



Article: It's a Long Story... The Continuing Conservation Saga of Two 20-Foot-Long
Panorama Photographs

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It's a Long Story... The Continuing Conservation Saga of Two 20-Foot-Long Panorama Photographs

Gregory Hill

Presented at the 2015 PMG Winter Meeting in Cambridge, Massachusetts.

Abstract:

In 2003, the Archives of Ontario (AO) received a call from Queen's Park, the Ontario Provincial Legislature in Toronto. Two large framed and mounted panoramic photographs of Niagara Falls had been discovered under the attic floor boards of the Legislature building during renovations. Solidly mounted onto galvanized steel sheets, these 20 foot long images were severely deteriorated from exposure to water and extreme adverse environmental conditions. AO preservation staff attempted to remove them from their mounts and stabilize them in situ to facilitate transport them archival storage. Unfortunately work had to be halted when no safe and effective method of backing removal could be found. These extremely significant objects are considered to be, at least as claimed by the photographer, the largest single-sheet, single-exposure photographs produced anywhere during that time period.

The panoramas were transferred to a state of the art cool storage facility, Archives One, a public/private archival storage partnership housing the AO collections. While cool storage provided a good preservation environment, the sheer size of these photographs and their fragility precluded public access and strained the limited and costly space available to the AO. Consequently the AO applied to the Canadian Conservation Institute (CCI) for assistance in the stabilization of the images and in their removal from the metal backing, facilitating public access and decreasing storage space requirements.

The project proposal was accepted and in 2013 collaboration began between the AO and CCI, which included a conservator from the AO participating in CCI's Visiting Professional Program. The agreement is that CCI will fully treat one of the prints and partially treat the second, providing a concurrent training opportunity for the AO conservator, who will later complete the treatment of the second print in the AO conservation lab. To date, the AO conservator has completed three one-week on-site sessions, having two more to complete her residency.

The treatment started in the winter of 2013, coinciding with the arrival of a photograph conservation curriculum intern, much of whose time was to be dedicated to this project, from the Institut national du patrimoine (INP) in Paris. The extent of the damage to the prints was soon fully realized and included the following:

- gelatin emulsion was rendered entirely water-soluble;
- extensive and disfiguring stains could be reduced using only aqueous treatments;
- adhesive bond between the photograph and metal support was extremely tenacious and released only with extensive humidification and caused further discoloration and staining;
- images were disfigured overall due to extensive losses throughout the emulsion.

To date, the ongoing treatment has focused on four areas: reducing staining with the use of Gellan Gum, removing the metal secondary support through Gore-Tex humidification, further reducing of stains using a suction table, and consolidating the emulsion layer with gelatin.

Ongoing dialogues between CCI and the AO has been critical in developing the final protocol for treatment. While further challenges will surely present themselves as the treatment progresses, everyone agrees that removal of the metal support is essential to long-term preservation of, and access to, the photographs.

This presentation will elaborate on the collaborative nature of this project, the development of the treatment options, treatments carried out to date, and the future of the project.

Introduction:

The story of the discovery of the William Thompson Freeland Panoramas has become legendary in Ontario's archival circles! In 2003, two 20-foot long photographs were discovered by construction workers beneath attic floor boards at the Legislative Assembly of Ontario, at Queens Park in Toronto. They were found in their original frames, and no record exists as to how, when, or why they were installed beneath the floor. Upon discovery their condition was exceedingly poor, exhibiting severe water staining, image loss, multiple cracks and tears, and a disfiguring overall yellowed varnish. In addition to this, each image was glued to a galvanized sheet metal backing, nailed to a wooden stretcher, and inserted in original frames without glazing.

The images capture views of Niagara Falls from the same vantage point in two different seasons: *Winter* dating from November 1912 and *Summer* from April 1913, with the large negatives having been manufactured in 1910 (fig. 1). The photographs are black and white silver gelatin emulsions, each on a single sheet of baryta paper, and both with significant amounts of overpaint. Allegedly, they are the largest known Canadian photographs of Niagara Falls of the time. Their inscription reads, "...largest one piece one exposure photo enlargement in the world..." The images capture many iconic landmarks including the Canadian and American Falls, the Honeymoon Arch Bridge, Goat Island, and the Maid of the Mist, and also documents development, mostly the industrial development on the American side

