SUSAN PAGE

Cellulose Acetate Lamination at the National Archives Part 1: The Louisiana Purchase Documents, a Case Study

ABSTRACT

Conservators at the National Archives and Record Administration (NARA) have years of experience working with cellulose acetate lamination, associated with both the application and removal of cellulose acetate lamination. Lamination, like its predecessor silking, was used as a means of holding together and safeguarding fragile or fragmented paper. Once considered a state-of-the-art preservation technique, lamination was one of many ways used to protect precious and inherently valuable historic documents of the United States. This paper will present a review of the positive and negative aspects of lamination almost fifty years after the National Bureau of Standards (NBS) studies that standardized lamination materials and processes.

Thirty documents relating to the purchase of Louisiana, 1803–04, laminated at NARA during the late 1930s or early 1940s, were recently delaminated to prepare for their two-hundred-year anniversary. This paper describes their treatment.

INTRODUCTION

Two centuries ago this spring—without a call to arms, with little advance notice, and with only the briefest negotiations—the United States doubled in size (fig. 1).

In an astounding transaction that amounted to four cents an acre, President Thomas Jefferson saw his dreams of westward expansion coming true for the nation he had helped create. The United States of America would grow beyond the Mississippi River and include rich forests, vast plains, and craggy mountains. The historic transaction is known as the Louisiana Purchase, but it was not something Jefferson had sought to make at the time. He would have been content just to buy the port of New Orleans so the United States—not Spain, not France, certainly not Great Britain—could control the gateway to the Mississippi River, the main street of commerce in what was then the American West.

But France's ruler at the time, Napolean Bonaparte, was losing interest in establishing a North American empire and needed funds to fight the British, so he directed his emissaries to offer not just New Orleans but all of the Louisiana Territory to the Americans. Jefferson's envoys in Paris, without awaiting any direction from their President (which would have taken two months), accepted the deal and on April 30, 1803, signed the Louisiana Purchase Treaty.

The story of the Louisiana Purchase, however, is more than just a quick deal among the top French and American

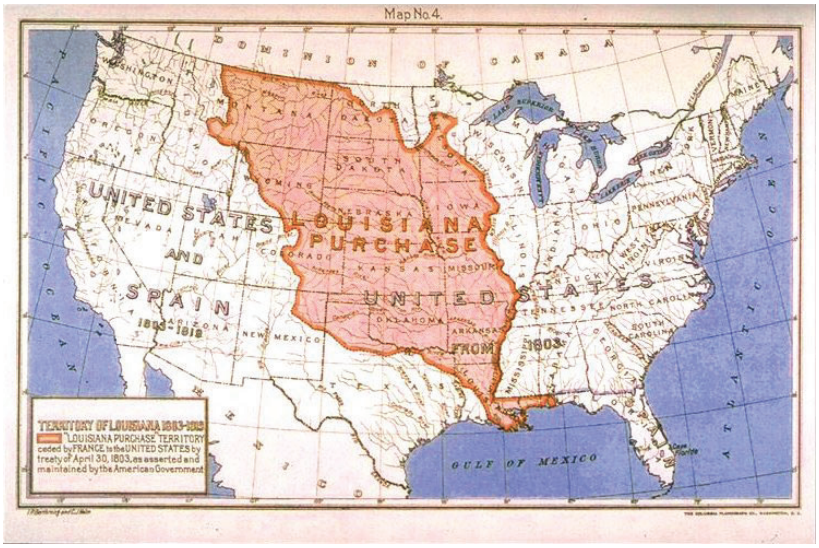

Fig. 1. Map of Territory of Louisiana, 1803–1819, the National Archives and Records Administration

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Fig. 2. Wood hydraulic laminating press, NARA

Fig. 3. Arbee rolling lamination press, NARA

diplomats in April of 1803. And it took more to complete the Louisiana Purchase than the treaty itself. It involved more than a year's worth of delicate negotiations to work out the approval of the treaty by Congress, the raising of funds to finance the purchase, and the transfer of documents that completed the deal. There were agreements on how the deal would be financed and various delegations of powers of attorney to individuals carrying out the various functions—some thirty documents in all. Over the years, the Louisiana Purchase Treaty and the two side conventions, which stipulated how France would be compensated for Louisiana, have been part of the Department of State records held by the National Archives. A few have also been part of NARA's popular American Originals exhibit, which is now touring various cities around the country. The thirty documents that were created to implement the financial aspects of Louisiana Purchase were retained for many years at the Department of Treasury. At one point in the late 1930s, they were sent to the National Archives for lamination and returned to the Treasury Department. In 1951 the National Archives accessioned them, and in 2000 they underwent significant conservation treatment in the Document Conservation Laboratory in College Park, Maryland, in preparation for the bicentennial of the Louisiana Purchase this year.

