



Conserve O Gram

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Caring For Color Photographs

Most archival and museum collections contain color photographs in a variety of formats (including slides, prints, negatives, and transparencies). Color photographs exist in thousands of variant processes, from early color screen plate processes such as Autochromes to contemporary color dye coupler slide processes such as Ektachrome and Kodachrome. Some images are color because they are hand-tinted. Color photographs consist of:

Emulsions, which are composed of:

- final image materials (such as silver and color dyes or pigments)
- binders (such as albumen, collodion, or gelatin)

Secondary coatings and colorings, such as hand-tinting, dyes, toning, and pigments

Base materials on which the emulsion rests, such as:

- paper (on which photographic prints and some negatives rest their emulsion)
- film bases (such as cellulose nitrate, polyester, and cellulose diacetate)
- glass (on which some transparencies and negatives rest their emulsion)

Secondary supports such as boards or mats

Photographic process names may either be:

- the combination of the final image material and the binder (e.g., silver gelatin)
- a descriptive phrase that explains how the materials are produced such as color screen plate
- a proprietary name or tradename such as Paget color plates or Kodachrome

To Preserve Your Archival Photographs Do This...	Don't Do This...
<p>Handling</p> <ul style="list-style-type: none"> • Use copies only, never the originals, of valuable original photographic prints, slides, transparencies, and negatives for reference, duplication, slide shows, or exhibition purposes. • Follow general handling guidelines in <i>Conserve O Gram</i> 14/4. • Keep all projection, examination, and display time brief. • Treat retouched handcolored, and hand-tinted photographs like friable media. • Use a stiff board support when lifting retouched or hand-tinted images to keep them totally flat. • Pay attention when researchers work with retouched or hand-tinted materials, as they are particularly vulnerable to mishandling. Warn researchers not to touch the image surface (emulsion) and limit exposure to light. 	<ul style="list-style-type: none"> • Don't give authors, photo editors, designers, researchers, and others original photographs for project work. • Don't use glass plate negatives and transparencies for reference; instead use copy prints following the guidelines under Reformatting below. • Don't use high intensity slide projectors with xenon arc light bulbs. • Don't view or project images for more than 30 seconds. • Don't use retouched photographs for reference/duplication copies, as they are vulnerable to mishandling.