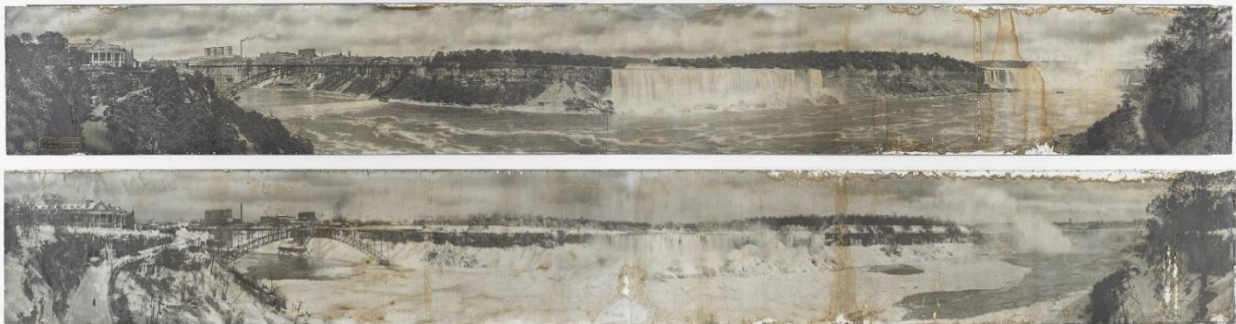


Fig. 1. *Summer*, April 1913, (top) and *Winter*, November 1912, (bottom)

Initial Treatment:

Prior to applying to CCI for treatment of the panoramas, several treatments attempts to stabilize the photographs were done *in situ*. Removing them from the attic was almost impossible as alterations to the attic space and access staircase subsequent to the photographs' installation would necessitate their unframing and rehousing as well as alterations to the stairwells. As their size also precluded their treatment in the existing conservation lab of the AO, a temporary conservation space was established in an unused store room within the legislature building.

Between 2004 and 2006 a number of treatments were performed, first cleaning the photographs in order to stabilize their emulsions and then attempting to remove them from their metal backings. The objective of these interventions was the hope that afterwards the photographs could be rolled, facilitating their move to the archives building and allowing for a more efficient long term storage solution. However, an adapted working space without fume extraction limited treatment options.

Treatment began with extensive dry cleaning followed by varnish removal with local applications of acetone. The varnish had discolored to a deep yellow and was embedded with surface dirt, resulting in an appearance of lost details and reduced tonal range. It was also felt that varnish removal was necessary in order to properly consolidate the emulsion, though the varnish was retained in areas of extreme fragility where any physical contact caused emulsion flaking. Next, areas of loose and lifting emulsion were consolidated with a brush-applied 2.5% solution of warm gelatin. Detached fragments and damage edges were reinforced with Japanese tissue and gelatin. With this stabilization completed, attention was turned to removing the metal backing.

As testing showed that the mounting adhesive was water soluble, moisture was introduced in a variety of ways: warm water applied directly to the metal

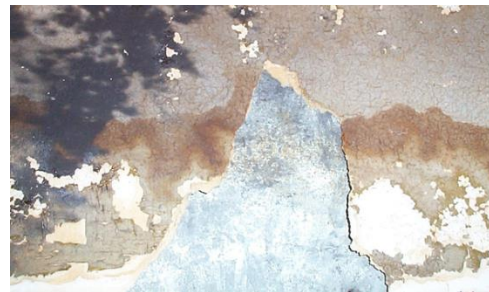
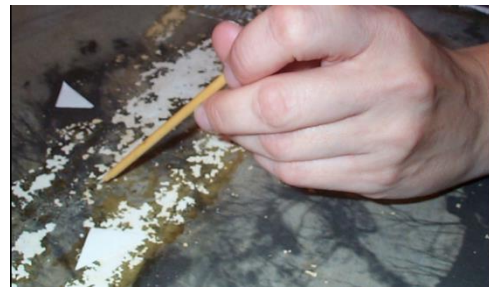


Fig. 2. Damage following the varnish removal and attempted removal from galvanized sheet metal: extensive staining (*top*); varnish present on area of extreme mechanical damage (*top center*); extensive losses to emulsion and support, severe staining (*bottom center*); and planar deformations (*bottom*)

paper interface; Gore-Tex humidification, and hot steam. Due to the high degree of degradation of the photographic paper and the exceedingly strong bond of the adhesive to the metal support, all attempts to remove the backing resulted in severe mechanical damage to the object. What little integral strength that remained in the paper disappeared with the introduction of water. This, coupled with the complete dissolution of the photographic gelatin by water precluded the use of any aqueous treatment.