THE ORIGINAL GOAL: BUYING NEW ORLEANS

Jefferson wanted to buy the port of New Orleans because for him, New Orleans was the key: whoever owned it would be America's natural enemy because that nation would control the channel through which produce from more than a third of the United States had to pass. Even as he was laying the groundwork for what became the Lewis and Clark Expedition, to explore Louisiana and the western lands, Jefferson gave his ambassador in Paris, Robert Livingston, instruction to negotiate with the French to buy New Orleans. Jefferson appointed fellow Virginian James Monroe as minister plenipotentiary and envoy extraordinary to join Livingston in Paris. Monroe was to work with Livingston on negotiations with France to purchase for ten million dollars the Isle of Orleans, on which New Orleans was located.

A SURPRISE OFFER AND A TIME CRUNCH

On April 11, 1803, a day before Monroe arrived in Paris, the French minister of foreign relations surprised Livingston by offering the United States not just New Orleans but all of the Louisiana Territory for fifteen million dollars. Now the real work of implementing the treaty and how the fifteen-million dollar compensation would be paid began. The United States would pay $11,250,000 in stock with an interest rate of six percent. For the remaining $3,750,000, the United States would assume the claims of American citizens against the French navy for seizure of property and goods from ships.

Two firms, Baring and Company of London and Hope and Company of Amsterdam, were selected to conduct the sale of the stock. In December 1803, the Louisiana Territory officially became part of the United States. But the story was not over for the documents of the Louisiana Purchase. It was just the beginning. Over the years, the thirty implementing documents, in the custody of the Treasury Department, survived extensive handling, excessive exhibition, and uncontrolled storage environments before they came to the National Archives in 1951 for good. But they had made several earlier visits to the Archives in the late 1930s—to be laminated, then a new technique. A typewritten note dated November 26, 1940,

tucked inside the first envelope in the transaction dossier, stated that the records had been "repaired and laminated by the Division of Repair and Preservation, the National Archives."

The National Archives began laminating records using hydraulic (fig. 2) and rolling (fig. 3) presses to apply cellulose acetate film in 1936. The last lamination press was removed in the early 1980s, and documents are no longer treated by cellulose acetate lamination. The thirty laminated Louisiana Purchase documents represent a wide range of types and conditions. Some documents were very simple as physical objects, such as a single sheet of cream colored paper written in iron gall ink. Others were more complex: for example, a large piece of watermarked antique laid paper contained hand stamps, resin seals (fig. 4), and important signatures. Some were distorted, yellowed, and embrittled. Others, however, appeared to be in good condition; they were flat, supple, and written on paper that was no more significantly darkened than similar but unlaminated paper two hundred years old. While it is impossible to know how each document was treated and handled over the years, some plausible explanations exist for their varying conditions exist. They may have been laminated using excessive heat and pressure, the cellulose acetate film may have contained unstable plastizicers, or they may have been overexposed to light during long-term exhibition at the Treasury Department. Resin seals on some documents remain intact, while others have been crushed, which indicates that some documents were carefully laminated by hand to protect the vulnerable resin seals, hand stamps, and presidential signatures that they bore, while others were not.

BRIEF TECHNICAL HISTORY OF LAMINATION

Although we don't know the exact date or dates, the note found with the documents states that they had come to the National Archives for preservation treatment sometime before November 26, 1940. In 1933, research into document lamination began at the National Bureau of Standards (NBS). In 1936, the National Archives began laminating records using hydraulic presses. Thus, the Louisiana Purchase documents were laminated very early in the history of lamination.

