RECORDS MANAGEMENT POLICY #12.0 - APRIL 2006

PRESERVATION OF PHOTOGRAPHS AND NEGATIVES

The purpose of this guideline is to provide basic information for the handling of photographic materials most prevalent in the New York State Unified Court System. If the type of photographic materials located in your court or office is not readily identifiable from this guideline, contact the Office of Court Administration's - Office of Records Management.

Background

Photographs and negatives have different needs to minimize deterioration. Each type of photographic process also has specialized requirements. It is therefore important to identify the types of photographic materials that are in your possession. The most likely type of photographic materials are black and white prints and their negatives, and color prints and their negatives, including slides. Color photography is the most unstable of the photographic processes. The age of the materials will determine which color photographic process was used. Over the next 30-50 years contemporary color prints will have at least a 30% image loss. Black and white metallic silver, if processed correctly and stored appropriately, will not deteriorate that fast. The life of the image on these negatives and prints depends on the physical and chemical stability of its component layers.

Photographic Processes

Negatives and prints are composed of a support layer and an emulsion (binder) layer. The support layer in a negative is currently composed of polyester. The support layer in a print is usually made from paper, but can also be glass or other type of material. (Note: If you have photographic plates contact the New York State Unified Court System - Office of Records Management immediately. Photographic plates are images on glass or metal supports. They are extremely fragile and present special preservation needs.) The emulsion layer, in both negatives and prints, is a light sensitive layer coated on to a support. The photographic process involves exposing the light sensitive emulsion layer to light to create a "latent " image. This "latent " image is then developed in a solution called a "developer " to make the "latent " image "visible ". Only the part of the emulsion layer that has been effected by the light becomes the "visible image ". The remainder of the emulsion needs to be fixed so it does not effect the "visible image ". The final step is washing. This removes the excess chemicals from the fixing bath which can cause deterioration on the final picture. In black and white photography silver compounds are dispersed uniformly in gelatin and added to the emulsion layer as the light sensitive material. In color photography, color dyes of yellow, green (cyan) and red (magenta) are dispersed in the emulsion layers.

The color dye forming process is called chromogenic. In 1955 Ilfochrome (Cibachrome) was introduced and decreased the rate of deterioration of color film. Deterioration of the images starts the moment the processing is complete because the dyes fade at different rates and react with water vapors (hydrolysis). A yellowish stain will start to appear on the photographic bases used to hold the images. Yellow dyes are the most sensitive and are a good indication that deterioration is taking place.

The life of the images begins with the processing to maximize stability. Processing includes developing and fixing the image on the negative and washing and drying the print/negative. Then the negative/print is washed and tested for residual chemicals. Once processed, storage and handling play an important role in the continued life of the image. Additionally, post processing treatments can also affect the stability of the image. This includes lacquers, plastic laminates and retouching colors.

Storage areas should meet the Records Management Guideline #I for Offsite Records Storage. Additionally, housing should also be provided to protect the negatives and prints. The key for storage environments and housing units is to minimize the amount of the physical and chemical deterioration of the images. Film, or a sample of the film, should be inspected every year to determine if any deterioration has taken place and correct any problems that may have caused deterioration. Look for physical changes in the materials, visual changes in the image and changes in the enclosure materials.

Physical and chemical deterioration of the adhesive layer and the film base cause emulsion pealing, lifting, flaking, wrinkling, and cracking. Changes in the sub-coat or the adhesive layers that hold the emulsion to support the base cause the dimensions of the negative/print to change. See the Degradation Table below for specifics. Appendix A contains further information on stability of different manufactured films.

Degradation Table for Negative and Prints

Physical Degradation	Chemical Degradation
emulsion pealing, lifting, flaking, wrinkling, cracking	image discoloration - change in tone or color
tears	stain - appearance of back ground area
warping, planar distortions of base layer	image fading
adhesion failures (of the layers)	microblemishes
embrittlements, discoloration of the emulsion layer	glazing
curling of the base layer	for black and white - oxidation which causes microspots, mirroring, yellowing

Environmental Conditions

The two most important factors in minimizing deterioration of prints and negatives are 1) a stable environment and 2) a clean work and storage space. A clean work area prevents scratches on negatives and prints which can easily become scratched.

