

PHOTOGRAPHIC ARCHIVES: PHILOSOPHICAL AND PRACTICAL ISSUES

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INTRODUCTION

This paper is intended for librarians, museum workers and general archivists who find themselves responsible for historic photographs and who have no specific photo-archive training. While some photo-archive work should be contracted out to trained technicians, much can be done on your own if you work with care and caution.

It is preferable to have an in-house darkroom to deal with most of the copy and printing procedures described below. The in-house darkroom can be monitored more carefully for archival processing and there is less danger of losing originals in transit or having your imagery pirated. On the other hand, many towns have very good and reputable professional labs that may, in the long run, be more economical for your situation. Try to think 100 years ahead when you make your choice of either an in-house or commercial lab—find out if they know about archival processing. If proper materials are not used and if proper developing, fixing, toning and washing are not observed, you may be paying for a copy that will not out-last the original.

For the sake of clarity, a definition of the term **image**, used often in this discussion, is in order. An image is the content of any given piece of photographic material, whether a negative, print, slide, copy print, Xerox copy, or some other form. An image can be described as having high or low resolution (good or bad focus); high, low, or normal contrast (a high contrast image has only black and white with little gray between, a low contrast image is all gray and muddy looking); and, high, low, or normal density (too dark, normal, or too light). All of these qualities are altered by generations of duplication and may be quite different in the various **objects** or forms (original, copy print, slide, etc.) that an image can take. The distinction between **images** and **objects** is important when developing systems of cataloging, accessioning and storage retrieval.

Normally a photo-archive is filled with a variety of materials, produced by a variety of photographic processes, in various states of deterioration or physical jeopardy. The host institution will usually have a lot of other more urgent things to spend money on. In addition, archives contain a small amount of materials that will receive a lot of research pressure and handling and a large amount that will not but are nonetheless valuable. All of these factors must be taken into consideration when deciding what to do, when, and how. And although some decisions must be made with urgency—those concerning large collections of nitrate based negatives, for example—it is important to read the pertinent technical literature, to consult with those that have gone before, and to make your decisions intelligently and calmly. On the one hand, panic can destroy (and has recently destroyed) volumes of historic graphic heritage, and on the other, wholesale copying of complete archives without proper analysis can waste hard won funds.

A HYPOTHETICAL SITUATION

Let us say that you are faced with the following real life situation. You have inherited with your new job a collection produced by a local professional photographer, donated by his widow in the 1950s. It contains:

- 600 glass plate negatives of extreme historic importance to your area: early townscapes, houses, transportation, industry, social organizations, Native Americans, etc.
- 300 original prints made by the photographer from these negatives and mounted on old acidic board. These are usually referred to as “vintage” prints.
- 10,000 cellulose nitrate and diacetate based negatives; two thirds identified portraits, and one-third important landscapes, townscapes, and commercial interiors.
- 3,000 original prints from these and other missing nitrate negatives.
- 100 tightly rolled panoramic prints, and corresponding rolled nitrate panorama negatives in metal tubes.

The public and the rest of the staff of the museum demand access, for publications and exhibits, to the "old pictures." You have a finite amount of money to spend. If you don't spend it soon, the director will take it back and use it to renovate a restroom.

DECISIONS

What do you do? You have a multi-faceted problem. Sit down quietly with your best advisors and make some decisions and plans before diving in. There are some obvious and not so obvious considerations.

You do some reading and discover that the nitrate material deteriorates due to its chemical composition and is dangerous because it is flammable. You also find out that the glass negatives and original prints are also in danger of deteriorating because gas emitted from the nitrate negatives renders their gelatin emulsions soluble in water and vulnerable to gases and moisture in the environment.

To make matters worse, in the years since 1950 several of the glass negatives have been broken while being used to make \$1.50 research prints and a number of the finest original prints have faded seriously from being on permanent display. The rest of the original prints are jammed into file cabinets with pertinent information on their backs: they are their own finding aid and cataloging system and are open to the public. The acidic backing of one print is in contact with the face of the next.

You will soon find, to your despair, that three areas of decision-making—technical, monetary, and historical/aesthetic—are often in conflict. For example, while you might be tempted to put the nitrate negatives first on the list of action, their historic value might not be so high, and it would be a big job to finance. On the other hand, some of the most important images for your local history might be on the relatively sturdy and un-deteriorated glass, so you might want to make them a high priority.

