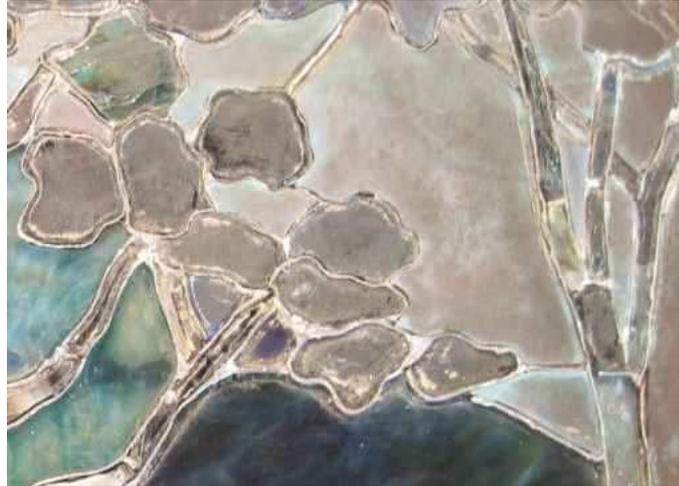


## 4. Cleaning

### The problems and the cleaning decisions

A variety of pieces of glass from different areas are examined under the microscope. There are several problems to treat.

There is a dark opaque film on the outside layer of all the pieces of glass including the painted ones. After consulting Mr. Brill at the Corning Museum of Glass, NY, it seems that the dirt is made of organic elements and is due to atmospheric pollution and time.

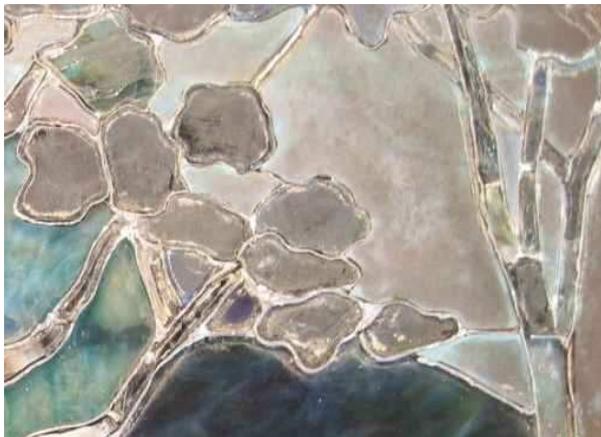


Mr. Brill's advise to get rid of this dark opaque film is to use some lye (Hydroxide sodium), diluted at 10 %. The lye is harmless for the glass. The brand used is "Red Devil". The pieces of glass except for the painted ones are soaked in a solution of 90 % of warm water and 10 % of lye for half an hour. The water is kept warm with a heating element. Then, they are brushed very softly with a nylon brush to get rid of the dark film, (the use of an organic brush is not recommended because the lye will destroy it), and rinsed carefully under water.

Great care must be paid during the process of using lye. As it is active to organic substances, this product is aggressive to the skin and the eyes. The use of masks, eye protection, gloves and a well ventilated area is highly recommended.

Web site for Corning Museum of glass : [www.cmog.org](http://www.cmog.org)

Phone : 800-732-6845



A dark opaque film covered the exterior side of the window.



The pieces after cleaning.



The pieces are being soaked in a solution of 10% lye and 90% of warm water for half an hour.

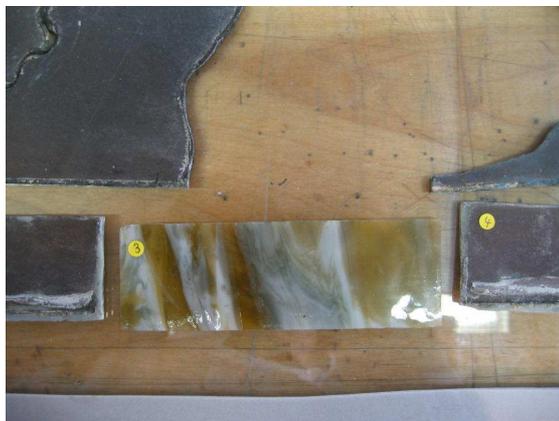


A piece of glass brushed after soaking for half an hour.

All the edges of the panels are covered with a layer of brown oil paint which has been sprayed with paint spay when repainting the wood frame.



To remove the brown paint, a detergent made of cellulose “Safest Stripper” (3M / Dimethyl adipate, Dimethyl glutarate), harmless for the glass, is very convenient because it can be laid on the glass as a gel. The pieces are soaked half an hour and then rinsed under water.



There is a large amount of soot between the layers of glass which could have come from a fire across the street from the church and/or the burning of candles inside the church.



To get rid of the soot, the pieces of glass are soaked for 1 hour in a solution of 75 % warm water and 25 % of “Simple Green”, an organic detergent, very effective in removing the dirt.

