*]
- 3) What are the current housing conditions? Are archival quality materials [acid-free and buffered holders or Mylar and other approved plastics] employed?
- 4) What conservation issues exist?
 - a. Evidence of damage
 - b. Evidence of instability

Physical needs should be described in precise terms that discuss evidence of instability, such as fading, darkening, odors, cockling or mention of some distortion. [Ritzenthaler, 1992, pp. 9-12]

More on Collection Analysis [taken from the Arrangement and Description Training Session]

Archival manuals on “arrangement and description” [see functions above] provide solid guidelines for analyzing collections that may be incorporated into the preservation survey and prioritization processes.

Elements of the Collection Analysis

The collection analysis is divided into two exercises, the intellectual analysis and the physical analysis. The intellectual analysis concerns itself with provenance--the record’s creator, chain of custody and the strategic goals of organic activity,

whereas, physical analysis concerns itself with original order--the filing structure and the tactical objectives of organic activity.

Steps of the Intellectual Analysis of Collection

- 1) Determine an accurate title for the record set.
- 2) Provide biographical information about the record creator, and outline the organic activity to describe purpose for the record set and span dates.
- 3) Outline the chain of custody and provide appraisal and accessioning documents.
- 4) Describe and give details on confidential, sensitive and restricted material. Especially restrictions, were they placed by the donor, or by U.S. law [including state and local statutes and ordinances] or by the repository [perhaps because it contains fragile material or is unprocessed]?
- 5) Describe the "type of collection" [discussion below].
- 6) Identify the record types and convey how each contributed to the organic activity of the creator.
- 7) Determine and describe the order or lack of order down to the series level. Begin to establish a hierarchy. [Discussion below]. Make notes of types of material, dates of material and note ideas about how it all fits together.
- 8) Forecast access needs by describing the importance and/or uniqueness of the contents of the collection. This description should convey demand for the records within the community-at-large or niche groups.

Steps of the Physical Analysis of Collection

- 1) State the preferred method of arrangement and if re-arranging is necessary provide rationale.
- 2) Verify size of the collection and forecast final size in linear feet.
- 3) Describe the material nature of the documents.
- 4) Describe the condition of boxes and folders.
- 5) Review documents and determine if conservation treatment is required.
- 6) Identify type and number of storage containers required and determine storage conditions for non-textual and over-sized documents.
- 7) Remove duplicates and blank forms.

Tactical decisions during Arrangement

- 1) Labor may be divided between professional and clerical staff.
- 2) Describe working assignments to accomplish the processing.
- 3) Create a budget for labor and supplies over the entire time needed to accomplish the project.
- 4) Consider space needs for staging during arrangement processes.
- 5) All the Re-housing, Re-boxing and re-folding should be accomplished during arrangement, but, it may be postponed until resources are available.

- 6) Budget realities often drive the system. It may expedite or hold up the process, depending on the situation.
- 7) Rearranging is somewhat controversial and considered a violation of the original order principle, but it is allowed to facilitate use and understanding of the collection. Remember the ultimate test question: Does the new order support usability?

Preservation and Handling during Arrangement

By employing the proper arrangement processes and adding precise descriptions and locations, an archivist is also supporting the preservation and security of holdings. [Ritzenthaler, 1992, p. 53]

Conservation concerns, problems and tasks should be identified early, either in the appraisal and accessioning functions or in the collection analysis process, and these issues should be addressed in the work plan as either long- or short-term projects.

Try to incorporate the following steps into the arrangement process:

- 1) When re-folding and re-boxing and labeling, acid-free materials should be used if budget allows.
- 2) Destructive fasteners should be removed and replaced with archival quality materials.
- 3) Remove any acidic materials if they do not remove with them any intrinsic descriptive value [e.g. newspaper clippings, pressed flowers, hair cuttings]. If they cannot be removed, then they must be covered before too much loss of information can occur.
- 4) Try not to overfill folders or pack boxes too heavy.
- 5) Maintain temperature and relative humidity at optimum levels during all stages of the project [62 degrees Fahrenheit and 42% Relative Humidity, but parameters are generally low 60s and low 40s respectively].

