KASLYNE O'CONNOR

Tip: TEK-Wiping Out the Competition: The Ideal Reusable Absorbent Material

ABSTRACT

Originating from the custodial and technological industries, TEK-Wipe is a highly absorbent non-woven textile made from a blend of hydro-spun cellulose and polyester. This progressive material is durable, reusable, extremely strong when wet, chemically stable, and highly absorbent. TEK-Wipe can be paired with a large range of conservation treatments, such as for washing or drying in place of blotters, as an intermediary layer on the suction table, or for the humidification of sensitive media. Alternatively, it can also be used as a support for lining, drying wet books, cleaning glass plate negatives, for local tideline reduction, and even for varnish removal. As a sustainable alternative to blotters and other absorbent materials, TEK-Wipe is available in large rolls or small sheets that can be easily cut and formatted for any treatment size. This research examines the use and treatment variations that can be paired with TEK-Wipe, as well as two case studies of treatment adaptations. With conservation's expanding focus on reusability and durability over the long-term, TEK-Wipe is indeed proving to be a material to contend with.

INTRODUCTION

The concept of 'reusability' in conservation is held in high regard. More often than not, conservators around the world are faced with the need to recycle materials and borrow tools from other industries in order to make certain treatments more efficient and feasible. Whether it is using dental picks to clean hard to reach crevices in artefacts, porcupine quills to pick up fragile gelatin emulsions from photographs, or the newly popular food-grade Gellan Gum for washing and humidifying both paper and textiles, alternative and reusable resources are integral to and a mainstay in conservation.

Accordingly, originating from the custodial and technological industries, and capable of absorbing large amounts of water and still retaining its shape, TEK-Wipe (fig. 1) is a non-woven reusable fabric with the ability to change the dynamic of aqueous conservation treatments. As an alternative to cotton blotters and other absorbent materials, this environmentally and economically friendly product is available in a range of formats that can easily be cut down and formatted for any treatment size.

Fig. 1. TEK-Wipe is available in 100 yard rolls; Courtesy of M. Doutre 2016.

Many conservators have already discovered the large and comprehensive range of treatment variations that TEK-Wipe can be paired with. Minter (2002) first advocates for the uses of TEK-Wipe, and uses it for drying water-damaged books. Edwards (2014) discussed uses for TEK-Wipe and circulated samples of the material to conservators at the 2014 AIC Book and Paper Group Tip Session in San Francisco, California. Since then TEK-Wipe has been suggested on the conservation DistList to many professionals looking for inert and lint-free absorbent materials.

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This report came about from a need for a large, strong, inert, and absorbent sheet material for an aqueous treatment. The range of uses for this material throughout this singular treatment truly demonstrated the incredible versatility and variability of this multi-faceted fabric.

OVERVIEW OF TEK WIPE

MATERIAL CHARACTERISTICS

Available from a number of sources under trade names such as Texwipe or Technicloth, TEK-Wipe is a thin synthetic, non-woven, towel-like material made from a blend of cellulose (55%) and polyester (45%). (fig. 2) It is manufactured by hydro-entanglement, meaning that high-pressure water jets are used to bind fibers together without introducing any thermal or binding techniques. This process creates an incredibly strong fabric with capillary channels running in one direction that resist solvents and will not break down or leave residue behind when fully saturated. (fig. 3) Not only is this material chemically stable, inert (pH~6.47), and free of binders and starches, it will also not distort when subjected to high humidity. TEK-Wipe is available in both heavy- (122-126 g/m^2) and light-weight (64-69 g/m^2) formats and can be purchased as individual sheets or as a large roll (by the yard or by 100 yards) for any treatment need.[1]

ABSORBANCE

In terms of absorbance, the suitability of TEK-Wipe for aqueous treatments really goes above and beyond the requirements of a standard conservation material. The user is able to exercise considerable control with the introduction of moisture. TEK-Wipe is extremely flexible for most options and with any desired relative humidity when it comes to humidifying treatment alternatives. Lightly misting the wipes with a dahlia sprayer will create a relaxing low humidity environment, while total immersion in water will supply a generous amount of moisture to any treatment. More than an essential tool for releasing moisture, the high absorption rate of this material has made it an important inclusion in disaster salvage kits and a staple during emergency response situations.