### Cleaning of the painted pieces

Problems encountered are missing trace lines; degradation of the matte; transformation of enamels and grisaille into crusts. The first step of the conservation work is to determine the stability of the paint. This is done by examining the painted pieces one by one under the microscope and also using a bright light and a tungsten pencil. It is very important with damaged paint to determine the approach to be taken.

Preliminary investigation into possible cleaning processes to be used on the painted glass is done.

The painted surfaces have deteriorated over time. There is a severe loss of paint. There is a big amount of soot on the painted pieces too.



Because the paint is so fragile, the soot will be cleaned only using water with cue-tips. The cue-tip will be rolled very softly on the areas to clean without scrubbing at all.

Some areas of paint have turned into a thick dark crust which is very unstable.



There is nothing to be done in this case and the crusted areas ought to be touched as little as possible.

An exact replica of the panel, in better condition with regards to the painted pieces, has been discovered in the Brown Baptist Memorial Church. All the areas that are crusted in Lafayette Avenue Presbyterian Church, are areas where there are some enamels laid on “grisaille”. It seems as though the presence of enamels allows this process. It is also possible that miscalculations in the firing caused the problem.



The exterior side of the painted pieces is also covered with the dark opaque film making the painted pieces less legible.



The pieces must be cleaned with some lye. But they cannot be soaked with the other pieces.

The borders of the pieces are covered with sticky foam and they are laid on little bases made of foam. This will avoid the lye dripping on the opposite side. The pieces of glass must never be moved or touched during this process.



Pieces of gauze (rather than cotton balls because the gauze retains the solution without dripping) are laid on the piece. A cotton ball is soaked in the solution containing the lye with plastic pincers and is used to soak the gauze.



After half an hour, the pieces of gauze containing the solution are removed and the pieces of glass

are very carefully rinsed with clean damp cue-tips and gauze. This process must be handled with great care.

### **Cleaning of the elements of the window which are not de-leaded**

Some parts of the window are not de-leaded (the top panel except for the borders, the frieze and the capitals in the main panel) and the pieces of glass cannot be treated as the other ones. Some gauze, soaked in the solution of lye and water, is laid directly for half an hour on the pieces of glass in their leads. The lye is removed with gauze soaked in water and the pieces are then rinsed with a solution containing vinegar. Vinegar neutralizes the effect of the lye. The vinegar is removed with gauze soaked in water and the pieces of glass and leads are then dried with some tissues.

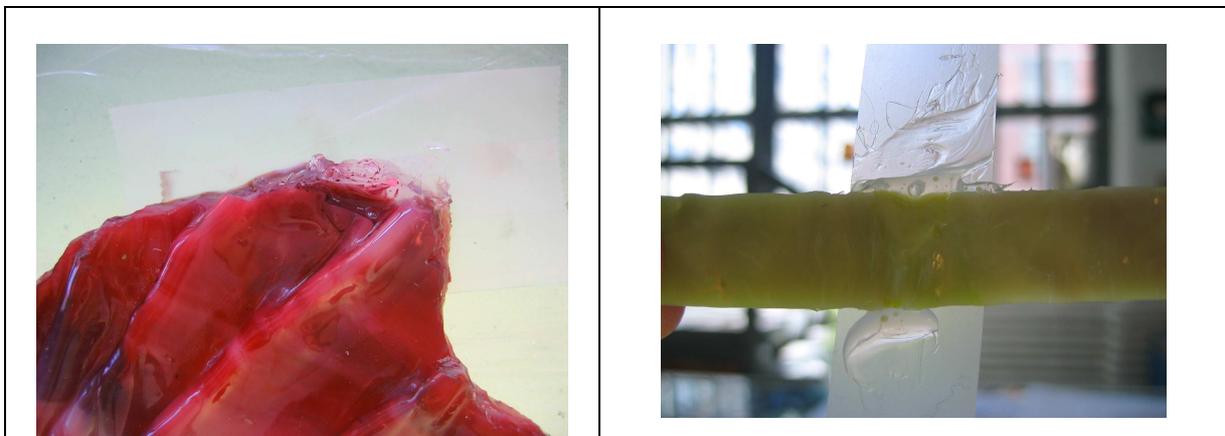
After the pieces are soaked, cleaned and dried, they are placed back onto the glass trays.

## **5. Glass repairs**

Numerous pieces of glass were broken in all three panels. When it is possible, the pieces are glued with HXTAL NYL-1 epoxy. In a few cases, the pieces will be copper-foiled.

