Article: Singing The Blues: the treatment of water-damaged negatives
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Topics in Photographic Preservation, Volume 5.
Pages: 84-88
Compiler: Robin E. Siegel

Topics in Photographic Preservation is published biannually by the Photographic Materials Group (PMG) of the American Institute for Conservation of Historic & Artistic Works (AIC). A membership benefit of the Photographic Materials Group, *Topics in Photographic Preservation* is primarily comprised of papers presented at PMG meetings and is intended to inform and educate conservation-related disciplines.

Singing The Blues: the treatment of water-damaged negatives.

Deborah Derby

In this paper I will discuss the treatment of some severely water damaged silver-gelatin, triacetate negatives, that was undertaken by Peter Mustardo and myself at The Better Image. In presenting the results of this work I will show what can be done to salvage water damaged negatives while emphasizing the fact that there is no substitute for disaster preparedness and a good recovery plan.

In November of 1991 a block of fused and moldy gelatin-silver negatives was received at The Better Image from the photographer who had made them. To quote the letter which accompanied them, "here is a portion of the negatives that I was telling you about. They have been 'frozen' in this form for about 20 years after being soaked in rain water."[1] The negatives had been housed in glassine and paper sleeves and stored in rows in photograph developing trays. At some point one of the trays had filled with water. The water, having not been detected, evaporated. The negatives and their enclosures dried over an unknown period of time and were fused together. There was also extensive mold growth. The photographer estimated that he had approximately 130 to 135 rolls worth of film fused in a block.
The photographer had spent many years in the late 1950's and early 1960's travelling with and documenting blues musicians throughout the United States. These images had been recently requested for a possible publication and were of great interest to The Delta Blues Museum, located near the photographer's home. The damaged negatives represented the photographer's work from the years 1965 and 1966. They included images of civil rights demonstrations and family photographs, as well as the images of blues musicians. Because the photographer had no system of organization for the negatives, other than approximate dates, it was impossible for him to know what specific images were included in the blocked negatives or to pinpoint areas where the more important images might be located. He needed to see what had been damaged and if anything was salvageable. He had therefore broken off a piece of the blocked negatives and forwarded them to Peter Mustardo.

Initial examination of the blocked negatives showed that in the process of wetting and drying, the enclosures had cockled and distorted. What had originally appeared as a solid mass was actually riddled with air gaps. This made it possible to separate the negatives into individual strips and enabled us to remove a large portion of the paper and glassine enclosures manually with a paper thin palette knife.

At this point it was possible to determine that the silver images on the negatives were in fairly good condition, but with the amount of residues still adhered, it was difficult to produce readable prints. We could also see that the negatives had sustained only a moderate amount of mold damage, mostly around the edges. Testing of aqueous treatment possibilities showed that the negatives could be safely bathed in a 1:1 solution of Ethanol and water, and that this would enable us to substantially reduce the paper and glassine residues. After consulting with the photographer, we proceeded to bathe the negatives from the sample that he had sent us. The negative strips were placed in a bath, a few at a time. A cotton "brush" made from frayed dental cotton, was used to gently brush the surface of the negatives to remove paper fibers, mold and any other accretions.
Dental cotton is a cylinder of cotton held together by silk thread. The ends can be easily frayed to create a small, very soft brush that is not as prone to "shedding" as wads of cotton can be. When the residues were reduced as much as seemed safe to do, the negatives were removed from the bath and dried between sheets of thin, smooth polyester web and blotters, weighted slightly at the edges to restrain the potential curling of the film. Once the negatives were dry they could then be swabbed to reduce the remaining enclosure residues. A solution of Ethanol and water was used to completely clean the base side of the film, while Ethanol alone was used on the emulsion side. It was ultimately not possible to completely remove all of the paper residues on the emulsion side of the film, though in general they were reduced enough for an image to be readable through them. The extent of the damage incurred by the negatives depended on the amount of initial wetting, the specific enclosures that the negatives were housed in, and the occurrence of mold growth.

Once the negative strips were detached from each other and it could be seen that substantial portions of the images remained, we began to consider the possibilities for optical reconstruction of the images. These included:

-hand retouching
-copy print or copy negative
-computer enhancement

As we were more familiar with the possibilities and expected results of hand retouching, we decided to investigate the option of computer enhancement. With this in mind, Peter approached a local custom photo lab, Washington House Photography, which was advertising a "new continuous-tone digital imaging system", that could manipulate or change any element or portion of an image in almost any manner.[2] After describing our project to the people at Washington House, Peter sent to them two strips of negatives and arranged an appointment for us to see a demonstration of the enhancement of our images.