OVERVIEW OF CELLULOSE ACETATE LAMINATION

Cellulose acetate lamination, like its predecessor silking, was a means of supporting and holding together fragile or fragmented paper. At the time of its dominant use, it was a state-of-the art preservation technique, used to protect precious and inherently valuable historic documents. The Louisiana Purchase records, probably laminated in the late 1930s, were among the first documents to be treated with this new technique. We now know that lamination could be applied poorly resulting in distortion of the original records, that some plasticizers used in these early films were later found to be unstable, and that environmental conditions in storage are key to stability.

Fig. 4. RG 56, page 17, Letter from the Secretary of the Treasury to the Register of the Treasury arranging for the stock to be delivered, February 7, 1804, NARA: resin seal on document before treatment

These important documents were written on a wide variety of handmade papers. Each manuscript is a unique object, in terms of its composition and history. The condition of the documents was the result of many factors, many of which are largely unknown, which contributed to their varying appearance. Several of the more popular documents in the collection had been on permanent public display while they were at the Treasury Department. It is likely that they were exhibited both before and after they were laminated. Some manuscripts were still in their vintage exhibition mounts when accessioned, attached to the back of window mats with pressure-sensitive adhesive tape, now yellowed and brittle. The matted records had been exhibited for many years judging from deterioration of the matboard, tape, and cellulose acetate lamination film.

DELAMINATING DOCUMENTS

Three documents were chosen for initial treatment to represent a specific conservation issue or problem of varying complexity. How these three prototypes responded to treatment would help determine the conservation of the other records. The three documents were:

1. The first document (fig. 5) was a letter from the minister of the Public Treasury of the French Republic to the Secretary concerning the arrival of Alexander Baring in America and the plans for carrying out the terms of the agreement. This double-sided single-page document on cream-colored antique laid paper bears the Dutch "Cobb & Co" watermark and is written in iron-gall ink. Like many of the Louisiana Purchase documents, it had a strip of cotton gauze adhered to its left edge. The gauze strips were sewn together and

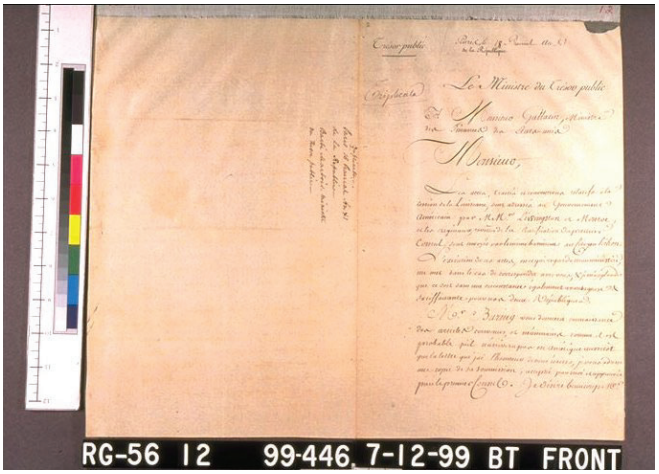

Fig. 5. Louisiana Purchase document, RG 56, page 12, Letter from the Minister of the Public Treasury of the French Republic to the Secretary conserning the arrival of Alexander Baring in America and the plans for carrying out the terms of the agreement, June 6, 1803, NARA: front, before delamination treatment

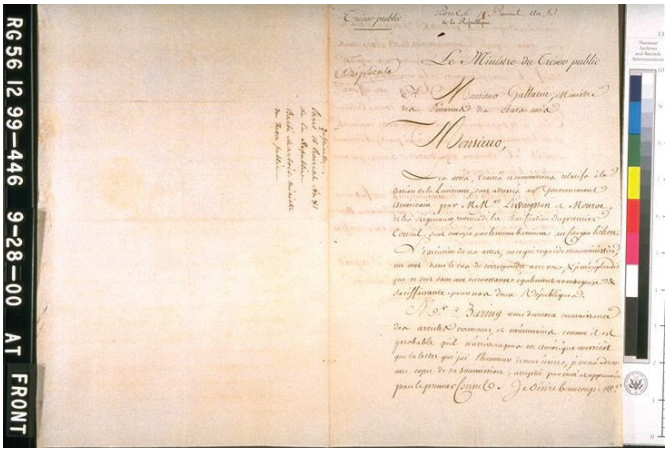

Fig. 6. Louisiana Purchase document, RG 56, page 12: after treatment

bound. There were smudges and surface dirt but the paper was in generally good condition (fig. 6).