Survey of Resources

- 1) What funding is presently available? What can you do immediately with the most effect?
- 2) What commitment exists from current funding sources for future projects?
- 3) What personnel are available and trained to begin preservation projects immediately?
 - a. How long will they be available?
 - b. What is the level of expertise?
 - c. What is a good project?
- 4) What training is available to bring staff to a higher level, if needed?
- 5) Will outside resources be used?
 - a. How long will volunteers, docents or others be available?
 - b. What is the level of expertise?
 - c. What is a good project?
 - d. If resources are materials, what is their best use?

Creating a Suitable Environment

The ideal environment requires control of the following conditions:

- 1) Temperature and relative humidity
- 2) Clear air with good circulation
- 3) Controlled light sources
- 4) Freedom from biological infestation [insects, molds, mildews]
- 5) Good housekeeping practices
- 6) Good security practices
- 7) Protection from potential fire and water hazards

[Ritzenthaler, 1992, p. 51]

Handling by Staff and Patrons

The greatest cause of deterioration of materials is handling by staff and researchers. Procedures should be established and enforced for handling materials by staff during processing and reference, and user guidelines should be established for researchers.

White cotton gloves should be provided to prevent the transfer of oil that in time will stain materials. Some archivists claim that wearing gloves makes one uncoordinated and likely to cause more damage to paper and photographs. In any case, micro spatulas or similar tools should be available to help patrons handle materials if needed.

When patrons request large amounts of material, the archivist should bring small and manageable amounts for review, and these should be returned before the next batch is retrieved.

The research room should always have a staff person to monitor use of materials. Researcher should register and sign in and out. The materials requested should be documented. Security cameras should monitor all entrances into and out of the storage areas. No large bags should be permitted in the research room.

Temperature and Relative Humidity (RH)

Science has established that all materials deteriorate faster at higher temperatures; therefore, lower temperatures mean longer life for all archival materials.

Temperature and relative humidity are related: as the temperature rises, the air becomes able to hold more water vapor, and water vapor accelerates corrosive effects of all materials. Relative humidity is the amount of water vapor in a volume of air expressed as a percentage of how much the same volume can hold at the given temperature.

Fluctuations to a higher temperature will cause the air to hold more water vapor and when the temperature lowers, water condenses when it reaches the dew point. The condensed water may form on the archival materials themselves or may form on the coldest surface and the surrounding air that is now extremely dry will suck water from the archival materials.

Therefore, fluctuations in temperature and accompanying changes in relative humidity are especially harmful to archival materials.

Temperature and RH are controlled by Heating, Ventilating and Air Conditioning [HVAC] systems, which can be costly to install. There are passive climate control measures that may be employed:

1. Do not place bookcases against outside walls
2. do not use enclosed bookcases, especially those with glass fronts
3. insulate walls and cover with an impermeable membrane
4. keep the air moving [DePew, 1991, p. 59]

There is no agreement on the correct levels for temperature and relative humidity:

- ▷ Common recommendation at the State Archives for storage areas:
 - Temperature = 70 degrees or lower
 - Relative Humidity = 30% - 50%
- ▷ Recommendation for storage areas by Ritzenthaler in 1983:
 - Temperature = 67 degrees, plus or minus two degrees
 - Relative Humidity = 47 percent, plus or minus two percent [Ritzenthaler, 1983, p. 30]
- ▷ Recommendation for storage areas by Ritzenthaler in 1992:
 - Temperature = 70 degrees, plus or minus two degrees
 - Relative Humidity = 45 percent, plus or minus two percent [Ritzenthaler, 1992, p. 53]
- ▷ Recommendation of John DePew in 1991 for **textual materials in reading and research areas**:
 - Temperature = 68 degrees, plus or minus three degrees
 - Relative Humidity = 50 percent, plus or minus three percent [DePew, 1991, pp. 48-50]

- ▷ Recommendation of John DePew in 1991 for **textual materials in storage areas**:
 - Temperature = 60 degrees, plus or minus three degrees
 - Relative Humidity = 50 percent, plus or minus three percent [DePew, 1991, pp. 48-50]

- ▷ Recommendation of John DePew in 1991 for **photographic materials**:
 - Temperature = 55 degrees, plus or minus three degrees
 - Relative Humidity = 40 percent, plus or minus three percent [DePew, 1991, pp. 48-50]

- ▷ Recommendation of John DePew in 1991 for **film and magnetic tape**:
 - Temperature = 70 degrees or lower [DePew, 1991, p. 202]
 - Relative Humidity = 20 percent, plus or minus three percent [DePew, 1991, p. 50, see Table 2.2]