1. **A stable environment is essential for preservation of photographic materials. Fluctuating environmental conditions (heat/cold and humidity) cause materials to age more rapidly. Negatives and prints dry out and become brittle in high heat; high humidity encourages the growth of mold; fluctuating heat and humidity accelerates the break down of the materials. Chemical reactions are accelerated by heat.**

2. **Provide control systems to monitor relative humidity (e. g. hygrometer) and temperature (e.g. hygrothermograph which measures both RH (relative humidity) and temperature) and create procedures and mechanisms to correct any problems.**

3. **Water and moisture accelerate the deterioration process. Storage area walls should be designed to prevent condensation on interior surface walls and provide protection against water from floods, leaks, and sprinkler systems.**

4. **Protect against fires by using fire-resistant storage that will not ignite or develop reactive forms or melt. Make sure all fire and smoke detection and suppression equipment is in working order.**

Negative Film Print Process	Medium term storage (Minimum 10 years)		Permanent Value (Extended Term Storage)	
	Temp Max	RH range	Max Temp	RH range
Silver-gelatin Heat-processed silver vesicular electrophotographic photoplastic diazo	25ºC (77ºF) +/- 5, but no more than 30	20 - 50% +/- 10%	18º (64ºF) +/- 2	30 - 50% +/- 10% over a 24 hour/period
Color	25ºC (77ºF)	20 - 50%	2ºC (35ºF)	30 - 40 %

ANSI -Imaging Media -Reflection Print -Storage Practices
ANSI IT9.20-1998

5. **Consult Appendix B for Recovery Methods if faced with a disaster from water, fire, or mold. Contact the New York State Unified Court System - Office of Records Management for further recovery details.**

6. **Light damages materials by making them dry and fragile. It causes discoloration, bleaching, darkening, and fading of the paper and photochemicals. Ultraviolet (UV) filters should be used on lights to filter out damaging ultraviolet light rays. Blinds or other window coverings should be operational to protect records from direct sunlight. Additionally, ultraviolet light, as well as fluorescent light, can cause rapid fading and deterioration of plastic layers that are part of the RC (resin coated - used as a water barrier) paper support. Most, if not all, color photos use this type of support.**

7. **Visible light will also fade color images both on the negatives and prints. Color film will start to deteriorate from light immediately after processing. Currently manufactured films will not show immediate visible fading, but the chemicals are deteriorating.**

8. **Photographic materials should be kept separate from paper and magnetic records.**

9. **The negatives should be kept separate from the prints. During the aging process the different types of negatives and copy prints emit different gases that cause rapid aging when mixed. Each copy print and negative should be kept in its own acid free/lignin free or Mylar® type-D folder or envelope. (See Handling and Housing Section)**

10. **The photographs and negatives should be housed in different waterproof and fireproof cabinets. Where possible, the negatives should be stored off site.**

11. **Air quality should be monitored to reduce pollution, dust, mold spores, soot and gaseous and solid suspended particulates. These items react with the chemicals of both black and white and color images. Black and white images will start to fade from the edge towards the center. Color images are less sensitive, but fading will occur. The system should remove OO-95% of particulates 1 micron or larger. (ANSI/ASHRAE standard 52. l-1992 Gravimetric and Dust Spot Procedures for Testing Air-cleaning Devices Used in General Ventilation for Removing Particulate Matter)**

Poor Environmental Conditions Examples

Condition	Results
wide range humidity recycling	cause curling, cracking of emulsions
hygroscopic print flatteners	promote fungus growth in humid environments
below 20%RH	risk of curling, brittleness; increases tears in the emulsion
above 50%RH	increases dampness causing dye fading, mold growth and gelatins softening; mold secrets enzymes that weaken and stain materials; mold attacks gelatin which holds the image
condensation	negatives stick together; foxing, chemical degradation of support
unclean area	attracts insects and rodents which eat gelatin and cellulose (paper)

Handling and Housing

It is very important to minimize abrasions, fingerprints, contamination and excessive exposure to light.