Also, some technical decisions are not immediately apparent. For example, if the original prints from your glass negatives are in fine condition and clear of deterioration, it could be that copying *them* instead of the original negatives might be the better course. Early negatives were specifically made with higher contrast and density, the better to print on papers that are not now available (“printing out” or P.O.P. papers in albumen or gelatin). Also, glass negatives commonly suffer from a silvering in from the edges, sometimes called “mirroring,” that was not present when the prints were originally made. This makes the negative difficult to copy or even to print well on modern materials, so your best choice might be to copy the “vintage” print.

There are many good reasons for copying historic photographs:

1. The ability to interpret history through the exhibition of photographic images combined with artifacts where a larger image than the original is needed to emphasize important details.
2. The ability to publish and disseminate images unique to a collection or area.
3. The ability to maintain a back-up to a fragile original for the use of following generations.

There is a philosophical side to the duplication of photographs as well. First of all, an original is always preferable to a duplicate since it is closest to the camera or what we call the “first generation.” But it only takes one slip of the hand to destroy this original if it is lent for publication, or, if a negative, used to make modern prints. If the original photograph or negative can be copied without damage or alteration and then preserved with safety and a minimum of handling, this should be done. Also, if the original is in danger of destroying itself due to the instability of the material on which it is made or mounted, or, if the original processing was incomplete, a duplicate will be necessary to continue the life of the image beyond that of its original form. Often these reasons for duplication present themselves simultaneously. The form the duplication takes must be matched to the reason for doing it and the budget for the job. During and after the copying process, the original must be carefully handled. It may need to be copied again, and going back to the original is always preferable to copying a copy. The resulting loss of focus and tonal range is called “generational degradation.”

NOTE: A word about large collections of portraits. How valuable are the portraits aesthetically and historically? Scholars in the fields of demography, clothing, and genealogy might be consulted. How many other collections like this one exist in the immediate area? If the portraits are identified, they of course will have higher value. In our hypothetical case, it might be best to select three hundred portraits that best represent the finest achievements of this particular commercial photographer and copy them in the most economical way possible, ideally to 35mm film. This would create a study or publication archive.

ACTION

What you can do yourself involves stabilization of environment, segregation of materials, safe storage, and duplication. Tricky conservation of original prints or negatives should be farmed out. This includes tightly rolled panoramic or other large prints, badly torn or separating original

prints, very badly faded prints, and, in some cases, deteriorating negatives, including cinema footage. Another job to contract out is the removal of original prints from crumbling, acidic mounts. This is usually such a huge job that it is best to bypass it and protect the face of the print as much as possible from abrasion after copying. Very important prints should be removed, or dismounted, but this is expensive and the choice should be made carefully.

First, the different materials that may be injurious to each other have to be separated from each other in our example collection. The nitrate-based film should be stored in an area that satisfies local fire regulations. It should be re-sleeved in paper only, and does not need expensive archival sleeves since it will destroy them anyway. Do not sleeve in Mylar as this will prevent the gas byproducts of deterioration from escaping and accelerate the process. You might also consider controlled cold storage. On this issue, see Rick Haynes article, "A Temporary Method to Stabilize Deteriorating Cellulose Nitrate Still Camera Negatives," *Photographic Conservation*, Sept. 1980. The glass negatives should be cleaned and sleeved in new, acid free sleeves with the emulsion side away from the glue seams of the sleeve. The original prints should be segregated as to size and stored loosely on end, interleaved with acid free paper and in numerical order, *not* by subject. Prints stored by subject invite browsing and destruction. This paper does not cover cataloging, but if a cataloging project can be accomplished at the same time as copying, it saves multiple handling of the originals. See *Administration of Photographic Collections*, Ritzenthaler ed. for cataloging suggestions.

CAUTION: when re-sleeving and separating materials, be very careful to record old numbers and information as well as groupings that may have been created by the original photographer. This will be important information in the future. Xerox old sleeves if possible. There are some newer portable Canon copiers that allow you to copy directly from an old sleeve to a new sleeve with manual feed. This saves a lot of time and preserves the original information precisely.

Second, while you are accomplishing the safe storage and stabilization, there is something else you can do. Exact and imperfect duplicates should be removed to environmentally stable "dead storage." This means you will not spend money or time on them immediately. Photographically useless images, i.e. so far off the scale of acceptable focus, contrast, and density as to be irretrievable should be discarded, especially if they are nitrate, unless they are of unique historical importance. For example, don't discard an out of focus photograph of the Centralia Massacre, if you find one. Any disposal should pass through several reviews, but dead storage can happen immediately. Also remember that really badly faded prints can be surprisingly well retrieved either with high contrast copy film or digitally.