- ▷ Actual settings for **preservation microfilms** at the SRCA:
 - Temperature = 50 degrees
 - Relative Humidity = 40 percent

- ▷ Actual settings for **electronic secondary storage and tapes and discs: magnetic and optical** at the SRCA:
 - Temperature = 56 degrees
 - Relative Humidity = 45 percent

Air Quality

Pollutants are becoming more of a problem, especially in urban areas. Particles attach themselves to surfaces of paper, photos, tapes and discs and cause mechanical [friction] damage. These particles also absorb gasses that cause chemical damage. Gasses such as sulfur dioxide and nitrogen dioxide combine with water to produce sulphuric acid and nitric acid, respectively.

Intake vents for HVAC systems should not be placed in areas high in pollutants like a busy street or loading dock. Filters should be used to eliminate gases and particles in storage areas. New filtered air should be able to reach all corners of the storage area. Housing your holdings in acid-free containers with covers will help the effort to prevent any damage from pollutants and particulates. Periodic cleaning improves air quality.

The best HVAC filters are active carbon and microporous alumina pellets impregnated with potassium permanganate. [DePew, 1991, p. 57] Be aware that some chemicals used with HVAC systems can have a negative impact. For example, chemicals used to prevent mold growth are sometimes poured into HVAC drain pans.

Look for internal sources of pollution such as formaldehyde and acetic acid emitted from particle board and plywood. A coat of latex paint over these composite boards will improve air quality.

Biological Pests

Biological agents, mold, fungi, insects and rodents, like moist and warm areas. All feed on paper, glue, and paper-sizing and gelatin emulsions of photos or negatives. Also, rodents like leather, vellum and book cloth used in book bindings.

Insects and mice can become a big problem if not monitored constantly and addressed quickly when infestations are discovered. One should be especially vigilant when the outside temperature changes. As cold weather ensues, rodents seek shelter inside. Mice are easy to catch or poison, and in extreme cases, city or county government resources are willing to help. One female insect can lay many eggs and as warm weather occurs, a surprising number of insects can appear quickly.

Infestations can disfigure or completely destroy materials and can contaminate wide areas of holdings and storage areas. Be especially careful of rodent droppings that can hold and transfer many diseases, not the least of which is hantavirus. Many institutions use sticky traps as a low-tech and cost effective method of monitoring for infestations.

Molds and mildews [microscopic agents] should not be a problem if temperature and relative humidity are kept low and air is circulated consistently. Be especially vigilant in areas with bad circulation and stagnant pockets of air. If possible, make sure doors to storage areas open to hallways or other rooms not to the outdoors. Inspect windows and door jams and their seals [weather stripping] to insure a tight fit.

Most importantly, when new collections arrive, isolate them until they can be inspected to insure they are vermin and insect-free before initial processing and incorporation into the general storage area.

Light

All light damage is cumulative and irreversible to archival materials. Cumulative means the damage gets worse with each exposure and archival materials never repair themselves the way a persons skin will. Light is radiation and measured by its wavelength. Ultraviolet light with the shortest wavelength is invisible and is the most destructive. Red light has the longest wavelength and is the least destructive.

Light performs a bleaching action on all artifacts and causes papers to darken or yellow and eventually crumble. Inks, dyes and paints will fade and eventually disappear. Fibrous materials such as cotton book bindings will weaken at the sub-atomic level and become brittle and eventually crumble.

Light damage is measured by considering the wavelength [type of light] its intensity and the duration it impacts an object. Archivists and librarians need not get too mathematical, but must consider “total exposure” of light. Because light damage is cumulative a long exposure to weak light is just as damaging as a short exposure to sunlight. [DePew 1991, p. 59]

The basic rule is to keep all archival materials, including artifacts, from direct sunlight. Also, use fluorescent light that is bounced off a wall or ceiling [in all areas: offices, storage and research areas]. Much damaging light can be removed from the equation by reflecting light. Ultraviolet light does not reflect. Finally, specific paints may used to absorb harmful rays. These are titanium dioxide and/or zinc white. [DePew 1991, p. 65]

Exhibit cases can be challenging because they are often in entry areas with windows. Outdoor light, even if it bounces indirectly from adjacent walls, can damage exhibit materials, especially with prolonged exposure. The best practice is to use copies in exhibits, and if possible install filtered glass. Filters of special plastics are also made for incandescent and fluorescent light fixtures. Blinds or drapes may also be employed to reduce intensity.