1. **Keep work area clean. Negatives and prints can scratch easily.**

2. **White cotton gloves should be used to handle any prints or negatives to prohibit the transfer of acid from human fingers and minimize scratches and static electricity. Static electricity attracts dust, dirt and grit which causes scratches.**

3. **Handle prints and negatives by their edges and support them properly to prevent flexing, creasing or sagging.**

4. **Different types of photographic negatives cannot be housed in the same enclosures. The gasses each emits can destroy the others.**

5. **Do not use glue, rubber cement, paste, mucilage, self sticking pages, double sided tape, or rubber stamps on prints or negative. Do not use paper clips or rubber bands.**

6. **Prints and negatives should be stored in durable enclosures and housings that will not have a harmful effect. Make sure enclosures are clean, prior to using. Enclosures prevent abrasion and protect against air impurities.**

Negatives & Slides

Negatives should be stored in Mylar® Type-D polyester sleeves. Do not slide negatives into sleeves, use prefolded sleeves. Prefolded sleeves reduce scratches, fingerprints and other physical damage. Uncoated transparent polyester has low gas permeability, and protects the negatives/slides from atmospheric pollutants and harmful chemicals from improperly processed negatives. It is non reactive with black and white images.

Do not write on negative or transparent enclosure. Put transparent enclosure into an acid free/lignin free paper enclosure. Prior to insertion, write identifying information in pencil on paper enclosure. Never write on paper enclosures while negative is inside. Store enclosures in acid free/lignin free paper envelopes and boxes and pack loosely to avoid sticking problems. Store envelopes in acid free/lignin free boxes, in appropriate cabinets or shelving.

Prints

Prints under 11 " x 14 " (28cm x 36cm) may be stored vertically. Larger prints should be stored horizontally, no higher than 2 " (5 cm), otherwise the bottom print will have excessive pressure.

Use acid free/lignin free folders or envelopes. Each folder or envelope should be labeled clearly in pencil on the outside prior to enclosing the print. This minimizes handling the print. If you must annotate the print, use pencil to write on the back, along the border. If you press on the image it will crack the emulsions. Store envelopes in acid free/lignin free boxes or appropriate cabinets.

Cabinets & Shelves

Use steel or aluminum baked enamel, chrome or nickel plated steel, anodized aluminum and stainless steel shelves and cabinets. No wood.

Displaying Prints

Prints can be displayed in either an exhibit case, with mats, or in frames. Ideally use a digital image or a copy of the print for display/exhibit purposes. Store the negative and print appropriately. Do NOT dry mount, use glue, rubber cement, paste, mucilage, self sticking pages, double sided tape, or rubber stamps on original prints. To annotate the print use pencil to write on backs, along the borders. If you press on the image it will crack the emulsions. If you must use original prints then use acid free/lignin free and non reactive, inert materials to display them.

Framing

1. **Do not use wood for black and white prints. Aluminum frames are best for displaying both color and black and white prints. They are inert, inexpensive, lightweight, and unaffected by moisture fluctuations.**

2. **For glazing, use glass or a high quality acrylic plastic sheet (plexiglass or Lucite). Note the prints will fade because of visible light, not just the ultra-violet light. The UV filter on the glass/acrylic plastic sheet will increase the stability of most color prints (Cibachrome 1963-1991). Glass is more resistant to scratching than plastic and avoid plastic for black and white prints.**

3. **Prevent contact between print and glass. Use acid free/lignin free mats and /or a spacer bar(s).**

4. **Use a moisture barrier between the mount board & backing board. For color prints use Mylar® or ICI Melinex. Do not vent frames.**

5. **The backing board should be of corrugated polypropylene, lignin-free type II. For black and white prints avoid polystyrene-foam laminate board.**

6. **When placing framed materials in storage containers, use lignin-free type II housing.**