RE-USABILITY

Since TEK-Wipe is able to retain such a large volume of liquid, given the right treatment it also has the ability to draw out considerable amounts of degradation. With large amounts of degradation can come a great deal of staining, however even when soiled, it's not the end for this fabric. TEK-Wipe can be easily washed by hand or in a washing machine, and therefore reused numerous times. To clear out water-soluble stains, TEK-Wipe distributors recommend soaking in warm water. For more resilient stains soaking the sheets in a solution of warm water and a small amount of detergent, followed by a thorough rinse is also quite effective. Though all washing

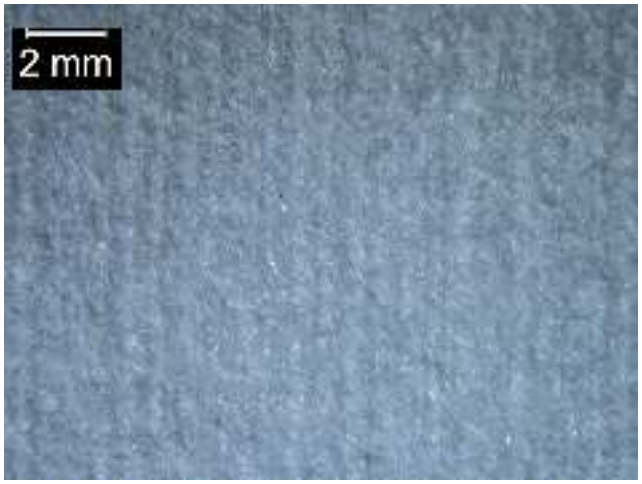

Fig. 2. Unidirectional fibers viewed under raking light with a Leica M125 stereomicroscope, x1.

Fig. 3. Defibrillation occurring in TEK-Wipe from scrubbing.

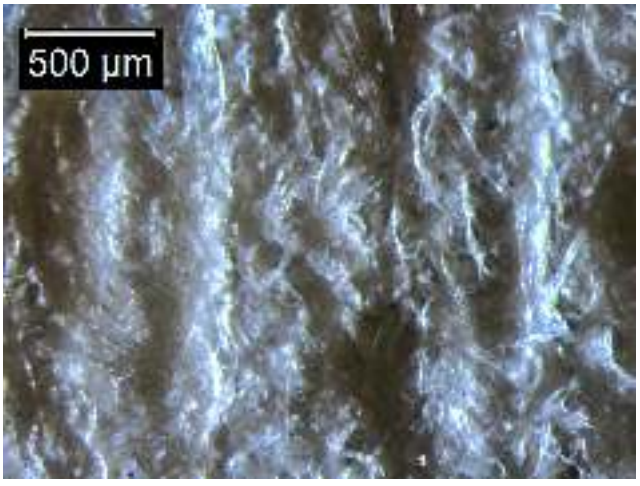

Fig. 4. TEK-Wipe fibers viewed under normal light with a Leica M125 stereomicroscope x5.

Fig. 5

LEFT TO RIGHT
a. Thick blotters hold moisture and expand when wet.
b. Thin blotters hold moisture and sag when wet.
c. TEK-Wipe fibers draw water out by capillary action resulting in no dimensional changes.

methods are safe, any heavy scrubbing must be avoided, as this will break up the fiber bonds in the fabric and result in defibrillation. (fig. 4)

DRYING

TEK-Wipe is a very low maintenance material. After being wet out, it can easily be left to air dry. Leaving the material on screens or racks is perfectly acceptable however the wipe will dry to the shape of its support. Re-humidifying the sheet will relax the fibers and flatten out any wave or cockle patterns resulting from its support while drying. Flattening TEK-Wipe on a smooth table with a brayer or squeegee will remove any wrinkles and excess moisture, allowing it to dry completely smooth and flat. Without weights or restraints, this method has the effect of edge tension drying on the fabric. After drying, the surface of this smoothed sheet will have two different textures: the surface that was exposed to air will retain its fiber texture, while the side at the interface with the table will be completely smooth.

FIBER COMPARISON

COTTON BLOTTERS

When it comes to the working properties of materials used in conservation, the texture, fiber formation, or overall strength, is a deciding factor in what will make or break the effectiveness of a treatment.