Third, if your economic situation is fair to good, proceed to duplication based on deterioration, research pressure, and your best prediction of future use. Divide the material you have definitely decided to duplication into the following categories. You will notice that the categories cross process lines: there could be glass negatives, prints, and nitrate based negatives in all three categories.

1. Those images deemed by local historians to be of the highest value and any other images that you and your staff consider to be "hot visuals," i.e. especially attractive for your

purposes: exhibition, publication and research. Also keep in mind your immediate community needs.

2. Valuable images that are important, but of secondary aesthetic and historic value.
3. Valuable images that you and your advisors predict will receive little endangering use and that can be stored under stable conditions for a reasonably long period of time while money is being sought to finish the duplication project.

As the money is found, spend it progressively through the categories. The following is a list of duplication alternatives for the various materials encountered, along with approximate current unit prices (1/96). These prices are based on having your own in/house or volunteer darkroom. Prices in professional labs will be higher.

1. The production of an archival print on fiber based paper with full tonal range and normal contrast from the original negatives. Unit price, including labor, material, overhead, and wastage: \$7 to \$10, depending on volume. These prints may then be copied to produce a new negative. Advantages: Deterioration or faulty original exposure and development in negatives can be corrected in printing; for lower budget institutions these prints, if sleeved in plastic, can serve as research tools as well as the copy of record when the originals are gone. In some cases this is the best alternative for nitrate based negatives because it is relatively fast. Good copy negatives can be made from these prints later on.
2. The production of a 4x5 inch copy negative from an original print: unit cost \$4 to \$8, depending on volume. This method requires a high quality copy stand, camera, and lens. The 4x5 negative is the archival standard. See choices of films below for special problems. Ideally, the finest grained film should be used for straight copying. Advantages: In many cases, original prints are in better condition than original negatives and a better copy negative can be made from them.
3. The production of a 35mm or 120mm copy negative from original prints. This should be considered for category three in the must-duplicate list above if the originals are very small to begin with, or if there is a large volume of photographs that would probably never be used in sizes larger than 16x20 in exhibitions. Contemporary lenses for medium and small format cameras are extremely good, especially flat field lenses (see below under technical information) so that this is now a viable alternative. A large archive of post cards that are real photographs, or an important album of small photographs would be good candidates for this method.
4. The production of a contact film positive from an original negative and then a new negative from this positive, also by contact. Unit cost: dependent on original negative size—approximately \$8 for 4x5 and \$12 for 5x7. This method is used for larger format originals (4x5 on up) of high aesthetic and historical value. The positive becomes the copy of record from which new negatives can be made in the future. It is critical to use a "point source" light and a firmly clamped contact frame for this method. Point source means a very small, very bright light like those found in high intensity reading lamps, at

least three feet from the contact frame. They are cheap and easy to set up. Contacts are made emulsion to emulsion.

5. It is also possible to make a positive 4x5 transparency by transillumination from a large negative, and then to contact the 4x5 positive again to get a 4x5 negative. This method requires a high quality copy stand, 4x5 camera, and lens, and a transillumination light source—a very bright, even light box on which the negative to be copied is placed under glass. An inverted cold head light source originally used for enlargers works well. The Aristo company makes these in sizes up to 14x14 inches. A strobe lit transilluminator is the easiest to control for this method, and better for the avoidance of heat build-up. A simple wooden box with a 45-degree angle baffle in it and a fogged glass top works well. A standard studio strobe can be aimed into a hole in the box opposite the baffle. Advantages: the 4x5 negative would have much more use in the future than the larger original, and two development steps are available for the control of contrast and density. Disadvantage: dust control can be a problem—a non-static negative cleaner is recommended for the contact phase of this process.

To satisfy researchers' need to see images in categories one and two, at this point (2002) you have two good choices, both of which cost about the same. One would be to create an RC research print either by enlargement or contact. Sometimes researchers are satisfied with small 4x5 contact prints. A second would be to scan the image and create a searchable database with screen quality (72 dpi) JPEGs attached to the information files. You can also consider making Xeroxes from original prints in category one for the casual browser and for the serious researcher's first search. One run in a Xerox machine will not harm historic prints, and will greatly relieve pressure on the originals.