7. **Light levels for displaying prints are still controversial. All color photos, except for ultra-stable permanent color and Polaroid permanent color pigment prints, when exposed to light will fade. Light levels and placement should be placed so that the surface temperature of the print will not increase. This will reduce the emulsion and base moisture content. Monitor the print with a densitometer and predetermine the limits of fading and staining that will be tolerated. Maximum levels for color prints are 300 lux of incandescent tungsten or glass filtered quartz halogen illumination. Maximum levels for modern black and white prints are 600 lux. For further information discuss the situation with the New York State Unified Court System - Office of Records Management.**

Exhibit Cases

1. **When displaying prints, always place the print in an acid free/lignin free display mat. This will give added support and reduce direct handling of the print, reducing deterioration. Mats also allow for the use of fasteners to the exhibit case without touching the print directly.**

2. **Do not lay prints on top of each other.**

3. **Use supports, made for exhibits, that will not have any off-gassing to deteriorate the print, if you wish to prop-up the print.**

4. **Make sure the display case is not in an area that is directly lit by the sun, or in a place that will cause temperature and relative humidity of the interior of the display case to rise above 65ºF and 40%RH . Use devices to monitor temperature and relative humidity. In other words do not "cook " the items in the display case.**

5. **Make sure the display case is in a secure area.**

Photo Albums

When access to multiple photographs is ongoing, photo albums can be useful to minimize damage. When possible, do not use the original photograph. Use a copy of the print, photocopy, or digital copy and keep the original in storage.

When selecting a photo album, look for pages to be of uncoated polyethylene and acid free/lignin free pages. Use Mylar® Type-D or polyester photographic corners to secure the image to the acid free/lignin free page or use uncoated polyethylene pocket pages. Do not use glues to secure the image. DO NOT USE MAGNETIC PAGE ALBUMS. The glues and vinyl pages will cause major damage to the image. Never use materials with PVC (polyvinyl chloride).

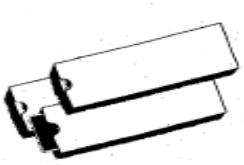
Supplies

All protection supplies should be inert and non reactive to the negatives and prints. They should not emit harmful gases, leach out substances or use glues, inks, labels, or coatings. All supplies should comply with ANSI Standard IT9.2-1 998 Imaging Media - Photographic Processed Films, Plates, and Papers -Filing Enclosures and Storage Containers.

All supplies should pass the Photographic Activity Test (PAT)-ANSI IT9.16-1993 for Imaging Media Photographic Activity Test. This test is used by the manufacturers as a standard to evaluate the possible photographic interactions between the storage enclosure, including, adhesives, inks, paints, labels, and tape and the photographic image.

Supplies for Black & White and Color Film Negatives

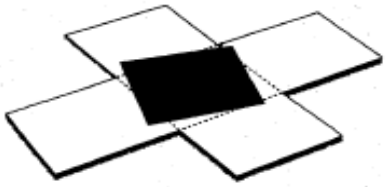
Select paper enclosures that match the size of the negatives. Negative strips of 35 mm and 120 film can be placed in sleeve envelopes while larger negatives can be placed in individualized envelopes.



Negative Strip Envelopes

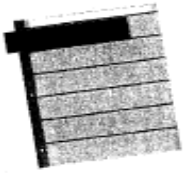
Negative/Print Envelopes

Four-flap Negative Enclosures provide extra support for prints and does not require adhesives.



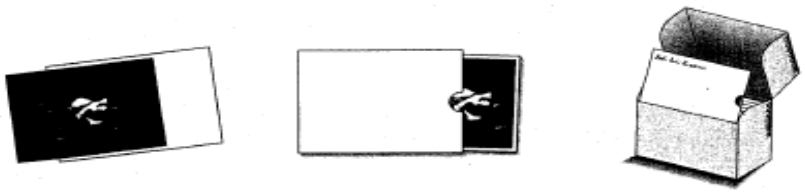
Self-locking Mylar® or Polypropylene Plastic Sleeves come in a wide variety of styles and materials. These are recommended for collections that are referenced frequently. Images may be viewed without removing the negatives.