Since TEK-Wipe is adaptable, reusable, and highly inexpensive on a grand scale, it has been gaining popularity, especially when compared to traditional cotton blotters. Whether thick or thin, blotters themselves are quite versatile in terms of the type of washing they can be paired with. One of the downsides of blotters however is revealed with its low wet strength. Since blotters are able to absorb and hold so much water, their wet strength fails with this corresponding increase—resulting in fully saturated blotters that can fall apart when moved or reused too often. When thick blotters are wet out they hold moisture and expand, creating dimensional changes and long dry-times. (fig. 5a) Thin blotters also hold moisture locally, but rather than expanding they become weaker and sag with too much water. (fig. 5b) After aqueous treatments, blotters can become cockled, stained, and ultimately quite deformed, making their overall reusability for treatments less possible with time.

When comparing the aqueous function of blotters to those of TEK-Wipe, we can see some very interesting correlations. Since the fibers in TEK-Wipe run in one direction, water is not kept in a mass of interconnected fibers as with blotters, but is rather drawn out to dryer areas by continuous capillary action, remaining flat and uniform when wet locally and overall. (fig. 5c) This feature allows TEK-Wipe to become wholly, and evenly, humidified without being fully saturated, while the considerable fiber expansion also allows it to hold more water than a standard blotter. Unlike blotters, if full saturation is desired, the high wet strength of the fabric can withstand submersion and even being lifted by one end, wrung out and twisted like a towel to remove excess water. (fig. 6)

PARAPRINT

TEK-Wipe can also be compared in effectiveness with Paraprint. Paraprint is also a non-woven fabric with unidirectional fibers, making it an ideal candidate for slant or capillary washing. Unlike TEK-Wipe, however, Paraprint contains an acrylic binder that can become solubilized after the first aqueous or solvent treatment. Since the binder can wash away with time, Paraprint sheets will begin to wet out unevenly

Fig. 6. TEK-Wipe can be lifted by one end when wet without falling apart; Courtesy of A. Kaspar 2016.

when reused, creating a cycle of potentially inconsistent washes. TEK-Wipe, with no inherent binders or starches, will continuously wet out evenly with no inhibitions to the specific needs of each treatment.

TEK-WIPE USED WITH TREATMENTS

AS SUPPORT

TEK-Wipe is so strong and thin that it can easily be used as a support for lining and transporting objects without fear of creating tears or cockles in paper materials. Since the available rolls are sold by yards in quantities of 100, the only limitation for size is the 36-inch roll width. For oversize objects, such as posters, using long overlapping sheets will be able to provide protection and a base upon which to do washing, sizing, lining, or repairs.

DRY CLEANING

TEK-Wipe's smooth and chemically stable surface can also be used for dry-cleaning some objects and even surface cleaning glass plate negatives. Acting like a sponge eraser, it will pick up and hold debris and soil without leaving small fibers behind like other materials such as cotton will. Following a recommendation by conservators at the Folger Shakespeare Library, Edwards (2014) suggests using TEK-Wipe for dry cleaning after first crinkling it to relax the fibers. This very slightly roughens the surface of the fabric in order to draw in and reduce surface dirt that is more deeply embedded.

HUMIDIFICATION

As TEK-Wipe can be cut to any desired size, the concept of localized and in situ humidification opens many doors when it comes to treatment possibilities. For general humidification, TEK-Wipe can be used in combination with GORE-TEX® as a wet blotter replacement, or used alone where the wipes can be lightly misted or fully wet out depending on the sensitivity of the treatment.

TEK-Wipe can even be used with materials that are highly sensitive to humidity, such as parchment or documents containing iron gall ink. Prior to these treatments, lightly spraying a stack of TEK-Wipe sheets and leaving them covered under plastic sheeting for approximately fifteen minutes will allow the moisture to equilibrate between all the sheets without having localized damp areas. When humidifying sensitive objects in a TEK-Wipe stack, short times of about 5–10 minutes will sufficiently relax the documents and avoid deformations or lateral ink migrations. For iron gall ink in particular, TEK-Wipe has even been used in conjunction with reductive phytate treatments. In this set up, the wipes are saturated with calcium phytate and placed on both sides of the document in order to bind free iron ions in the ink. The treatment can be repeated as many times as necessary and can be monitored with bathophenanthroline indicator paper.