To Preserve Your Archival Photographs Do This...	Don't Do This...
<p>Cold Storage</p> <ul style="list-style-type: none"> • Keep original images in cold dark storage at < 14°F (-10°C), 20-50% RH (if this is colder than you can manage, use 36°F [2°C], 20-30% RH). Each 10°F cut in temperature will double the life expectancy of color images. • Keep light levels at < 50 Lux or 5 foot-candles to avoid dye fading while using storage; otherwise turn lights off. • Use a preservation environment monitor (PEM), (a device that includes a datalogger, hygrothermograph, and a time weighted preservation index that tells you how long the stored materials will last in that space) to select the best storage space. See Reilly (1995) report in <i>References</i>. • Reformat originals for reference/duplication purposes before placing them in cold storage. See <i>Reformatting</i>, below. 	<ul style="list-style-type: none"> • Don't remove images from cold storage for long periods, or frequently (more than once annually) or you will begin to lose the cold storage benefits. • Don't place items in cold storage without housing them in folders and boxes within waterproof packaging, such as Ziplock bags to stop condensation. • Don't place glass or metal plate based materials in cold storage. • Don't allow fluctuations in temperature and humidity and intense light exposure or images may crack and separate from their bases (delaminate).
<p>Housing/Storage</p> <ul style="list-style-type: none"> • Keep color photographs in the dark, as light and ultraviolet radiation can cause image fading, color shift, yellow stain formation, and paper embrittlement and darkening. • Place original slides, negatives, transparencies, and prints in individual sleeves to protect them. • House color prints in <i>unbuffered</i>, unprinted, neutral pH, alum-rosin-free, lignin-free, high alpha-cellulose (> 87%) four-flap paper enclosures with a pH of 7-7.5 that pass the Photographic Activity (PAT) test. The PAT is described in <i>Conserve O Gram 14/2</i>. • Place individually sleeved image folders in a box. • Place fragile images on a piece of unbuffered, neutral pH board within the enclosure. • Store retouched or hand-tinted images in four-flap envelopes or L-weld sleeves or sink mats, not plastic or buffered housings. Avoid sleeves that require the images to be slipped in or out. Then place the images in shallow archival print boxes. Buffered storage materials can cause color changes. • Store slides in polypropylene or polyester multiple pocket sleeves or slide pages in boxes on powder coated metal cabinets only if you can maintain your humidity at < 70%. • Use glass mounts on slides that will be handled. 	<ul style="list-style-type: none"> • Don't leave color photographs in the light, on exhibit, or in warm environments. • Don't let your storage environment's RH fluctuate more than +/- 5% in 24 hours. • Don't use Kraft paper, glassine, or other acidic <i>or</i> buffered enclosures. • Don't use enclosures such as envelopes with hygroscopic or reactive adhesives, particularly those with center seams. • Don't use images at light levels > 100 Lux or 10 foot-candles. • Don't use polyvinyl chloride slide pages or sleeves. • Don't use plastic housings if the image is fragile or flaking or the relative humidity gets over 70%.
<p>Treatment</p> <ul style="list-style-type: none"> • Select a conservator who has significant experience working with photographs and preferably is in the American Institute of Conservation (AIC) Photographic Materials Group as listed in the AIC <i>Directory</i>. Call AIC at (202) 452-9545. • Hand deliver glass plates or images with flaking emulsion; avoid sending them through the mail or by delivery service. 	<ul style="list-style-type: none"> • Don't use preservative lacquers, such as Scotchguard, on original photos. • Don't try to treat color photographs by yourself, instead send them to a conservator. • Don't retouch, dry mount, or laminate original color images.

<p>To Preserve Your Archival Photographs Do This...</p>	<p>Don't Do This...</p>
<p>Photographic Reformatting</p> <ul style="list-style-type: none"> • Copy negatives via the interpositive process for reference and duplication and place originals in cold storage. • Ask current photographers to follow ANSI Standards cited in <i>Museum Handbook</i>, Part I, Appendix R: Curatorial Care of Photographic Collections. Check all returned film for residual chemicals according to ANSI standards. • Use stable water washed color processes (not instant processes) when producing new photos or copies. Henry Wilhelm, cited below, lists the most stable color processes as: <p>Slides</p> <ul style="list-style-type: none"> - Fujichrome films, - Kodachrome films (if not projected) <p>Transparencies</p> <ul style="list-style-type: none"> - Ilford Ilfochrome - Fujitrans and Fujiclear <p>Color Negatives</p> <ul style="list-style-type: none"> - Kodak Ektar, Ektapress Gold, Gold, Gold Plus, and Vericolor - Professional, Fujicolor Super G, and Super HG - 3M ScotchColor <p>Internegatives</p> <ul style="list-style-type: none"> - Fujicolor Internegatives <p>Printing Papers</p> <ul style="list-style-type: none"> - Fujicolor, Fujiflex, and Fujichrome - Konica Color - Ilford Ilfochrome <p>Print Films</p> <ul style="list-style-type: none"> - EverColor Pigment Color Prints - Polaroid Permanent Color Prints - UltraStable Permanent Color Prints 	<ul style="list-style-type: none"> • Don't expect all color processes to deteriorate at the same rate. Unstable color photographs identified by Henry Wilhelm as requiring priority reformatting include: <p>Slides/Transparencies</p> <ul style="list-style-type: none"> - Process E-1 through E-4 - Ektachrome - ANSCO - GAF <p>Negatives</p> <ul style="list-style-type: none"> - Ektacolor - Vericolor II - Kodacolor-X - Kodacolor II <p>Prints</p> <ul style="list-style-type: none"> - Pre-1984 Ektacolor - Pre-1984 Fujicolor - Pre-1984 Agfacolor - Pre-1984 Konica color prints • Don't use Kodachrome if a slide will be frequently projected; instead use Fujichrome. • Don't use post processing treatments such as retouching, lacquers, or high-temperature or high-pressure mounting techniques.
<p>Digital Reformatting</p> <ul style="list-style-type: none"> • Get professional (not vendor) training in digital creation for long life before you begin digital reformatting. • Use digital copies for access, not preservation. • Use file formats that cause no distortion during compression for your digital masters (known as lossless compression). • Match the digital copy to the original's appearance. • Produce high quality large sized digital masters that are not processed for a special type of output, then produce derivatives (copies) in special file formats for special uses. • Keep the digital copy authentic to the original by identifying and measuring color variations and mapping images into a uniform color space (a consistent color model for binary data used for printers, monitors, and scanners). 	<ul style="list-style-type: none"> • Don't color correct images individually. Set benchmarks and technical standards for your project that are uniformly applied. • Don't expect different scanner systems from different color models, such as RGB (red, green, blue), or CMYK (cyan, magenta, yellow, and black), Photo CD, and CIE Lab, to appear identical in terms of color. Different manufacturers represent color differently. Conversion may lead to color shifts. • Don't neglect quality control for tones, colors, noise (electronic static), and detail and edge reproduction.