### **Infill**

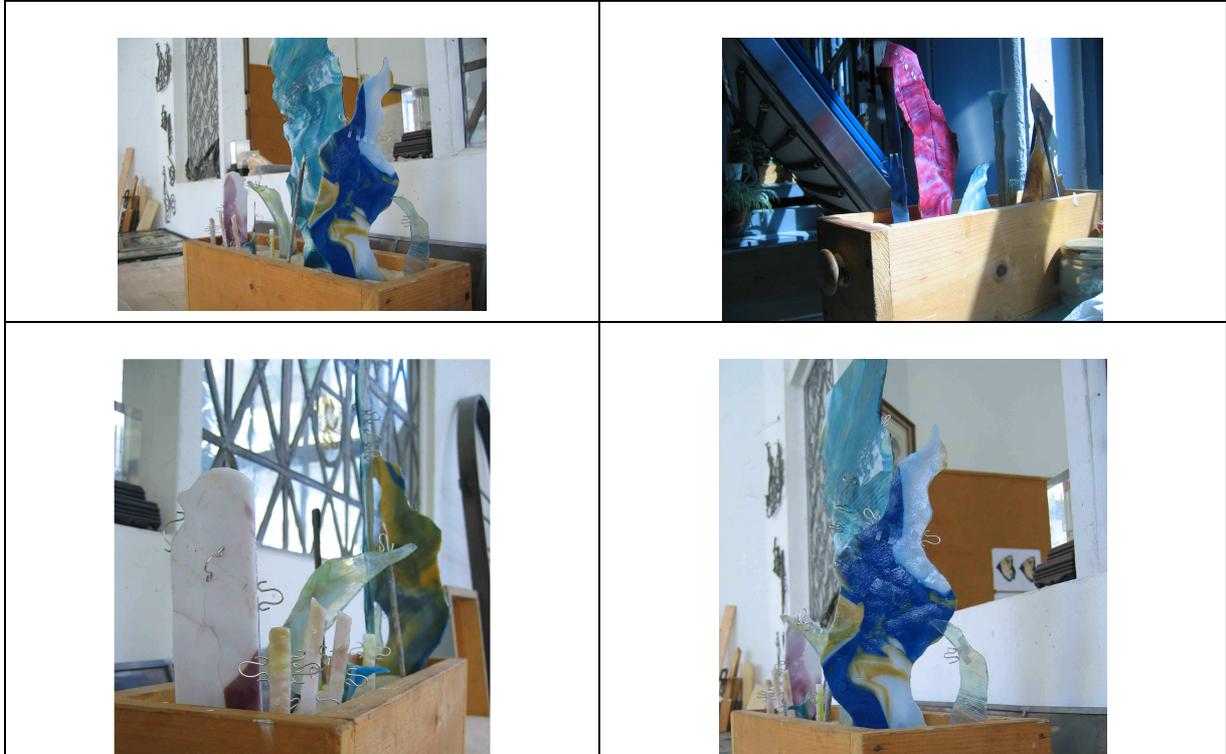
In-fills are done when small pieces of glass are missing. The broken pieces are cleaned with acetone and then carefully taped together and laid on a glass tray covered with plastic film. A silicon dam is placed at the edge of the break preventing the glue from leaking out. The epoxy may be colored with some pigments if needed.



## Infusion

The pieces are aligned over the light table, cleaned with acetone and carefully taped together with 3M tape; some clasps, made with brass wire. The pieces are then placed vertically in a box full of sand to insure that the pieces of glass do not move. The epoxy is carefully infused into the crack. The epoxy is applied thoroughly. Excess epoxy is removed from all surfaces of the glass.

## Copper foil



In few cases, the pieces cannot be glued. The edges of the pieces to glue are cleaned very carefully with acetone. The copper foil is applied on the edges of the glass. The edges are placed together; flux is applied and then soldered on both sides. This method creates a thin smooth soldered repair. To minimize the overlap of copper foil on the glass the foil is trimmed, this keeps the mend to a minimum.

## 6. Reinforcement pieces for the painted glass

### Analysis of the condition of the painted pieces

The painted pieces are in a very bad condition and they are all in need of restoration. The paint loss is severe, leaving many pieces almost illegible to the eye. The deterioration of the paint is due to several reasons:

- The painters used a variety of mediums which were not always compatible. In our case, the grisailles seem to have deteriorated because of a layer of enamel fired on top of them. According to Arthur J. Femenella<sup>1</sup>, “Enamels are fired at lower temperatures and usually adhere to themselves better than they do to the glass. If the coefficients of expansion between the glass and the enamel differ significantly, they may become unstable and may peel off the glass in sheets. This may also occur on a smaller scale with trace and matte paints. The loss of enamel is common to Tiffany windows.”

- The glass seems to have been insufficiently fired. Temperature controls seem to have been inaccurate and the glass has been under-fired making the paint unstable.
- Also, the protective glazing installed seems to have been an aggravating factor in the deterioration of the painted pieces. The window in Brown Baptist Memorial Church does not have a protective glazing and is in a much better condition; there is almost no paint loss. In fact, this would acknowledge the thesis that the protective glazing installed at the Lafayette Avenue Presbyterian Church did increase the deterioration of the stained glass windows.



Numerous painted details being lost, research was done to try to help with the restoration process. Fortunately, as a similar panel has been found in Brown Memorial Baptist Church, elements of the flesh parts are a great help to determine exactly what has been lost.

Lafayette Avenue Presbyterian Church	Brown Memorial Baptist Church