2. The second document (fig. 7) was a convention between the French Republic and the United States. This record was selected because it represented a group of popular documents that had been on permanent exhibition and, thus, was severely distorted. It was at first unclear whether the planar distortions could be reduced or eliminated during treatment. Pressure-sensitive tape had been applied to the back to hold the paper in position in its window mat during exhibition. Although the exact circumstances are unknown, sometime during the past the ink bled as a result of contact with water (fig. 8).
3. The third document (figs. 9–10), a power of attorney given to Alexander Baring by Hope and Company to act in American matters relating to the negotiations of the American fund, was written on July 20, 1803. This document in the pilot project was selected because it, like several others, had a fragile resin seal (figs. 11–14). The seal was attached to the back near signatures and hand stamps in black ink.

Before treatment began, testing was done to determine whether the inks were soluble in the solvent selected for delamination. Fortunately, each document had a wide left border of cellulose acetate that extended beyond the paper itself, to allow it to be bound into a volume (fig. 15). This non-record salvage strip was removed and used to test the solubility of the cellulose acetate. These samples of laminated non-record material were also used for study and analysis and provided information about the early kinds of cellulose acetate film, including its components and plasticizers. It was hoped that this analysis could provide information and insight to inform future conservation and preservation treatments. For example, information about the presence of specific types of cellulose acetate lamination film and plasticizers could have an impact that would help determine the solvents to use during delamination and environmental conditions to recommend for storage. (See Part 2 of this paper.) After several unsuccessful attempts to dissolve the lamination in acetone alone, as well as in more toxic solvent combinations, the conservator conferred with colleagues. They passed on an oral tradition well known in the early days of the conservation lab at NARA but news to this conservator—to use a mixture of acetone and water in the ratio of 3 parts acetone to 1 part water—and the lamination dissolved quickly. The delaminated cotton gauze was removed from the test beaker, dried, and examined. After delamination the previously yellowed appearance was gone. The gauze was white, clean, and when the solvent and water had evaporated, the fabric was flat.

CONSERVATION TREATMENT: PROTOTYPES

The explanation of the result of this solubility test is that as cellulose acetate changes over time, as it oxidizes and becomes brittle, it often loses acetyl groups and becomes less soluble in organic solvents. Acetone alone, the most commonly used solvent for delamination, cannot dissolve deteriorated cellulose acetate. A combination of acetone and a more polar solvent, water, was needed to solubilize this degraded cellulose acetate. Next, all inks, seals, hand stamps, and all other media were tested for solubility with the acetone and water mixture to determine that all materials were safe and would not bleed when immersed in the mixture during delamination. The red ballpoint pen ink was soluble in acetone, but the red annotations were on top of the cellulose acetate film and were not original notations; thus, the inked numbers were not an inherent part of

the record. Therefore, before the solvent bath, the red ink was removed with an abrasive eraser and the remaining pink ink residue was intentionally allowed to bleed with alcohol. Tenacious shadows of ink were removed with tetrahydrofuran, which was quickly absorbed into blotter squares. All other media and seals were found to be unaltered by the solvents chosen for delamination.

1. Each document was immersed in four successive baths of acetone and deionized water in a ratio of 3:1 for 20 to 30 minutes. Pieces of thin supportive tissue, when present, were removed from the front and back.
2. The documents were air dried and then examined for any residue of cellulose acetate. After delamination the documents were tested for pH. All tested in the range of pH 4.5.
3. Each document was immersed in a 50:50 mixture of ethyl alcohol and calcinated water for approximately 20 minutes.
4. Finally, each document was immersed in a shallow bath of calcinated water for 10 to 20 minutes, lightly blotted between Hollytex, and dried between lightly weighted blotters.
5. Resin seals, wafers, and embossed areas were protected during drying with blotters cut to shape.
6. Tears, losses, and fragile or vulnerable areas behind the seals or thick areas of highly acidic and corrosive iron-gall ink were mended and reinforced with Japanese paper and wheat starch paste. Folios separated during lamination were rejoined.
7. Fragile seals crushed during the previous lamination process were consolidated with B-72 in toluene, applied under magnification.
8. The documents were encapsulated in polyester film.