As you complete your duplication plan, your exhibition curators will have requests for specific images. You might consider budgeting the cost of making these into the exhibition costs. As researchers request specific material, you might also factor the cost of conserving the image into the use or publication fee.

An ideal solution for our hypothetical collection is somewhat costly if it produces an archival copy of record (positive or negative) and a research print. In actual practice, however, it is almost always necessary to drop back from some of these ideals or to delay them. From the professional archivist's point of view, the first priority should be a stable collection; second an archival copy of record; third, a usable negative for researcher access, and for making exhibition and publication prints.

Duplication should not relax your attention to the original. Even nitrate materials can be stabilized for long periods of time by cold storage (before or after the money is found to duplicate them), and glass negatives and prints should be stored under safe conditions after they are copied. In the Northwest region there is a fine example of archival cold storage at the Cheney Cowles Museum in Spokane.

MISCELLANEOUS PRACTICAL NOTES

Non-archivally processed materials such as RC research prints should not be stored in direct contact with original or archivally processed new negatives or prints.

Never use oil-based paints or mineral solvents in the same room or area where photographic materials are stored. This is rarely mentioned in the literature. The fumes are immediately and severely damaging to the silver image in photographs. This can happen in the most casual and unexpected way.

Do not destroy originals after copying under any conditions except for deteriorating nitrate-based films that are beyond saving. There have been a number of examples in the past of copy projects that were discovered to be non-archival after the originals had been destroyed.

If nitrate based negatives are deteriorated to the point of being discolored, panchromatic film must be used to copy them. If orthochromatic film is used, the usually reddish or brownish deterioration will be amplified and exaggerated in the copy.

If you store nitrate-based negatives in a refrigeration unit, try to keep the temperature above freezing. Freezing changes the nature of gelatin and can harm the negatives. Also, seal the negatives in an airtight bag: double bagging with two ziplock bags works well for batched negatives. This package must be brought up room temperature before opening to avoid condensation on the emulsion, which will destroy the partially deteriorated negatives. As an added precaution, it is a good idea to remove materials from cold storage in a sealed Tupperware tub for the warm-up period.

TECHNICAL NOTES FOR DUPLICATION

General Suggestions

There are a lot of good copy stands on the market—discount catalogs are a good place to look. A very good one is the Polaroid MP-4 that can be used with 35mm and 120 cameras and its own dedicated 4x5 camera. It is very precise and efficient and costs around \$1500. There are many less expensive. A good place to look is the Calumet mail order catalog (800 225 8638 for a catalog). Four lights are better than two, and a good tall column for moving the camera up and down helps when copying different sizes.

Getting the light even all over the base of your copy stand where the original sits is essential. An incident meter is used for this, for example a Sekonic Studio Deluxe. It can be moved around on the base to determine if the light is even. Carefully adjust the lights at a 45-degree angle from the copy surface. Uneven copy negatives are hard to print because dodging and burning is needed. Use a small "bullet level" for getting the camera level, or, practically speaking, getting the camera parallel with the copy platform.

When using a 4x5 or larger camera, a phenomena called "bellows factor" must be dealt with. As the bellows extend for a closer shot of a smaller copy, the exposure must be increased. The Kodak copy manual, *Copying and Duplicating in Black and White and Color*, Kodak Technical Publication No. M-1, which also has good tips for using filters to eliminate stains, has a clever set of guides on the back cover that can be cut out and used to calculate bellows factor. A two-inch measure is placed on the copy and the other slip is placed on the ground glass and lined up with the image of the two inch measure. The number of stops to increase exposure is read right off the slip. Bellows factor is not a problem with 35mm cameras except in extreme close-up or with lens tube extenders.

A good magnifying glass or loupe is needed for focusing a 4x5 camera. A cable release is needed for all size cameras to avoid camera movement. A filter holder for the lens is handy if you need to use a polarizer filter to eliminate glare, or colored filters to help diminish stains on the original.

A longer cable release is preferable so as to avoid reflections of your hand in a shiny print and to keep your hand from making a shadow on the print to be copied. Black photographer's tape can be used to cover the shiny parts of the front of the cameras. Also be careful to shut off room lights in order to reduce reflection from the ceiling directly above the copy stand. Look for other shiny places on the camera and copy stand directly above the copy and cover them with black tape or paper. This all takes time but it is preferable to reflections in the print that will show up on the copy negative and, ultimately, copy prints.