DRYING AND FLATTENING

When acting as a drying material for an object, just like drying TEK-Wipe on its own, capillary action in the fibers pulls moisture from one area to another to equalize drying. For sensitive objects, this slow drying time can allow better overall flattening without creating micro-cockles in a work. As with a traditional conservation drying stack, when cotton blotters become overly wet, there are no continuous fibers to pull moisture from the material. This and can result in the formation of wrinkles in sensitive objects after drying. To avoid this, blotters are changed frequently in the first stages of drying. This reduces the chance of creating cockles but increases the handling of fragile objects. In comparison, TEK-Wipe pulls moisture from a work slowly, drawing it out within the material fiber, resulting in very even drying which gives time for the object to relax. Since moisture is pulled out through the entire sheet uniformly, TEK-Wipe would not need to be changed as often as blotters if used in a drying stack. Reducing the amount of flipping and changing of drysheets would in turn create a safer and more stable drying environment for the object.

For other drying methods, Minter uses TEK-Wipe in a modified interleaving system to wick away water from wet books while still bound. The physical flexibility of the sheets, and their variable size, creates an array of opportunities for introducing TEK-Wipe into any drying system. Furthermore, using more than one sheet of TEK-Wipe at a time will increase the rate of capillary action within the sheets, thus becoming a more effective washing or drying tool with the more sheets used and ultimately reducing unnecessary handling of objects.

WASHING

When considering individual conservation treatments as a whole, the best use for TEK-Wipe is clearly shown in the variation of washing treatment options available. Whether used alone or as multiple stacked sheets, it can be used as a blotter replacement, or in conjunction with cotton blotters for standard blotter or float washing to reduce water-soluble degradation and mold staining.

By drawing on the strong porous structure of TEK-Wipe, it can also be used for slant or capillary washing to uniformly pull water and degradation products away from the surface of prints with sensitive or friable media.

Acting as a thin and absorbent towel, TEK-Wipe can also be used in conjunction with the suction table as it equals the suction power through filter paper but is ultimately much cheaper since TEK-Wipe can be cut to the size of the object or to the entire suction table, washed, and reused for other treatments without reduced suction power. The inherent characteristics of TEK-Wipe, when compared to filter paper or blotter, also allows suction table treatments to go on much longer than usual without having to stop and replace the base material. When the wipes are flooded with water, any degradation products that have been removed will continue to be pulled to the very edge of the sheet. This means that degradation products do not remain under your artefact, (fig. 7) but are rather pulled to the very edge of the TEK-Wipe with the water, allowing a more thorough and visibly effective cleaning.

Fig. 7. TEK-Wipe on the suction table will draw more water than blotters or filter paper and prevent the formation of tide lines on artefacts.

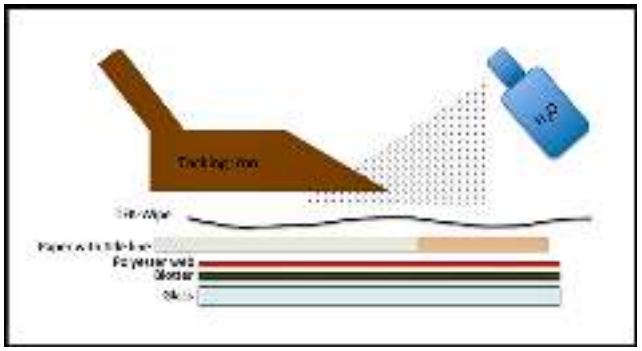

Fig. 8. Seth Irwin set-up for the reduction and removal of tide lines on sensitive works.

TIDE LINES

TEK-Wipe has also been thoroughly investigated in terms of removing tide lines. The Library and Archives Preservation Department at Iowa State University in Ames, Iowa has used it effectively on large folios from horticulture journals suffering from water and mold damage. In their tests, TEK-Wipe performed well in a combination of washing scenarios (notably with a blotter sandwich, and slant and immersion washing), dramatically reducing the visibility of tide lines in normal light. Irwin (2016) has also described a set up to reduce tide lines that occur after exposure to moisture or when a work of art cannot be subjected to aqueous treatment. (fig. 8) When placed over an object and dampened with a light spray, a tacking iron is used to heat the area over the TEK-Wipe and activate capillary action in the fibers, causing any tide line to be drawn into the wipe from the paper. This quick and easy process can be repeated on the front and back of the work as many times as necessary.

TREATMENT CASE STUDIES

When discussing the multi-disciplinary uses for TEK-Wipe, two treatments completed by the author and her colleagues at the Library and Archives Canada (LAC) Preservation Centre in Gatineau, Québec provided perfect situations to test uncommon uses for this absorbent material.