Information written on historic envelopes was photo-reduced and electrostatically copied onto permanent bond paper and adhered to 20-point paperstock folders.

A custom-made box was constructed to hold the records.

As noted above, upon initial examination many of the Louisiana Purchase documents appeared to be in relatively poor condition. But in fact, below the layers of cellulose acetate film and reinforcing sheets of thin tissue, the paper records were found to be intact and the integrity of the paper had been preserved. After delamination, the documents were brighter in appearance and the ink contrast and, thus, legibility, was greatly enhanced (figs. 16–18).

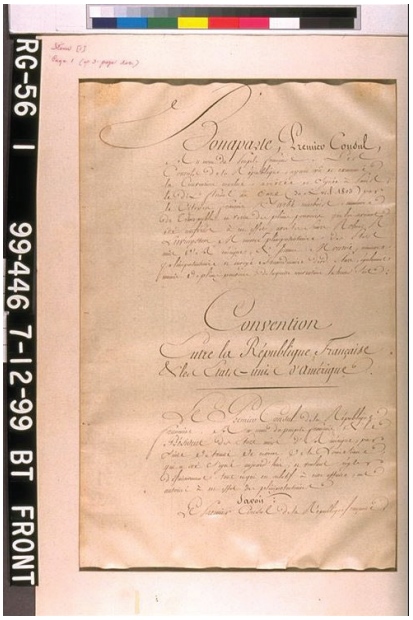

Fig. 7. Louisiana Purchase document, RG 56, page 1, Convention between the French Republic and the United States, April 30, 1803: front, before treatment

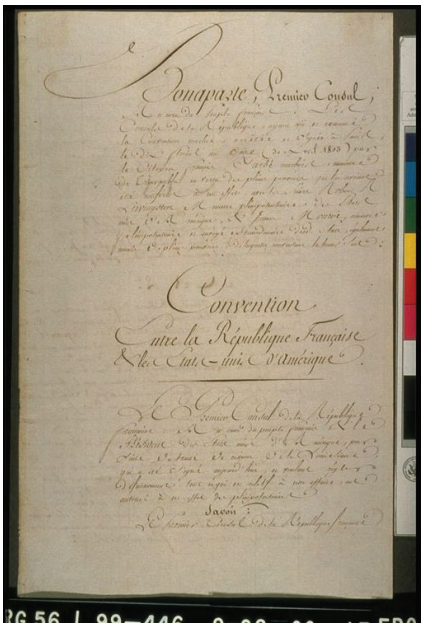

Fig. 8. Louisiana Purchase document, RG 56, page 1: front, after treatment

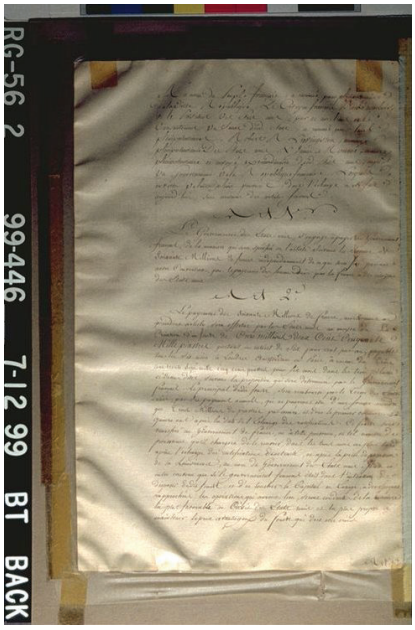

Fig. 9. Louisiana Purchase document, RG 56, page 1: back, before treatment, raking light angle