STORAGE OF ARCHIVAL HOLDINGS

Books

Archives and libraries should be kept as clean as possible. No food or drink should be allowed in research or storage areas [*but some accommodation is often made for office areas*]. Persons touching books should have clean hands. New books should be opened carefully to stretch the spine without breaking the glue. [DePew, 1991, pp. 96-97]

Paper

Paper is the most common material found in archival collections worldwide. Modern paper uses two components, alum and rosin, as “sizing.” Without sizing, paper would not hold ink very well and would act more like blotter paper. When alum and rosin contact with water they produce sulfuric acid and aluminum hydroxide and other compounds. Light and some atmospheric pollutants facilitate the creation of acids in paper. [DePew, 1991, pp. 12-13, 22 and 429]

The time between 1850 and the present day is considered “the era of bad paper” because of the use of acid-producing sizing. Many modern paper mills are converting to the use of non-acidic sizing such as starch [first used by Chinese, 104 A.D.] and animal gelatin, *casin* and glue, which were first used in the production of paper. [DePew, 1991, pp. 12-13, 22 and 429]

Paper materials should be stored in acid-free folders and boxes. Most acid-free materials are “buffered” meaning that they have an alkaline reserve that helps to neutralize acid that is produced by the paper itself. Buffered materials also mitigate “acid migration” from one item to another in the same box. For example, newspapers produce large amounts of acid during decomposition, and the acid hastens the destructive processes of other surrounding paper and materials.

An appropriate size box should be selected to ensure that the folders are not packed too tightly or too loosely. All papers should be unfolded. All fasteners (staples, paper clips, rubber bands) should be removed. All boxes should be stored on shelves above the ground level.

Maps

Most modern maps are produced on paper. However early maps were produced on vellum or other animal skins. Modern maps are also found on microfilm and magnetic and optical media.

Paper maps should be stored flat in map cases, and if needed, they may be humidified and reconditioned in order to be flattened. Large acid-free folders can be constructed to hold maps that show similar geography [i.e. county, city, state, nation, national forest, trails, land grants, etc.] Map cases should be of metal painted with enamel [oil based] paint. Map cases should not have drawers at floor level.

Mylar sleeves can be made to house maps that are fragile, and sleeves should not be sealed on all sides. Paper maps may be mended using Japanese paper and methyl cellulose.

Photographs

Traditional photographic images are formed when light strikes chemicals that are adhered to film or paper by a layer of gelatin or some other “binder.” The film is processed first to create a “negative” that is then used to project the image onto light-sensitive paper. The light-sensitive chemicals on both the film and paper are then “fixed” with other chemicals to stop the reaction to light. Even though the reaction to light is stopped, photographic materials will always react to light at slower pace.

Therefore, photographic materials should be kept out of sunlight or prolonged exposure to any light.

Prints and negatives should be stored individually in an envelope composed of either acid-free paper or inert plastic. There is still some debate in about which is best: paper or plastic.

There are advantages and disadvantages to each. Paper envelopes are cheaper, easy to write on, and protect from light damage and they absorb harmful off-gasses. Off-gasses from nitrate-based images can be especially dangerous since these images can spontaneously ignite and burn. Plastic enclosures provide better protection from water and external gasses and the image can be seen without removing it from the enclosure. [DePew, 1991, pp. 197-199]

Buffered paper envelopes are “not” suited for certain types of photo images, namely albumen and color prints and cyanotypes because the alkaline can accelerate degradation of these images. Plastic envelopes, although inert, are “not” suited for nitrate-based films because enclosing the chemical reaction causes it to accelerate. [DePew, 1991, pp. 197-199]

Three types of plastic are considered archival quality: polyester, polyethylene and polypropylene. [DePew, 1991, p. 198; and Ritzenthaler, 1983, p. 44]

The current approach at State Archives is to house photo images in polyester plastic sleeves sold under the brand name **Mylar**, which was first patented by the DuPont Corporation in 1952. Negatives are housed in alkaline buffered acid-free paper envelopes. Prints and negatives are housed in separate boxes. Descriptive information is written onto the backside of each photo being careful not to emboss the image. This requires a delicate hand and locating the information on the borders of the print. Descriptive information concerning negatives is penciled onto the envelope.

Photos and negatives should be stored horizontally. Glass plate negatives should be stored vertically with supports in between each negative.