Further removal attempts focused on non-aqueous solvents and mechanical treatments, but to no avail. All attempts aggravated and augmented existing damage. The decision was finally taken to cease removal attempts. Further consolidation and repair followed using liberal applications of B-72 in acetone, particularly around the perimeter of both images. The bottom image of Figure 2 is a raking light shot following this consolidation with B-72. No further treatment was deemed possible. The photographs were returned to their frames, crated, and sent to a climate controlled vault.

Long Term Storage:

Throughout this period the Archives of Ontario was in the process of constructing a new storage facility, embarking on a public/private partnership with a company called Archives One. This private enterprise would build and manage the off-site archival storage facility on a fee-for-service basis, including a cost for square footage occupied. In 2006 the panoramas moved into this facility, into a new cold vault set at 10C and 40% RH.

After five years in the new facility the AO faced a dilemma. They had reached the limit of their available contracted cold vault space. As their size and poor condition precluded public access to the originals, the panoramas occupied approximately 10% of the AO storage space. The high cost of storage coupled with a lack of access prompted a review of the situation. CCI was then approached to offer an opinion as to their treatment and the potential for removing the images from their backings, allowing for more efficient use of this limited storage space.

Application to CCI for Treatment:

The application for treatment services submitted by the Archives of Ontario's was followed up with a visit from the CCI photograph conservator (author) to Archives One to see the panoramas first hand, take samples of the adhesive, and complete an examination report. Based on this investigation, the Panoramas' were accepted for treatment and in 2012 the Archives of Ontario and CCI entered into a treatment partnership whereby CCI would complete the full treatment of *Summer* and partial treatment of *Winter*.

This was a seductive project for CCI for many reasons, and met many of CCI's treatment project acceptance criteria:

- they are of great interest and significance to historians, documenting the environs of Niagara Falls circa 1912;
- they are rare, and allegedly unprecedented in scale;
- their highly degraded state offered the potential for developing new treatment options;
- the potential to pursue a collaborative endeavour with the Archives of Ontario was great.

Due to limited resources at CCI, the acceptance of a project of this magnitude was made feasible by adopting a collaborative approach. The senior conservator at the Archives of Ontario would participate in CCI's Visiting Professionals mid-career development program and, over a series of six one-week visits to CCI, help to develop treatment protocols and receive training in the treatment techniques used with the panoramic photographs. This would ensure a consistent approach to the treatment of both objects while simultaneously providing CCI with the needed increase in man power.

The partial treatment of *Winter* was to include its removal from the metal support, repair and lining, surface cleaning, stain removal, and surface consolidation. The remaining treatment, which includes final surface consolidation, infilling of losses and retouching, would be completed by the AO conservator upon return to the Archives of Ontario.

Conservation Treatment at CCI:

In January 2013, the photographs arrived in the CCI paper lab. A month later, with the arrival of an intern from the Institut national du patrimoine, the treatment commenced. While completing standard written and photographic documentation, spot tests determined that the residual varnish was soluble in ethanol and the B-72 consolidant applied by AO conservators was soluble in acetone. The red paint present at the center of the image was also soluble in acetone. Lyndsie Selwyn, CCI Senior Conservation Scientist, confirmed that the metal supports were comprised of two separate pieces of steel, galvanized to a high standard. That was the good news. The not-so-good news was that the gelatin emulsion was highly water sensitive, as was the over paint, as was the baryta layer... The mounting adhesive was also water soluble, and the photographic paper tended to crumble, exhibiting no inherent strength, when exposed to water.

Following these spot tests, a treatment proposal was developed, submitted, and agreed to by the client. It was well understood that there was significant risk of further damage as a result of the treatment, but that this risk would be mitigated to the extent possible.

After the approval, materials analysis of adhesives and varnish was undertaken. The initial attempt to identifying the mounting adhesive was inconclusive, with only inorganics being identified. A second sampling identified protein and starch, confirming the presence of a water-based adhesive. The materials composing the heavy staining was analyzed and, not surprisingly, gelatin, natural resin, barium sulfate, and B-72 were identified. Residues of the original varnish were identified as a combination of natural resins, including heat pre-polymerized (boiled) linseed oil, dammar, Pinaceae resin, shellac (minor), and gelatin (trace), all common varnishes for the time. Based on the different materials identified, the hardened plaster-like material filling the gap between the vertical join of the two metal plates at the center of the photograph was identified as some form of mastic.