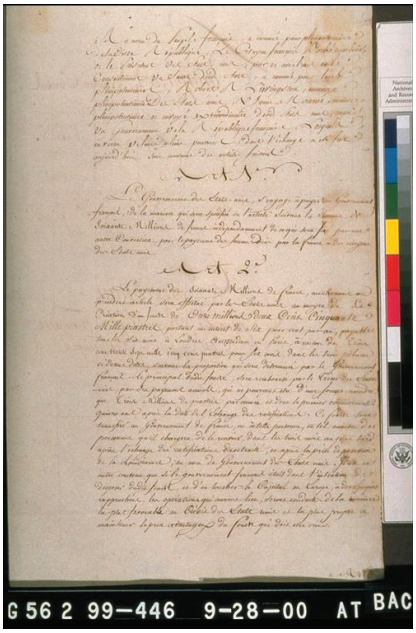

Fig. 10. Louisiana Purchase document, RG 56, page 1: back, after treatment

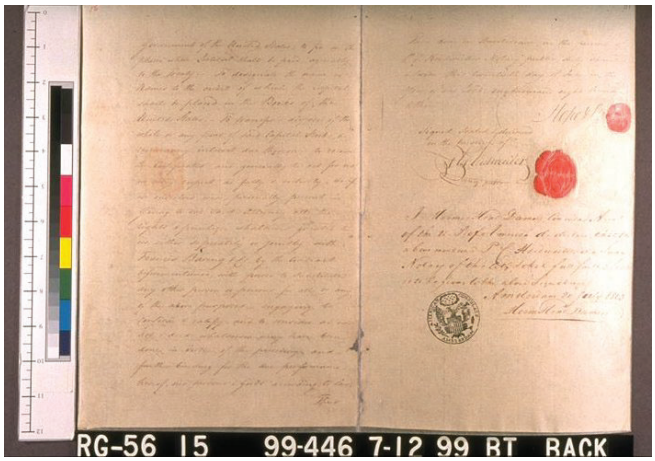

Fig. 11. Louisiana Purchase document, RG 56, page 15, Power of attorney given to Alexander Baring by Hope and Company to act in matters relating to the negotiation of the American fund, July 20, 1803: front, before treatment

Fig. 12.Louisiana Purchase document, RG 56, page 15: close-up of resin seal

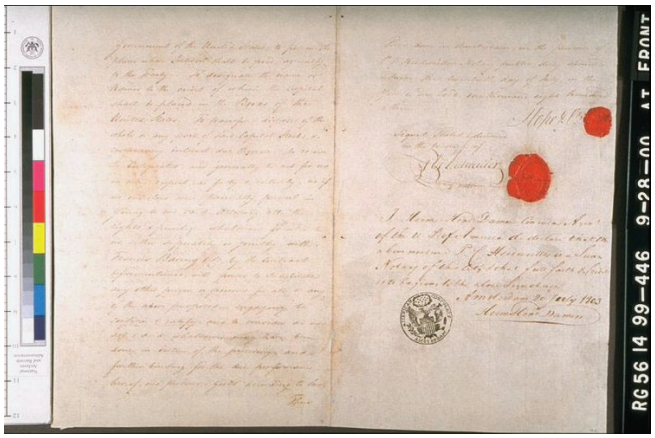

Fig. 13. Louisiana Purchase document, RG 56, page 15: after conservation treatment

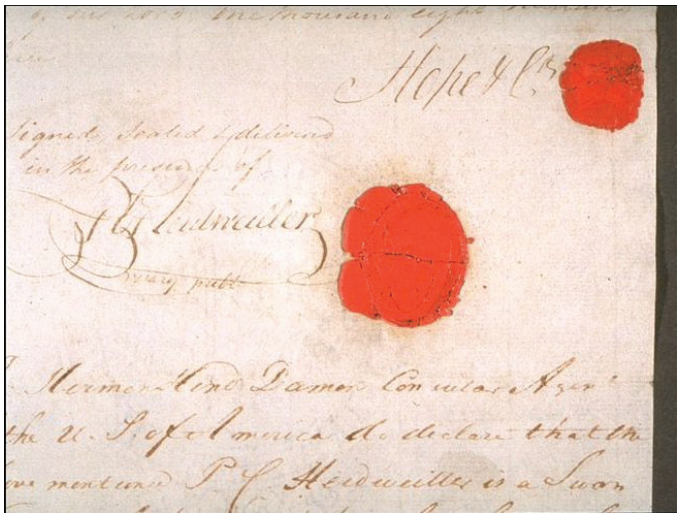

Fig. 14. Louisiana Purchase document, RG 56, page 15: close-up of seal after delamination and consolidation

