



## PROTECTING WOODWORK AGAINST DECAY WITHOUT CHEMICAL PRESERVATIVES

The survival of millions of historic wooden windows is a testament to their long useful life. Faced with windows that are beyond repair, however, many owners are reluctant to install wooden replacement windows, in part due to the belief that without constant maintenance the windows will quickly decay. Studies undertaken by the Forest Products Laboratory (FPL), U.S. Department of Agriculture, have convincingly shown that when wooden elements in windows are treated with a water repellent very little decay will occur in the new windows even if many years of maintenance neglect follow. This important finding was an outgrowth of a research project to determine alternatives to potentially toxic chemical wood preservatives.

### Problem

When old wooden windows in historic buildings have to be repaired or replaced, it is always advisable to incorporate treatments that will extend the useful life of the new wood. Application of a water-repellent chemical preservative, such as pentachlorophenol, to new wood prior to painting traditionally has been recommended. The toxicity of some formulations, however, pose potential health problems. A treatment to prolong the useful life of the new wood—and therefore the windows—is needed which avoids certain potential health hazards.

### Solution

A 20-year test on wooden windows by the FPL in Madison, Wisconsin, has concluded that there is a safer alternative to traditional water-repellent chemical preservatives for treating wood in order to prevent decay. It was found that the easiest way to prevent decay in woodwork items such as frames and sash is the application of small amounts of wax to the surface. The wax, *in the absence of chemical preservatives*, protects the wood from excessive moisture and provides good long-term protection to window units and other wood exposed above ground.

Twenty years ago, test window units at FPL were dipped for 3 minutes in either a solution of water-repellent with a chemical preservative or a water-repellent without chemical preservatives. Some units were left untreated as comparison controls. After only 6 years' exposure on an outdoor test in Madison, the untreated samples were so badly decayed that they fell apart as they were being removed. Figure 1 shows where three of the control (untreated) window units were installed. Figure 2 shows a portion of the untreated window frame and the extensive decay.

A close-up view of the window unit treated with a water-repellent chemical preservative shows how well this unit was protected against decay for 20 years (*see figure 3*). All test units were painted originally but never repainted. Most paint

## PRESERVATION

# Tech Notes

NATIONAL PARK SERVICE  
U.S. DEPARTMENT OF THE INTERIOR  
WASHINGTON, D.C.

## WINDOWS NUMBER 4

### Replacement Wooden Frames and Sash: Protecting Woodwork Against Decay

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*Deteriorated architectural features should be repaired rather than replaced wherever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities.*

Figure 1. View of the test panels showing untreated control window frames in the foreground. Note the dismembered frame at the far right, and long crevices along the sills of the other two—all results of decay. Treated window units can be seen in the background. Photo: Courtesy of the Forest Products Laboratory

was gone from exposed surfaces after 10 to 12 years' exposure. The water-repellent with a chemical preservative treatment was very effective in protecting the window unit long after all the paint had weathered away.

But the most surprising result in the 20-year test was that shown in Figure 4. Window units treated with a simple water repellent (1.5 percent paraffin wax in mineral spirits plus 10 percent exterior varnish resin *with no chemical preservatives*) performed as well as did the water-repellent preservative (which contained both wax and a chemical preservative). This showed that a non-chemical water repellent like paraffin wax with a small amount of resin, such as exterior varnish, was capable of providing protection to wood exposed above ground to the elements for 20 years in a northern climate.

A water-repellent treatment alone can provide excellent decay resistance to outdoor painted woodwork without the addition of a chemical preservative. This can represent a saving of money and resources and judicious avoidance of chemical preservatives in items such as windows, sheds, porch and fence rails, and other above-ground wood products.

The water-repellent treatment is easily done before or after construction and before painting. A simple formula, easily prepared, is:

Exterior varnish	3 cups
Paraffin wax	1 ounce
Mineral spirits or paint thinner or turpentine	Add to make 1 gallon

Treatment is best done by dipping the wood for 1 to 3 minutes in the solution. If dipping is inconvenient, liberal brush application can be made—paying particular attention to heavy treatment of all board ends and joints. The treated surface can be painted after 2 or 3 days of warm weather. In fact, paint should last longer over the treated surface than over untreated wood.