Fig. 9

LEFT TO RIGHT

a. Before treatment: Raking light [John Ellis, *Malcolm's Genealogical Tree of the Royal Family of Great Britain*, 1862, Color lithograph, 108x77 cm, Library and Archives Canada, AMICUS No. 42281363

b. After treatment: Normal light [John Ellis, Malcolm's Genealogical Tree of the Royal Family of Great Britain, 1862, Color lithograph, 108x77 cm, Library and Archives Canada, AMICUS No. 42281363.

VARNISH REMOVAL ON A RARE PRINT

Malcolm's Genealogical Tree of the Royal Family of Great Britain is a lined and varnished lithographic broadside print, by John Ellis of Toronto, Canada. (fig. 9a) From research it was discovered that the LAC print was one of only three recorded copies to have been found. Plagued with horizontal cracking from apparent unrolling, a repeating pattern of severe stains, and tacking holes at the top and bottom edge, it is believed that two wooden dowels (now missing) were once used as a support for this piece. Though adhesive still adhered the paper to the linen lining, the multitude of creases and cracks that had occurred at the dowel edges resulted in well over a hundred small paper fragments and many areas of loss. On the extremely brittle support, the varnish had yellowed and discolored the print. After the removal of the stained lining and applied facing, it was decided that in order to fully stabilize the print, the varnish would also need to be removed. Though solubility testing concluded that ethanol would be an effective varnish remover, since the top and bottom edges were fractured, removing the varnish by hand with cotton swabs was not an ideal option.

A previous LAC conservation report by Hirono (2015) eventually presented a solution. Following this research, and working in the fume hood, large pieces of TEK-Wipe were soaked in ethanol and immediately applied directly on the surface of the print, covered with a sheet of Mylar, and compressed with a piece of acrylic and weights. The soaked TEK-Wipe sheet remained on the print for approximately 15 minutes during which time capillary action in the wipe released the solvent onto the print dissolving the varnish. The varnish was then successfully absorbed back into the wipe. After the first TEK-Wipe was removed, the discolored yellow varnish was already heavily noticeable within the sheet. (fig. 10) This process was repeated twice more with new sheets to ensure all of the varnish had been absorbed. The second wipe had only a slight amount of varnish, and by the third sheet, all varnish had been evenly removed from the print. (fig. 9b)

Fig. 10. Discolored varnish removed with TEK-Wipe and ethanol.

To clean the TEK-Wipe the fabric was soaked in an ethanol bath to solubilize the varnish that had been absorbed into the sheet. Since the varnish fluoresced when viewed under ultra-violet radiation, this solvent bath was repeated as necessary to completely remove all traces of varnish residue from the fabric.

BACKING REMOVAL

Also in the LAC archives is a collection of hand-colored engravings from the National Audubon Society's compilation of J.J. Audubon's "Birds of America" series. This large collection of prints had been trimmed down and were all mounted overall to thick wood-pulp boards. Not only were the mounts acidic, but inclusions within the board were also creating distracting stains on the prints. Due to the large volume of prints in this series, mechanical removal of the backing was not plausible due to the enormous amount of required treatment time. Furthermore the adhesive bond between the board and the paper was still quite strong preventing a full mechanical removal of the mount. To facilitate and reduce the cumulative and ongoing treatment time, it was decided that a humidification and swelling treatment of the board would be paired with the mechanical removal of the mount once the board was reduced as much as possible.

The original humidification design involved the full immersion of thick blotters in water and their transportation to a large plastic sheet. The print would be placed, board side down on this wet blotter stack, encapsulated with plastic sheeting and covered with a sheet of acrylic and weights. The weight and the acrylic provided an even distribution of pressure over the print that drew water into the mount to reactivate the adhesive so it could easily be mechanically removed.

However when dealing with 4 or 5 large, thick, and fully saturated blotters, this became quite difficult. Often the blotter would start breaking apart after a single use and start to create creases in the prints. To investigate the possible working range for this backing removal method on one of the prints entitled "Red-Headed Woodpecker," this same technique was attempted with several overlapping sheets of TEK-Wipe, which could easily be cut to the size of the prints. Not only was transporting the sheets considerably easier, but TEK-Wipe was able to retain more water within the fibers without dripping all over the floor. After approximately four hours the moisture from the TEK-Wipe was drawn into the board and the print sufficiently to swell the adhesive and allow for mechanical removal of the remainder of the backing and adhesive residue. Once washed and dried, these large TEK-Wipe sheets could be reused for other large object treatments as they remained undamaged, clean, and free of distortions.