Treatment began with a gentle dry surface cleaning. Though the AO staff had removed the dirty varnish layer during the initial treatment a few years prior, there had been a little accumulation of dirt since then.

Stain reduction was deemed necessary, as they were highly disfiguring and entirely focused one's attention. The staining was water soluble, as predicted, though the use of standard stain reduction techniques was precluded due to the high solubility of the emulsion layer.

The hard work of the intern paid off: it was found that a rigid hydrogel (Gellan gum) used in small pieces and applied with an interlayer of Japanese tissue was effective at reducing the staining, though extreme caution was required to ensure the emulsion was not solubilized and removed. A 4% solution of Gellan gum was used, limiting the amount of moisture delivered to the object. The rigid gels were left in place for 1-2 minutes and were followed by the immediate application of more fresh gels. The fresh gels were placed around the perimeter of the cleaned area, reducing or eliminating possible tidelines, and were in contact with the surface for less time than the initial gels. It was a painstaking process, but was ultimately effective (fig. 3).



Fig. 3. Application of Gellan gum to the stains (*left*), stains before Gellan gum treatment (*center*), and the same stains after Gellan gum treatment (*right*)

Residual varnish was then removed using swabs lightly dampened in ethanol. This rendered the surface less disfigured and facilitated further stain reduction and consolidation of the surface.

In order to stabilize and strengthen the emulsion, it was coated with dilute solution of gelatin in reverse osmosis (RO) water. Two coats of gelatin were applied: the first coat was a very fine mist of 1% gelatin in RO water applied using a Becker Ultra Sonic Mister and the second coat of 1.5% gelatin in RO water by fine spray from a mini atomizer.

The effect of the ultrasonic misting appeared to be minimal, however it provided what was felt to be enough of a benefit to proceed with a further application. Spraying gelatin with the atomizer proved to be more effective but resulted in a slight darkening of the surface if applied too liberally



Fig. 4. Consolidation of emulsion with 1% gelatin mist

One of the primary reasons for the panoramas coming to CCI was so that a treatment to remove them from their metal backing could be devised. This would allow the photographs to be stored in a more efficient manner and would reduce the weight of the objects. Not surprisingly, given the solubility of all of the elements involved, this proved to be the most challenging aspect of the treatment.

Necessary first steps included:

1. Releasing the perimeter of the photograph from the metal backing – this was required in areas consolidated with B-72 and would be done mechanically (where possible) as well as with acetone.
2. Facing the emulsion - given the extreme fragility of the photograph, facing seemed prudent and tests using Klucel G in ethanol as the facing adhesive were carried out. While initial tests using small patches proved successful in terms of the strength and removability, larger tests proved ineffective regarding their capacity to reduce potential mechanical damage and their removal was extremely difficult. It was determined that facing would not be done.
3. Removing the nails anchoring the metal sheets to the wooden stretcher along the perimeter of the object – most of the nails had popped and punctured the photograph, and the nail heads that were present would hinder the removal of the photograph from the metal (fig. 5).
4. Supporting and strengthening the perimeter of the photograph – once the nails were removed, Japanese tissue and wheat starch paste mends were applied, where accessible, to the perimeter's verso.