Figure 2. Close-up view of decayed, untreated window frame. Frame fell apart after 6 years' exposure. Photo: Courtesy of the Forest Products Laboratory





Figure 3. Close-up view of the window unit treated with water-repellent chemical preservative after 20 years' exposure. Condition of millwork is very good. Photo: Courtesy of the Forest Products Laboratory

### Conclusion

The field test conducted by the Forest Products Laboratory showed that there are safer treatments for protecting woodwork in northern climates than many commonly used. The combination of pretreating and painting provides good long-term protection against decay. Of equal interest, the test showed that there are effective ways to prevent decay in wooden window elements even where the windows are exposed to long periods of maintenance neglect.

In the southeastern states and in the Pacific Northwest where there is a high decay potential due to the combination of higher moisture and moderate to warm temperatures, it is still recommended that wooden windows be treated with both a water-repellent and a chemical preservative. A number of newer, less toxic chemical preservatives are now commonly available and will provide similar long-term protection.

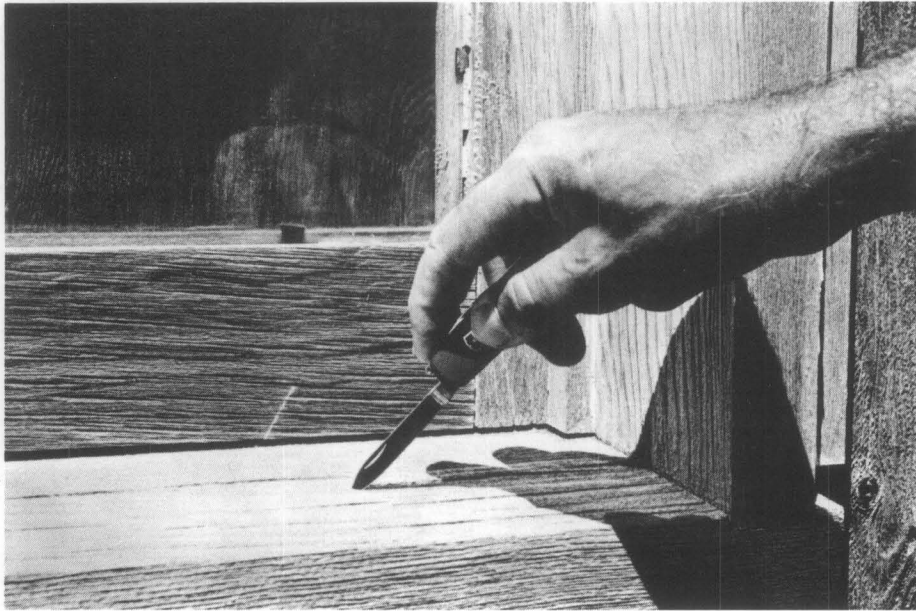


Figure 4. Close-up view of window unit treated with a paraffin-wax water-repellent *without* a chemical preservative. After 20 years' exposure, firm wood resists penetration by the knife blade. Photo: Courtesy of the Forest Products Laboratory

This PRESERVATION TECH NOTE was prepared by the National Park Service in cooperation with the Center for Architectural Conservation, Georgia Institute of Technology. Charles E. Fisher, Preservation Assistance Division, National Park Service, serves as Technical Coordinator for the TECH NOTES. Substantial portions of the text have been reprinted from "Protecting Woodwork Without Preservatives," by William C. Feist, Chemist. We wish to thank the Forest Products Laboratory, Forest Service, U.S. Department of Agriculture for their permission to reprint this material. Special thanks also go to the following people who contributed to the production of this TECH NOTE: John H. Myers, Center for Architectural Conservation, and Preservation Assistance Division staff, particularly Kay D. Weeks, Martha A. Gutrick and Mae Simon.

This and many of the TECH NOTES on windows are included in "The Window Handbook: Successful Strategies for Rehabilitating Windows in Historic Buildings" (available late 1984), a joint publication of the Preservation Assistance Division, National Park Service and the Center for Architectural Conservation, Georgia Institute of Technology. For information, write to The Center for Architectural Conservation, P.O. Box 93402, Atlanta, Georgia 30377.

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ISSN: 0741-9023

PTN-4

January 1984