Mylar®, Polypropylene Sleeves

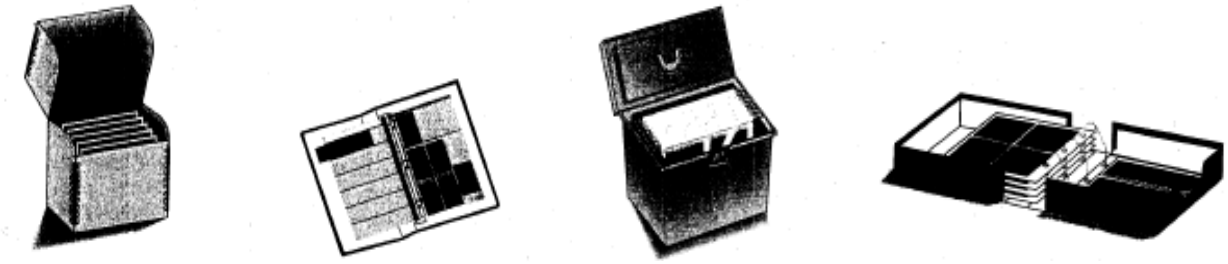


Polyethylene Sheets with Pockets

Plastic enclosures can be inserted into paper envelopes. This allows you to record cataloging information on the paper envelope.



Once in enclosures, negatives may be placed in boxes, binders or hanging folders.



Clamshell Negative Storage Box

Three - Ring Binder

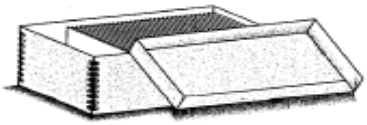
Hanger Bars

Century Album

Glassplate negatives are extremely vulnerable to damage and require additional support.

Use Four-flap Enclosures that are double-creased to fold around the thickness of the plates.

Glassplate negatives must be stored vertically and need a sturdy box made to size. Place a piece of rigid alkaline/buffered board between every 5 - 10 plates to provide additional support.



Supplies for Black & White and Color Film Prints

Unless the photographs are to be accessed infrequently or are of little value, each print should be placed in its own enclosure. Photographs to be accessed frequently should be placed in plastic enclosures that allow the image to be readily seen. Polyester is recommended for prints that are delicate or are on thin paper. However, it is not recommended for prints with flaking emulsion that could be lifted by static electricity. Acid- free boards are recommended for very fragile prints.

Self-locking Mylar® or polypropylene sleeves have a self-locking top flap that allows the sleeve to be opened completely, eliminating the possibility of abrasion during insertion.

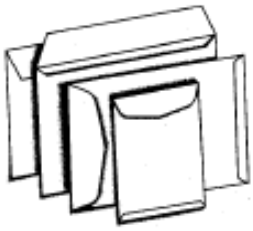
Mylar®, polypropylene, or polyethylene sleeves are sealed on three sides with a thumb cut opening.

8 X 10 inch prints fit comfortably in Mylar® Sheet Protectors that are three-hole punched for storage in a ring binder.

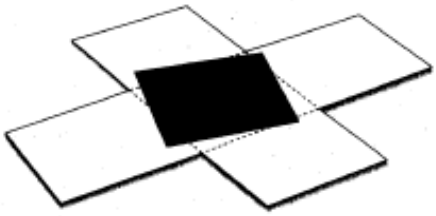
Photo/Print Album Pages are made of polypropylene and have pockets for a range of print sizes.

Print Envelopes with a thumb-cut opening facilitates insertion.

Envelopes with top and side openings keep out dust.

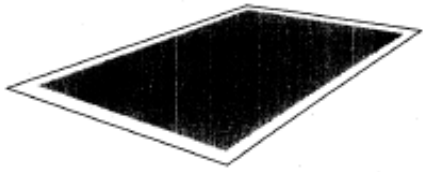


Four-flap Negative Enclosures can also be used for storing prints. Although they do take up more space, their design eliminates all adhesives and the flaps provide additional support for the prints.