After placing the film holder in the 4x5 or advancing the film in the 35mm camera or 120 camera, wait a few seconds to let the lights and the stand "calm down." Movement will ruin a crisp copy negative. If you will be using the copy stand in the same place for extended periods of time, it is best to attach the top of the column to the wall solidly.

Use white gloves if possible; they keep fingerprints off the prints to be copied. Sometimes these fresh smudges show up in the copy when they are hard to see with the naked eye. Use a darkroom enlargement easel for holding down the prints to be copied by the edges only. This avoids using a piece of glass that causes glare and reflections.

Include a Kodak gray scale in each batch of copies, at least in each roll of 35mm film toward the beginning. Place it near the edge of the print to be copied but not over the image area. Kodak makes several different sizes of these gray scales. The scale helps you estimate whether you are getting good contrast in your copies. You should be able to print from your negative and duplicate the gray scale very closely. A few experiments with printing the gray scale will let you know how difficult it is to get a really good copy even though the negatives look O.K. to the eye. If you have a densitometer (a machine that quantifies the densities in the copy negative and allows you to exactly match the original print) the gray scale is a necessity.

Clean originals to avoid having to spot out dust marks on copy prints later. Get a routine down for cleaning just before exposure. A camel hair brush is O.K. for getting dust off, but they will scratch delicate print surfaces. A small syringe (rubber squeeze type) is cheaper than canned air

for blowing dust off and works well. A compressor fitted with a moisture and oil filter is best. It is best to blow prints off a final time right after focusing because dust particles are good to focus on.

Normal lenses will work for copying, but “process” or flat field lenses are better—they avoid a lost of focus in the corners. If you are working for the future, the sharpest lens you can afford is the one to use. A Schneider G-Claron 150mm is a good process lens for 4x5 and a Micro-Nikkor 55mm for 35mm. These are designed to record a flat surface as opposed to most normal lenses that are designed to record a three dimensional scene.

Polarized light will eliminate silvering or reflections on the print to be copied. It will also help reduce the effect of wrinkles. **Two** things are needed: polascreeens in front of the lights and a polarizing filter over the lens of the camera. Rotate the filter until the glare can be seen to disappear. This combination, unfortunately, considerably increases the contrast in the copy negative, as well as increasing the exposure time, so development time should be reduced at least 10% when using this setup (see next section on contrast). Do some tests to get the contrast you require. When shooting 35mm, try to batch all glare problems on the same roll so you can under develop that roll. Many old photographs (almost all) have a slight silvery fog overall which polarized light will remove. Some people use polarized light all the time so they don't have to keep remembering to alter the exposure and development.

Contrast Control

The rule of thumb when copying is that if you want to decrease the copy contrast, under develop the film a little. If you want to increase contrast, over develop a little. I have found that for general copy applications, it is wise to over expose (for example, I shoot Kodak T Max 100 at ASA 80 instead of the recommended 100) and over develop about 10%. A little contrast is always lost when copying without Polarized light and this small amount of increased development compensates for it. Add development or decrease development for special cases *in addition to* this general adjustment—for example if you have print that is severely faded. .

Archival Printing

Only fiber based photographic papers (as opposed to RC or resin coated papers) should be used for copies intended to last for the long (100 years) term. Examples of this paper Kodak Polyfiber and Ilford Multigrade Fiber, both very good. All film can be archivally processed.

- a. Full manufacturer recommendation time for developing (no partial development).
- b. Acid stop bath and two non-hardening fixing baths.
- c. Combination hypo clearing agent and toning for permanence. Formula: to one gallon of working Kodak Hypo Clearing agent or equivalent add 75 grams Kodak Balanced Alkali and 3.5 fluid oz. Kodak Rapid Selenium Toner and mix thoroughly. At 68 degrees F. treat films and papers for 3 minutes with intermittent agitation. Longer treatment will cause a color shift, i.e. the material will tone visibly. CAUTION: use gloves and good ventilation with selenium toner, as it is highly toxic.

- d. Interleave prints in a solution of dilute Kodak Hardener for one minute.
- e. Wash prints for 30 minutes with adequate circulation of water and interleaving of paper.
- f. Spot test during copy project with residual hypo tester (obtainable from Light Impressions Corp. See bibliography). It is a good idea to do your testing on an extra print or negative and do it in a highlight area in the *middle* of the sheet. This area usually gets shorted on agitation.
- g. Use this same procedure for film except only one fixing bath (use a hardening fixer and no hardener later in the procedure) is needed and 20-minute wash is sufficient.