Cased Photographs [Daguerreotypes and Ambrotypes] should be stored vertically with supports in between each cased photo. Loose cracked images can be stored flat in a hand made container that allows each piece of the image to be laid down in foam.

Outsized Volumes

Oversize volumes should be stored horizontally in acid-free boxes. A variety of acid-free boxes can be purchased from archival supply companies. For odd-sized volumes, acid-free card board is available in sheets of 4x8 feet and specific sized boxes may be constructed

Sound Recordings

The primary concern with all types of sound recordings is to protect them from dust by using covers and keeping storage areas clean. Older recordings with great value should be migrated to a modern medium or transcribed to paper.

Albums and Records

Albums should be stored vertically and sleeved in polyethylene liners or acid-free paper sleeves. Original sleeves are acidic and can migrate and attack the vinyl surfaces. However, most albums are housed in their original sleeves because they provide aesthetic values and original information. Lower temperatures are desirable, but whatever the temperature, it is best to have a “non-fluctuating” situation. [DePew. p. 215]

Cassettes and Video Tapes

Protect cassettes from dust and extremely high temperatures, usually caused by sunlight in cars. Magnetic tapes composed of iron-oxide, polyester or chromium-dioxide do not last very long when not treated well.

Be careful not to wind tapes too tightly as excessive friction harms the recording. Proper tape tension can be maintained by storing tapes in the “played” position and rewinding before each use. DePew recommends temperature and RH settings at 60-70 degrees and 20%-40%, respectively. [DePew, p. 218]

Cassette tapes are not considered long-term storage and valuable information should be copied to another, more permanent medium. Each time a magnetic tape is played some degradation of audio or video occurs. Videos and cassettes will function for 30 years if kept in a “controlled” storage situation. [DePew, 1991, p. 226] In normal, household situations, tapes will last about 14 years, and this is often aggravated because machines are not kept clean. Store cassettes in an upright [vertical] position and keep them away from magnetic and electrical fields created by electric motors or areas of high electrical transfer. [Ritzenthaler, 1983, p. 47]

Since 1956, over 30 different formats have been sold for magnetic recording tape with the most popular being BETA, VHS and 18mm [reel-to-reel]. [DePew, 1991, p. 225] Older recordings of high value should be migrated to modern long-term formats before equipment becomes hard to find.

Discs [Optical] CD-ROM and DVD

There are four basic guidelines to remember and employ concerning discs:

1. Keep work and storage areas clean and within archival parameters of temperature and RH
2. Keep discs and equipment clean and in good operation
3. Make back-up preservation copies and house these in another building
4. If the technology is aging, migrate the information or images to a modern format

Please note that the optimum temperature setting at the State Archives vault is 56 degree Fahrenheit, lower than for most other mediums, and relative humidity is a bit higher at 45 percent.

To accomplish guideline No. 2 above one should never bend a disc or touch the playing surface. Never force discs into the slot of the disc drive or place an object on a disc. Always remove discs from the playing devices and return them to their envelopes or cases. Store discs in a vertical position and keep them away from extreme heat and from magnetic fields if the disc is a magnetic device. Magnetism should have no effect on CD-ROM or DVD devices. Clean CD-ROM and DVD discs only as directed: with a **dry soft cloth** and never using any solvents. Finally, keep playing machines in good working order. [www.clir.org]

Because the cost of discs is affordable, the best approach to preservation is to transfer information, photographs and moving films to CD-ROM or DVD formats, and store preservation discs at other locations.

Optical discs were first developed in 1980 by Phillips and are composed of polycarbonate plastic. The layer that holds information is made of either metal or colored dye. The read and writeable discs are made of aluminum surfaces while the “read only” and “write once only” are made of colored dyes. Again, it is important to never touch the playing surface. [www.clir.org]

Rough handling and bad storage conditions are the main causes of disc damage. Be aware that damage will also result from extreme environmental conditions related to temperature, relative humidity, moisture and dust and gasses and solvents.

Discs [Magnetic]

All the conditions and treatment requirements pertaining to Discs [Optical] above also pertain to magnetic discs that are used for computer secondary storage. The only added guideline is to keep floppy discs and diskettes away from magnetic and electrical fields.

Motion Picture Film

Prior to the 1950s, most movie film was **nitrate**-based and posed a serious problem because of its tendency to spontaneously ignite and burn robustly. In 1951, the movie-makers began to use **acetate** film base, called safety film, because the word “safety” was often embossed on the edge.