<p>To Preserve Your Archival Photographs Do This...</p> <ul style="list-style-type: none"> • Maintain a consistent and well documented color space by: <ul style="list-style-type: none"> – using standard target images, color bars, and gray scales – calibrating (color test and align) your monitor, printer, and viewing environment (CD-ROMS, the Web, etc.) – selecting and testing your scanner for at least 12 bits per channel and clearly documented spectral sensitivities. • Be aware that any change in software or hardware may lead to a change in the color appearance of the digital files. • Be aware that all color variations from migration of data or changes in software or hardware over time are cumulative and may eventually lead to dramatic failures of color files. • Develop a strategy to migrate and refresh your files every 5 years and each time the software and hardware changes. 	<p>Don't Do This...</p> <ul style="list-style-type: none"> • Don't check your digital images only against your photographic intermediates; also check them against your original objects for color and tonal fidelity. • Don't expect to do professional quality work without professional training and assistance.
<p>Exhibition</p> <ul style="list-style-type: none"> • Exhibit only copy color images. • Keep light levels in exhibition spaces < 100 Lux and 10 foot-candles. Keep light exposure duration short. 	<ul style="list-style-type: none"> • Don't exhibit original color photographs of value. • Don't use original photographs in long-term exhibitions.

For further NPS reformatting guidance see *Conserve O Grams* 19/10 (selection), 19/11 (technology), 19/12 (contracting), and 19/13 (copy inspection); for general NPS photo guidance see 14/1 (mounting corners), 14/2 (storage), 14/3 (a process chronology), 14/4 (general guidance), 14/5 (special formats), and 14/7 (special monochrome processes). Also see NPS *Museum Handbook*, Part I, Appendix R: Curatorial Care of Photographic Collections; and NPS *Museum Handbook*, Part II, Appendix D: Museum Archives and Manuscript Collections.

References

Reilly, James M. *Care and Identification of 19th Century Photographic Prints*. Rochester, NY: Eastman Kodak, 1986.

Reilly, James M. *IPI Storage Guide for Acetate Film*. Rochester, NY: Image Permanence Institute, 1993.

Reilly, James M. *New Tools for Preservation*. Washington, DC: Commission on Preservation and Access, 1995.

Wilhelm, Henry, and Carol Brower. *The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures*. Grinnell, IA: Preservation Publishing Co., 1993.

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