Films

- **Kodak Professional Copy Film.** The best all around film for high resolution and tonal range control when copying. It is orthochromatic (can be used with a red safe light) which means it will translate stains and colors differently than you may expect, but in ways that may be useful for corrective purposes. It can be developed in Kodak HC 110 liquid developer, dilution E, and processed archivally to produce very fine copy negatives. Its one drawback is that it is slow: ASA 12. 4x5 and larger. Kodak plans to discontinue this film in 2003—bad news.
- **Kodak Technical Pan.** Good for corrective copying where increased contrast and high resolution are required. Panchromatic film (sensitive to all colors), therefore useful for removing some stains with appropriate filters. (See Kodak technical manual on duplicating mentioned above for details on how to do this.) Comes in 35mm and 4x5 and can be cheaply developed in Phenodone or expensively developed in Technodol. This film is tricky to use, so some initial testing and experimentation is required. It is particularly sensitive to differences in color temperature of copy stand lights. Not recommended for novices. 35mm, 120, 4x5 and larger.
- **Kodak Contrast Process Ortho.** Use when higher contrast is needed to correct severely faded prints, also developed in HC 110, Dilution B or E. E is better because of longer development time. 4x5 and larger.
- **Kodak T Max 100.** Panchromatic film with high resolution and extended tonal range capabilities. Good copy results can be obtained by rating this film at ASA 80 using tungsten lights and developing normally in HC 110, dilution B. Along with Kodak Professional Copy Film (also over exposed slightly) this is the preferred film for achieving tonal separation in both highlight and shadow areas when doing copy work. The T Max 400 film is not recommended for copy work, as it has different tonal separation characteristics. 35mm, 120, 4x5 and larger.
- **Agfapan.** Fine grain, slow (ASA 25) panchromatic film, high resolution film for general copy work. Very good tonal range characteristics. Can be developed in HC110, dilution B also. Pre-soak for three minutes in plain water for best results. I have begun to use this film almost exclusively for small format copying. 35mm (long rolls for self loaders and single rolls), 120.

BASIC SHORT BIBLIOGRAPHY

Conservation of Photographs, Kodak Technical Publication No. F-40, 1984

Copying and Duplicating in Black and White and Color, Kodak Technical Publication No. M-1, 1984. (the one with the bellows factor slips)

Administration of Photographic Collections, Ritzenthaler, Munoff, and Long. Society of American Archivists, Chicago, 1984. (Available through Light Impressions Corp.)

The Life of a Photograph, Laurence Keefe and Dennis Inch, Focal Press, Boston, 1990.

The Permanence and Care of Color Photographs, (all forms from prints to slides) Henry Wilhelm, Preservation Publishing Company, Grinnell, Iowa 1993.

Supplies

The best source for small and large quantities of materials for management of photographic collections (sleeves, interleaving papers, archive boxes, adhesives, etc. as well as reference books): Light Impressions Corporation, 439 Monroe Ave., PO Box 940, Rochester, NY 14603. Send for catalog. 1 800 828 6216.

A newer company with a small but excellent line of archival storage and presentation materials is: Conservation Resources International, Inc., 8000-H Forbes Place, Springfield, VA 22151. 703 321 7730. Send for catalog.

Also very good: Gaylord Archival, P.O. Box 4901, Syracuse, NY 13221-4901. They have a very complete catalog with some unique items. Send for catalog.

A good supplier of all kinds of plastic sleeves is Kleer-Vu Plastics Corp. of California.

Appendix A

Microform copying (that is, microfilm or micro-fiche) is very valuable as a conservation tool in the sense that it takes research pressure off the original material. But it should not be thought of as a method of preserving images for the future in any other sense. In the above example it might be used for copying the research print file and the original prints for a quick first access to the collection with a microfilm reader, or in order to make the contents of your collection available to other researchers across the country.

The production of a microfilm 16mm copy can take at least three different forms and must start with positive material only of relatively uniform size (for ease of shooting):

- a. A continuous roll of 16mm microfilm. The cost is approximately \$50.00 per thousand frames and 2500 images can be copied onto a one hundred foot reel. Copies of a master reel on archival stock are around \$16 each.