CONCLUSION

After testing TEK-Wipe with a range of two-dimensional treatment variations, the following advantages have been noted in this product:

- is chemically inert and safe for a range of sensitive materials
- can be used to introduce moisture locally or for overall treatments
- can be used for drying, cleaning, and even solvent treatments or de-acidification
- can be subjected to a range of flexible RH levels, for which the user is in complete control
- will retain dimensional stability without causing cockling or localized distortions in an object
- has the flexibility to be used with flat, bound, or distorted materials of any size safely
- has the potential to be useful in the treatment of some 3-dimensional objects
- can be reused without adverse side effects during treatment
- reduces handling of fragile objects by increasing the effectiveness of a wash

The treatments outlined in this article, while still only a portion of the ways that TEK-Wipe can be used effectively, substantiate the versatility of TEK-Wipe as a conservation material. The author hopes that these examples will be beneficial in demonstrating how the possibilities of aqueous treatments in conservation can be expanded beyond traditional means.

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NOTES

1. 66 sheets of 100-point blotter (66 sheets of 38 x 52 in.=100.6 $yd^2 \cong$ \$1300) are almost four times more expensive than the same amount of TEK-Wipe (1 heavy-weight roll=100 $yd^2 \cong$ \$350). Considering that TEK-Wipe is reusable, this represents an incredible cost in savings (Edwards 2014).

REFERENCES

Andres, A.M., L. Di Gennaro, and L. McCann. 2013. Superstorm Sandy: Response and Recovery at NYU Ehrman Medical Library. *Archival Products News* 18(2): 1–4.

Edwards, G. 2014. Tek-Wipe in Conservation. Presented at the American Institute for Conservation Book and Paper Group Tip Session, San Francisco, California, USA.

Frisa, C. 2016. Personal communication. Works on Paper Conservation Studio, Bellows Falls, Vermont.

Hirono, S. 2015. Conservation Project Report. Gatineau, QC: Library and Archives Canada.

Huhsmann, E. and U. Haehner. 2008. Work Standard for the Treatment of 18th and 19th Century Iron Gall Ink Documents with Calcium Phytate and Calcium Hydrogen Carbonate. *Restaurator* 29(4): 274–319.

Irwin, S. 2016 Personal communication. University of Hawaii at Manoa Library, Honolulu, Hawaii.

Minter, W. 2002. Water Damaged Books: Washing Intact and Air Drying – A Novel (?) Approach. *Book and Paper Group Annual*. American Institute for Conservation Book and Paper Group. Washington, D.C.: AIC. 21:105-109.

Minter, B. 2011. TEK-Wipe. October 3. Conservation DistList Archives. Foundation of the American Institute for Conservation of Historic and Artistic Works (FAIC).

Minter, W. 2016. Personal communication. William Minter Bookbinding and Conservation, Inc., Woodbury, Pennsylvania.

Parks Library Preservation. 2015. TEK Wipe and Tidelines. Iowa State University Library blog. https://parkslibrarypreservation.wordpress.com/2015/02/04/tek-wipe-and-tidelines/ (accessed 01/25/2016)

Polistini Conservation Materials LLC. 1999. Tek-Wipe. http://www.polistini.com/products/non-wovens/tek-wipe.php (accessed 06/15/2015)

Pulp Fixin'. 2014. Two Very Large Posters; Ponderings from the Works on Paper Conservation Studio. www.worksonpaperconservation.com/blog/worksonpaper/?p=289 (assessed 02/18/16)

Texas State Library and Archives Commission. 2015. Testing Tek-Wipe. http://tslacconservation.wordpress.com/2015/03/23/testing-tek-wipe/ (accessed 01/28/16)

MATERIALS

COTTON BLOTTER (actual name: Unbuffered 100% Cotton Blotting Paper)
University Products: The Archival Company
1-800-628-1912
www.universityproducts.com

TEK-WIPE (*actual name: Hi-Tek Wipers, item:HTW-DT)*
TEK Products
800-783-4944
www.tekproducts.com

PARAPRINT (actual name: HPCR-54 Paraprint OL 60)
HIROMI Paper Inc.
310-998-0098
https://store.hiromipaper.com

KASLYNE R. O'CONNOR
Master of Art Conservation
Conservator
kaslyneoconnor@gmail.com