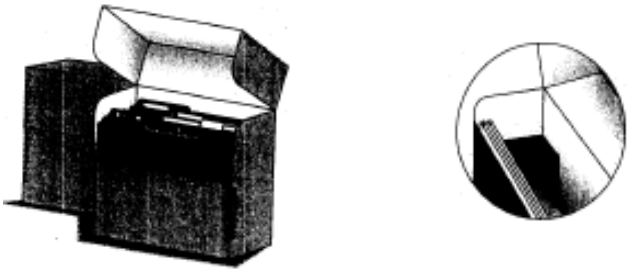


If the photographs are to be boxed without enclosures, place interleaving paper between the prints.

Interleaving sheets should be slightly smaller than the prints so that they cover the image completely and do not project beyond their edges.

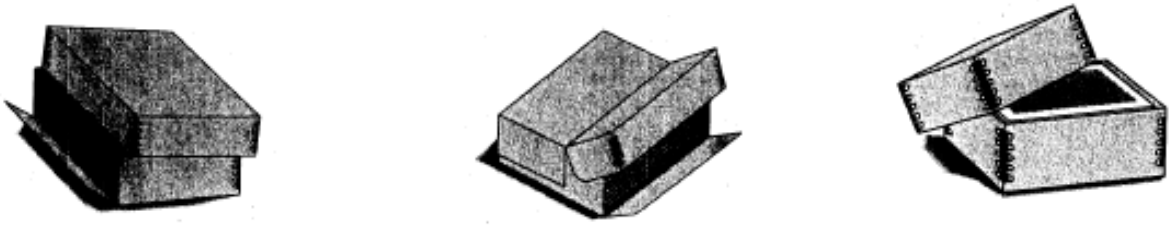


If standard Document Cases are selected for vertical storage, it is important to fill the box or use spacers so that the prints receive adequate support and do not curl or become distorted. The box should not be so full, however, that it is difficult to remove material. File folders may be used to group prints and facilitate removal.



Clamshell and Short LidPrint Storage Boxes are available in standard print sizes.

Flat storage places less strain on the photographs and is especially recommended for fragile items.



Drop-Front Storage Box **Hinged Lid Storage Box** **Flat Print Storage Box**

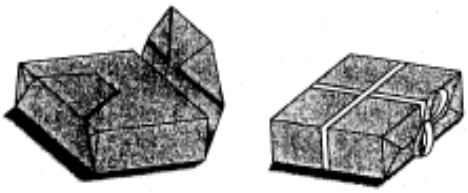
Supplies for Photographs within Albums

Photo albums have traditionally been the selected format for storing photographs. Papers and glues used in the past have usually been acidic, thus damaging the quality of the photographs. Photo albums that will preserve your photographs are now readily available. Look for an album that is chemically stable.

If photographs are placed into an album facing each other of if the album includes unstable material like newsprint, place interleaving sheets between the pages as a barrier. Both buffered and unbuffered interleaving paper are available. Interleaving, however, does add bulk and should not be used if it strains the binding.

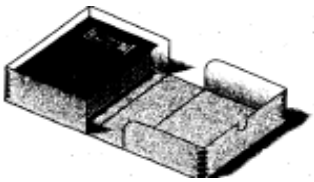
Interleaving paper should be slightly smaller than the album page but large enough to cover the photographs and inserts.

If the photo album is not accessed often and if funds are limited, an inexpensive solution is to wrap the album in alkaline/buffered paper and store it flat.

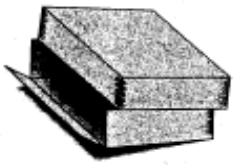


Tie with flat cotton tape.

If the size of the album corresponds to the size of a standard size document storage box, place it in a clamshell or drop-front box so that the album can be removed without damage.



Clamshell Box



Drop-Front Storage Box

Boxes should fit properly. If a pre-made box is not available in an appropriate size, consider contacting a bookbinder who can make one. Be sure to specify that all materials, especially the inner box linings, are alkaline and buffered. This is an expensive option usually reserved for rare and valuable albums.

Suppliers

The list of suppliers provided below is for informational purposes only. It is not to be considered an endorsement of the vendors.