Your film archives should be inspected to identify and segregate all nitrate films [movies or flat negatives], and this film should be stored in airtight containers away from other materials. Also, it should be stored at very cold temperatures; DePew recommends storing in a freezer at minus five degrees Fahrenheit with RH at 25%. Copies should be made of the movie or photo and the nitrate film destroyed with the help of your local fire department. [DePew, 1991, pp. 209-212]

Acetate film was first used about 1901 and gained popularity beginning in 1923 and became the standard after 1951. Over the years new compounds were made available. Diacetate and triacetate are stronger and more resistant to moisture. Most professional film is still made from triacetate.

The acetate group of films is susceptible to damage from high humidity. DePew recommends that RH be maintained at 30% and temperature no higher than 70 degrees Fahrenheit. [DePew, 1991. p. 212] DePew presents a conflicting setting of 20% on page 50, Table 2.2; however, the point is that RH should be low, between 20 to 30 percent and fluctuations should be within three percent.

The most obvious sign of improper storage of acetate film is the smell of vinegar. Because animal gelatin is used to bind the emulsion to the base, film will also become sticky and begin to curl. Eventually the emulsion layer will separate from the base.

Acetate films should be spooled onto plastic cores and housed in polypropylene containers [i.e. ♻️ inside the recycling triangle] or in acid-free buffered cardboard containers. Films should be laid flat and not stacked too high, and of course, nitrate and acetate materials should be separated.

Polyester film is a modern film that has greater strength and resistance to many negative qualities, such as tearing, burning, separation of layers and it resists moisture better than other films. While the base layer is stronger, the emulsion layer is bound by animal gelatin and is also susceptible to damage from high RH. Storage conditions are the same as acetate film.

Motion Picture Film should be periodically inspected for shrinkage, tackiness, curling, brittleness and the smell of vinegar. The best preservation approach is to condition films by splicing, storing in proper plastic containers and copying the images to a DVD format.

Microfilms

Microfilm is still the best method to preserve records in both the public and private sectors. With preservation practices and environmental controls, microfilm will last 500+ years. Many modernists insist that computer digitization is preferred for preservation, and they have many good points. Microfilm is still the recognized standard because it does “not” take a sophisticated retrieval system - it may be read with a magnifying glass and light. Another argument details the prohibitive cost involved in upgrading the diverse and quickly changing computer operating systems and accompanying applications that arise ever few years. Perhaps the best argument supporting the digitization of documents is the fact that preservation microfilm at present offers only black-and-white image capability.

Preservation requirements and guidelines for microfilm are the same as motion picture film because it is composed of the same base material. Polyester film is now preferred after years of using acetate and nitrate bases, but acetate base is still used. Preservation copies of microfilm, and if budget is available working copies, should be kept in acid-free boxes.

Microfilm is produced in different sizes and shapes. Most often film comes in 35 millimeter and 16 millimeter film that rolled onto spools and microfiche resembles a plastic 3x5 index card. Together these are called microforms.

Previous discussion of films focused on the base materials. Presently microforms are most often made with a polyester base and discussion of their differences centers on emulsion types. There are three emulsion types: silver-halide [or silver gelatin] and diazo and vesicular. Vesicular is actually diazo covered with base material on both sides.

Only one type of emulsion type is acceptable for preservation purposes: silver halide film will last for centuries if maintained in a proper environment. However, silver halide film scratches easily and should not be overused. DePew recommends that a silver master be used only five times to produce working copies before a second silver film is made. [DePew, 1991, p. 187]

Working copies are usually diazo film on polyester base. Diazo film is easily produced and durable; however, diazo is sensitive to light and will eventually fade even in the best archival conditions. Diazo film, as with all archival materials, should be kept out of sunlight.

Funding Sources

National Endowment for the Humanities Preservation Assistance Grants, see website at WWW.NEH.GOV; for deadlines and requirements and awards for 1 year projects

- New Mexico Historical Records Advisory Board Grants and Scholarships, see website at WWW.NMCPR.STATE.NM.US, for deadlines, requirements, and awards for 1 year projects

Training Resources

- Northeast Document Conservation Center, see website at WWW.NEDCC.ORG, for online preservation course [free] and technical leaflets

- Amigos Library Services, Inc., see website at WWW.AMIGOS.org, for information about preservation training and assessment services