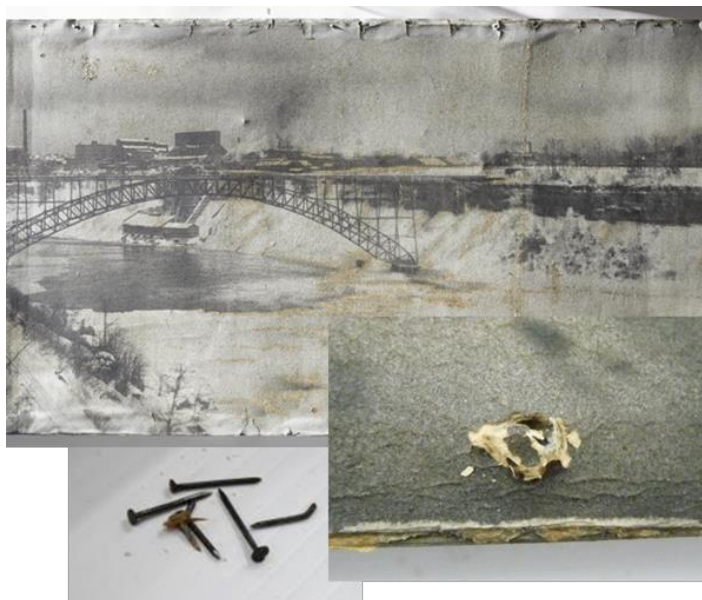


Fig. 5. Nails removed from the photograph's perimeter

At this point the need to identify a method for removing the photograph from the metal support became critical. Figuring out how to solubilize the mounting adhesive with minimal risk to the photograph required investigating numerous options. Many attempts were made and several colossal failures were recorded, including:

- warm water – when applied to the paper-metal interface warm water resulted in complete loss of integrity of the paper, and even with added ethanol there was virtually no penetration between the layers

- hot water vapor – attempts to use the Preservation Pencil® gave the same results as applications of warm water: complete loss of paper integrity
- dry ice delivered through the cold jet system – while this initially showed some promise, it ultimately proved ineffective.

As discussed with the client during the initial treatment risk analysis, damage resulting from these various tests was anticipated and included staining from the water and preservation pencil, lifting emulsion, and cracking of the photographic paper.

The situation seemed hopeless, but once again the tenacity of the intern paid off. By eliminating liquid water from the equation and allowing water vapor delivered through Gore-Tex sufficient time to penetrate and soften the adhesive, in conjunction with some gentle physical prodding, the adhesive eventually released. Though effective, the humidification did cause considerable staining by solubilizing acids, products of decomposition, and air pollution particulates embedded in the paper (fig. 8). There was a moderate-to-high risk of physical damage in some areas related to mechanical action of scraping the paper.

As the staining was quite disfiguring, it was of major concern. Due to the solubility of all of the elements (emulsion, baryta layer, and paper) stain removal on the suction table seemed an option worth investigating. Testing using a mini-suction table allowed reasonable confidence that the staining could be significantly reduced or diminished: the overall degradation of the print made it possible to pull a mixture of alcohol and water through the object without dissolving the gelatin. In discussions with the client revealing all possible risks, they agreed to proceed with the humidification and removal of the print from the metal. Vertical strips of 8 to 10 inches were humidified for up to 2 hours. The humidified areas were immediately mechanically separated from the metal immediately after. Most areas separated relatively easily, while others required some persuasion.

Following the photograph's removal from the metal support, the entire print was washed on the large suction table, though not without challenges. In order to assure uniform contact with the blotters on the suction table, the print was again humidified to a minimal degree using Gore-Tex method. A 50/50 water/ethanol mixture was applied as a fine spray. The process continued through several changes of blotter, until only minimal staining material migrated to the blotter. Some staining did remain, but was deemed an acceptable level (fig. 9). During the suction table washing of the second panorama, further consolidation was done using a 2% solution of warm

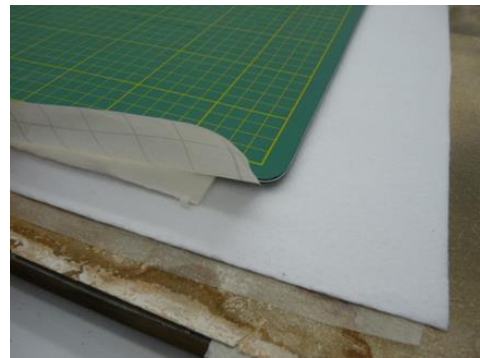


Fig. 6. Removal of the print from metal backing using Gore-Tex humidification (*top*) followed by mechanical removal (*bottom*)

gelatin while the object was still on the suction table. This appears to have provided a stronger consolidating effect than spray consolidating the surface without the suction.

Repairs were carried out using Japanese tissue and a dry mixture of wheat starch paste. The photographs were then lined overall with a medium weight Kurotani Japanese tissue coated with acrylic dispersion adhesive Lascaux 360HV. The Lascaux-coated tissue was gently ironed onto the verso of the object with an iron set to 60C. The edges of the lining paper were trimmed, and some planar deformations remained.

Flaking emulsion continued to be a problem following the lining. The fragility of the emulsion layer was thoroughly discussed with the client, and at this point the decision was taken to reverse the original proposal to roll the prints upon completion of the treatment. This was not taken lightly, as one of the primary desires of the Archives of Ontario was to store the prints rolled.