Conservation Resources International, LLC
5532 Port Royal Road
Springfield, VA 22151
phone: 800 634 6932
fax: 703 321 0629
web: www.conservationresources.com

Gaylord Brothers
P. O. Box 4901
Syracuse, NY 13221-4901
phone: 800 448 6160
fax: 800 272 3412
web: www.gaylord.com

Hollinger Corporation
P.O. Box 8360
Fredericksburg, VA 22404 - 8360
phone: 800 634 0491
fax: 800 947 8814
web: www.hollingercorp.com

Light Impressions Archival Supplies
P.O. Box 787
Brea, CA 92822-0787
phone: 800 828 8216 or 800 411 7038
fax: 800 828 5539
web: www.lightimpressionsdirect.com

Metal Edge Inc.
6340 Bandini Boulevard
Commerce, CA 90040
phone: 800 862 2228
fax: 888 822 6937
web: www. metaledgeinc.com

University Products
517 Main Street, PO Box 101
Holyoke, MA 01041-0101
phone: 800 628 1912
fax: 800 532 9281
web: www.universityproducts.com

APPENDIX A - STABILITY CHARTS

Stability Chart - Negatives

Least Stable	Most Stable
Kodak Kodacolor & Vericolor II	Kodak Vericolor III & 400
pre-1989 Agfa color XRS &XRG	Kodak Ektar
pre-1992 3M Scotch Color Films	Kodak Gold Plus
	Fuji Color Super HG, Super G
	Fuji Color Reala
	Fuji Color Professional 400 &160
	Konica Super SR, GX, Super DD &XG

Stability Chart - Prints

Least Stable		Most Stable
Ektacolor 37RD	Konica Color	ilford ilfochrome (a.k.a. cibachrome 1963 - l991 polyester base materials)
	Ektacolor -1984/1985	Kodak Dye Transfer
	Agfa Color -1984/l985	Fuji Dye Color
	Fuji Color -1984/1985	Black & White Prints
		Ultrastable Permanent Color Prints
		Polaroid Permanent Color Pigment Prints

Dimensional Stability Chart

Least Stable		Most Stable
diacete	cellulose esters (triacetate)	polyester

APPENDIX B - DISASTER RECOVERY FOR PHOTOGRAPHIC MATERIALS

RECOVERY TIME	RECOVERY METHODS		
	WATER	FIRE	MOLD
WITHIN 24 HOURS Negatives (Color/black & white) Color Prints Black & White Prints OVER 48 HOURS FREEZE	If material cannot be dried immediately - freeze DRYING METHODS Air Drying Freeze Drying Vacuum Freeze Drying Check that emulsions have not stuck together, then dry emulsion side up Know the type of photographic materials being salvaged Watch for mold growth	Dry materials first, if wet, use appropriate drying method CHARRED MATERIALS use a soft rubber sponge to gently brush off soot and dirt Photocopy if information is not obliterated	Can be caused by water and fire damage and poor environmental conditions Freeze the materials to kill infestation Avoid fumigation (health hazard) Stabilize and clean damaged location before returning treated materials

Bibliography & Further Reading

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IS0 (International Standard Organization) 10214:1991(E)(R1966) - Photography -Processed Photographic Materials -Filing Enclosures for Storage.

ANSI IT9.16-1993 Imaging Media -Photographic Activity Test.

ANSI lT9.20 -1996 Imaging Materials - Reflection Prints - Storage Practices.
IS0 6051(1992)(E)(R1997) - Photography - Processed Photographic Paper Prints - Storage Practices.

ANSI IT9.11-1998 Imaging Materials - Processed Safety Photographic Film - Storage. IS0 5466: 1992(E) Imaging Materials - Processed Safety Photographic Film -Storage.

ANSI/ASHRAE standard 52.l - 1992 Gravimetric and Dust Spot Procedures for Testing Air-cleaning Devices Used in General Ventilation for Removing Particulate Matter.

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National Archives and Records Administration. Preservation and Maintenance. Photographs (www.nara.gov), June 1998.

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