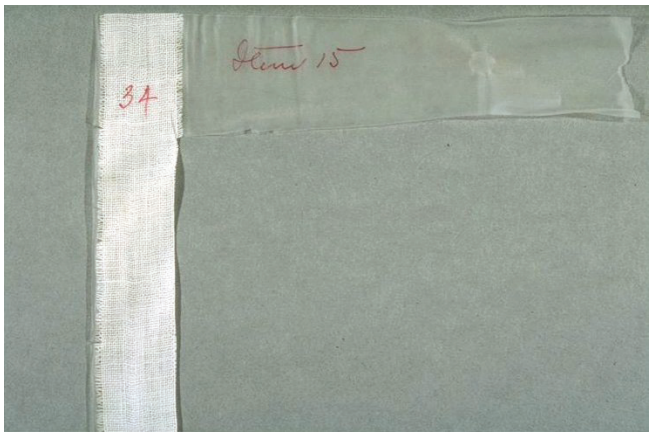

Fig. 15. Non-record material, used for analysis. See Mark Ormsby's article "Cellulose Acetate Lamination at the National Archives, Part 2: Analysis of Laminated Documents Using Solid-Phase Microextration," pp. 61–66.

Following conservation treatment, a few of these documents were placed on short-term exhibit under low light levels as part of the National Archives' American Originals exhibition.

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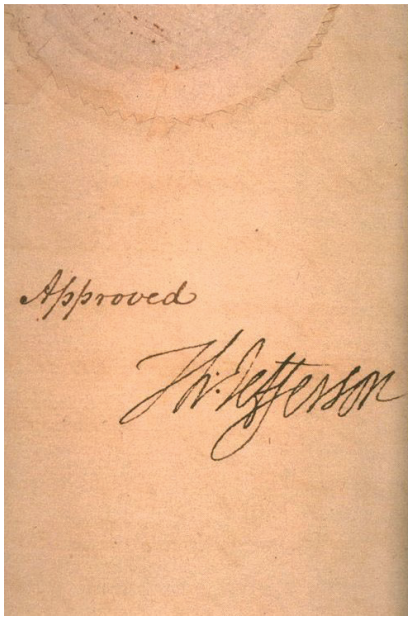

Fig. 16. Louisiana Purchase document, RG 56, page 24, Agreement between the Secretary of the Treasury, Albert Gallatin, and Alexander Baring, approved by the President, Thomas Jefferson, providing for the payment of the fund in four annual installments, December 22, 1803

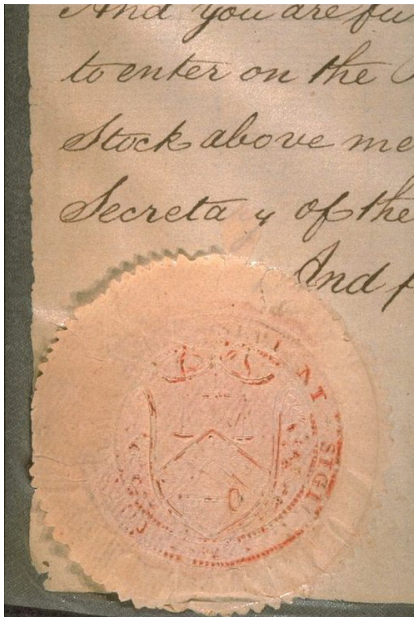

Fig. 17. Louisiana Purchase document, RG 56, page 24

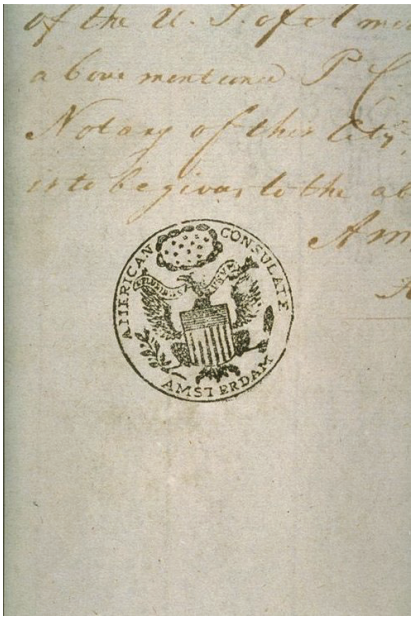

Fig. 18. Louisiana Purchase document, RG 56, page 15, Power of attorney given to Alexander Baring by Hope and Company, hand-stamped emblem in blanck ink, American Consulate, Amsterdam, July 20, 1803: after conservation treatment