The first image that Washington House scanned was one of the more damaged examples that Peter had sent to them. It exhibited severe image loss which appeared as horizontal black lines throughout the image as well as cracking of the emulsion associated with the areas of loss. The image was scanned into the computer at the highest possible resolution which resulted in the computer reading the cracked emulsion as image detail and "enhancing" it. This caused the damage to be more pronounced than in the original.
After the image had been scanned into the computer, it was then retouched with the use of a stylus by the computer operator. Large background areas such as the sky were cleaned up by "cloning" undamaged portions of the print to replace the losses. The computer operator placed the stylus on the screen in an area similar to the one that was damaged to record the image, then moved to the damaged area to "draw" in the "new" sky. In this way the operator was able to remove much of the damage in the background areas caused by the heavy black lines and crackling. The unique areas, such as the subject's chin and harmonica, were more complicated as they had to be recreated or ad-libbed.
The second negative that was scanned was considerably less damaged than the first negative. It exhibited an overall reticulation of the emulsion, but no real image loss. This negative was scanned at half the resolution of the first, but the image quality was still fairly good. The benefits of scanning at a lower resolution are that less manipulation is needed to clean up the image and it extends the number of images scanned for the cost. In cleaning up this second image, the computer operator concentrated mainly on reducing the reticulation of the emulsion that occured in the two figures depicted. By reducing the damage in the focal points of the image, the background damage became less noticeable.

In considering optical restoration of images there are two main issues.

- -cost
- -ultimate use of the images
  - publication, exhibition, research

In this case, the photographer had indicated that since The Delta Blues Museum was interested in acquiring the images, he wished to see what could be done to restore them. While we found the computer enhancement procedure to be relatively successful, it was also quite time consuming and costly. The first image required 5 hours to partially enhance and was quoted at a price of $1280.00. The second image required 3.5 hours to enhance at a quoted cost of $780.00. Washington House also offered the option of housing the entire damaged collection on optical disc so that it could be accessed by researchers. We found this to be an interesting option, but at the rate of scanning 102 images per disc, it would require 47 discs to hold the 135 rolls of

film that were damaged in this collection. It is apparent from these examples that a negative collection would need to be carefully sorted to provide the best results for the cost involved.

The treatment presented here is a fairly graphic illustration of the value of appropriate housing in protecting collection materials from disasters. If these negatives had been housed in boxes with lids it is possible that the boxes might have sustained some damage while successfully protecting the negatives inside. Because of my work on this project I became interested in investigating how photographic materials are protected by their enclosures during water disasters and the behavior of the enclosures during the recovery process. With this in mind I have begun preliminary experiments with modern polyester based film and various archival and commercially available enclosures. To date, film negatives housed in paper, polyester, polyethylene, glassine, and glassine within paper, were tested at the immersion times of 12 hours, 48 hours and allowed to dry without being disturbed. While these tests have been purely practical in nature the following are some conclusions that I have been able to draw from the results of my experiments so far:

-If the negatives are recovered while they are still wet, there is no appreciable visible difference between objects that have been stored in various enclosures after being immersed for 12 or 48 hours.
Note that most disaster plans recommend that film based materials be air dried within 48 hours of the disaster occurring. If this is not possible, they should be frozen, and then thawed and air dried once the more vulnerable materials in the collection have been stabilized.

-When negatives are allowed to dry in their enclosures there was a noticeable difference in their recoverability. Glassine tended to cause the most damage visually, marring the surface of the negative wherever it had adhered. Paper enclosures tended to stick more overall and in all of my samples there were some paper residues permanently embedded in the gelatin binder. Polyester and Polyethylene tend to hold moisture longer which may make it easier to recover these objects, although the trapped moisture does increase the risk of mold growth.

This research is ongoing and I hope to be able to expand it into some guidelines that will be helpful in preparing collections caretakers, volunteers and others in the handling of photographic materials during disaster recovery.

In the final analysis, the importance of disaster planning and response cannot be ignored. Through the work of a variety of groups; archivists, conservators, librarians, and

scientists, we have expanded our knowledge of disaster planning as well as how various types of collection materials behave in disaster conditions. Photographs made by various processes respond differently to water related disasters, therefore, it is important for those responsible for collections to know which objects in their collections are most vulnerable to water damage and insure that they are stored in a manner that will best protect them. As you have seen in this presentation, photographs that do survive a water-related disaster, often need extensive and time consuming treatment to stabilize them.

> "Water damage is the most common emergency, from floods, storms, leaking pipes, faulty sprinklers systems, and firefighters hoses. Most archival materials will be severely damaged or destroyed by the action of water, unless a prompt, well-organized recovery program is in place to minimize the loss of photographs."[3]

1. Correspondence with the client, November 1991.

2. Washington House Photography Advertising Literature, Summer 1992.

3. Hendricks, Klaus B., Brian Thurgood, Joe Iraci, Brian Lesser, and Greg Hill. Fundamentals of Photograph Conservation: A Study Guide. Lugus Productions. Toronto, Ontario, Canada, 1991.