- b. A microfiche. This is a sheet made from sixty frames cut from the film produced in (a) above and then copied onto a single sheet of film for reading in a fiche reader. The cost is approximately \$.75 per image including the cost of the production of the original film.
- c. A microfiche produced by the step and repeat process. Here there are 98 images per standard fiche. The cost is approximately \$30 per master and \$.50 per copy fiche. This method is usually used for publishing fiches for sale to other institutions.

A word of explanation concerning microfilming. When positive prints are microfilmed, a roll of negative frames is produced. This must then be copied or "printed" in order to produce a positive roll for use in fiche readers that take rolls. To produce a fiche sheet the initial roll of negatives is cut into individual frames and these are slipped into small pockets in a fiche jacket. Indexing information is added to the jacket and the whole package is then printed onto a new fiche film producing a positive for use in fiche (sheet) reader machines. The "step and repeat" method avoids the production of the initial roll by exposing 98 images onto a single sheet of film in a special camera that moves the film each time an exposure is made. Indexing information is added when this sheet is printed onto a new sheet to produce a positive for use in reader machines. Microform copies should *not* be thought of as copies of record, but as a very good way to handling pressure off of originals and speed research.

While still used widely in libraries and archives, this process is fast being replaced by searchable databases that include thumbnail images.

Appendix B: Use of Digital Technology in Archives

Digital images of archival photographs are an important *conservation* tool when used in access and collection management database systems, such as proprietary systems like Past Perfect, or a database of your own design. A low to medium resolution scan for computer screen legibility is less expensive to produce than a copy negative and a research print for an analog file system. The database retrieval, if well designed, gets the researcher to the precise few images they are concerned with without the necessity of physically going through cabinets of originals, placing them at jeopardy of damage.

There are some drawbacks at present to thinking of scanning as a *preservation* project for your photographs; in other words of thinking of the resulting digital file as a copy of record. The scanned file size needs to be at least 40 MB to be able to print a film negative of the quality needed to make enlargements for exhibits or publications. A negative from such a file costs \$50 to \$60 dollars to print at a service bureau such as Ivey Seright in Seattle. The labor cost of scanning must be added to this to get a realistic idea of how much a digital copy of record would cost. Long-term storage is also a problem with digital archiving at present. As the technology changes, files will need to be "migrated" onto new media or new platforms as they arise. At present, this appears to be necessary once every five or six years just to be able to access the data. In ten years, probably less, the CDRoms we use today will be like 78 records. It may be possible to preserve photographs digitally in the future, but right now the cost of creating a negative from the data and problems of long-term storage make it economically marginal and administratively complex.

This issue is complicated by the fact that ink jet printers that will make prints 40 x 50 inches and smaller are becoming more affordable for museums and archives. These printers still require a very large scanned file to produce a chemical print quality image, but after amortizing the cost of the printer, the unit cost is much less than a chemical mural print. And, of course, eliminating darkroom chemistry is better for the microenvironment of the museum and the larger ecosystem as well.

Whether archives make clear decisions about the advisability of accepting digital scans as copies of record or not, very soon they will have no choice. In the rush to move into the digital world, both for in house production of images and for Internet access, large collections of cellulose nitrate and early safety diacetate base films continue to silently deteriorate in vaults. In five years, many of the low to medium resolution scans that are being produced today will be the only copy of images carried by historic negatives that have passed beyond usefulness. These scanned images will be very useful still for historic research, but will not produce fine publication or exhibit prints. This situation makes the development of a migration schedule now imperative.

There is precedent for this last phenomena in archives management. In the 1960s and 1970s microfilm was heralded as the technology of the future and thousands of newspapers and historic photographs were microfilmed. If one looks back at the advertising claims of the of the microfilming companies the word preservation is used freely. One of the microfilm systems was developed specifically to preserve large collections of cellulose nitrate X-ray film and was then sold to archives for their nitrate collection preservation. Now many archives find that the tiny 16mm microform positives and negatives are all they have left of both paper and film originals, and that, while still good for relatively rapid research access, make very poor hard copy reproductions. They are now, however, the copy of record.

The digital decisions facing archivists today are serious and somewhat urgent. Some cultural information that historians depended on in the past are simply no longer produced. For example, newspaper “morgues” of chemical photographs are a thing of the past as journalistic photographers use digital cameras and delete the files as soon as the paper is published. The record of journalistic photography will now be low-resolution images printed on decidedly non-archival paper. Family snapshots, another trove of social history, are fast becoming digital files that are not saved systematically. The photographic record, fragile in its analog form, has become even more ephemeral.

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