The housing compromise was that the photographs would be mounted onto Tycore panels which would then be attached to the wooden stretchers from the original frames. The mounted photographs would then be housed separately from their frames in a smaller and significantly lighter crate, reducing the space required to store the photographs as well as the weight and the long term storage costs.

After close inspection of the original stretchers, it was decided that they would be replaced: new stretchers would provide much greater strength and less torquing during handling. The wood of the new stretchers was sealed with Marvelseal®. The original frames will be housed in their original crates but in ambient conditions.

Surface consolidation, infilling of losses, and retouching were then done. Large losses in the photographic paper were filled with an Arches paper, and cellulose powder filled smaller holes. Japanese tissue reinforcing mends along the perimeter to help consolidate the fragile edge. All were adhered with wheat starch paste. The baryta layer was recreated using barium sulphate in 2% gelatin. Both of the photographs received this treatment.



Fig. 7. Before stain removal



Fig. 8. Overall staining caused by humidification



Fig. 9. After washing on the suction table to reduce staining



Fig. 10. Mending and in-progress heat-set lining (*left side is lined*)

Retouching was completed on only one of the images, *Summer*, as per the agreement with the client. Winsor & Newton watercolour pigments and pastel pencils were used in combination to integrate areas of loss. Heavy stains found along the upper edges, though reduced considerably during washing on the suction table were further masked with pigment applied to their surface to lessen their visual impact.



Fig. 11. After retouching

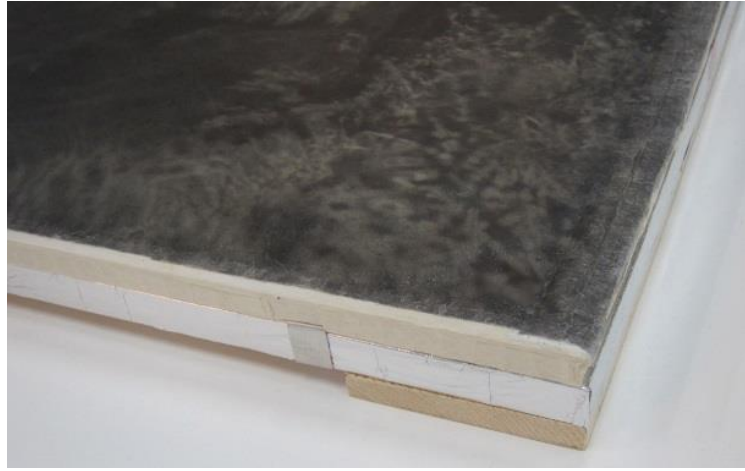


Fig. 12. Photograph mounted onto the Tycore panel and Marvelseal®-wrapped wooden stretcher

A margin of medium weight Japanese tissue 5 cm in width was then applied to all edges of the photograph and would be used to secure the object to the Tycore panel. Due to the slim tolerances of the mounted photographs in their frames and to secure the vulnerable edges of the photograph, thin pieces of Japanese tissue were applied to the edges of the recto, overlapping the perimeter of the image. This provided a secure mounting hinge.

The Tycore panels were assembled and the exposed outer edge wrapped with Japanese tissue and wheat starch paste. The photograph was then placed on the panel and the margin adhered to the edges and verso of the panel, again with wheat starch paste. Once dry, the mounted photograph was clipped to the wooden stretcher using custom aluminum clips that penetrated the bottom edge of the Tycore and screwed into the verso of the stretcher. Handling instructions will be provided to the client as it is possible to torque the panel and stretcher if attempting to move the object with an insufficient amount of assistance.

Conclusion:

Due to the high degree of degradation of these photographs, treatments seldom (if ever) carried out on conventional black and white silver gelatin photographs were possible. The successful use of the rigid hydrogel Gellan gum and suction table washing were contingent on the **degraded** nature of the object. Further studies are planned in the use of Gellan gum for washing and stain reduction of photographs

This has been an extraordinarily challenging and time consuming treatment project. Due to the exceptional fragility of the photographs, a risk evaluation was built into every step in the process. Working collaboratively with the Archives of Ontario not only enabled the project to be

completed, but the regular presence of the AO senior conservator as part of the treatment team ensured that the client was kept well informed of all issues relating to the treatment.

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