

WEATHERABILITY OF MAP DISPLAYS

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Introduction

Photographic maps in color as displayed in Tourist Information Centers were reported to fade rapidly. It was claimed that most of the maps showed excessive color fading in less than three months. A rapid method, such as subjecting samples to an accelerated artificial weathering, was desired to evaluate a plexiglas covering.

On September 26, 1980, J. Lawry, Technical Services Division, submitted two map samples for accelerated weathering tests. One sample was sealed in plastic and the other sample was unprotected.

After two weeks of artificial weathering the unprotected maps faded and the emulsion cracked; whereas, the map sealed in plastic showed no evidence of fading or cracking after three weeks of artificial weathering. Encapsulation as submitted was recommended and a brief field trial verified laboratory findings. A less expensive alternate plastic treatment is recommended.

Procedure

The aerial photomaps were Cibachrome (Ciba-Geigy Corp.) color prints. One print sample was enclosed with a 1/4-in. plexiglas (polymethylmethacrylate) sheet over the map face and a 0.1 mil Chromalin (DuPont photopolymer) film over the back. The plexiglas and Chromalin film were larger than the map print. The Chromalin film was attached to the plexiglas by means of an optically clear adhesive (Macbond). A second map print sample was glued to a sheet of aluminum coated with a white enamel.

The prints were artificially weathered approximately 506 hours from September 29, 1980 until October 21, 1980. The weathering was terminated because field application of the results was urgent. The artificial weathering period was judged to be approximately equivalent to five to six months of field weathering.

The samples were weathered in the Atlas Model XW-R Weatherometer. The weathering cycle provided continuous light and included 18 minutes of water spray every two hours. The emulsion side of the prints faced a carbon arc light source.

Results

After 308 hours in the weatherometer, the emulsion of the unprotected sample cracked and peeled back from the substrate. The colors had faded.

It was noted that colors on prints from display cases at Tourist Information Centers faded in about three months. The display case faces are polycarbonate plastic.

When the encapsulated sample was removed from the artificial weathering cycle after 506 hours of exposure, the print showed no evidence of fading, cracking, or peeling.

Conclusions and Recommendations

The plexiglas absorbed a portion of the ultraviolet rays which was significant enough to deter ultraviolet-caused fading.

Since the major difference between the two samples was the encapsulation of one sample, other factors leading to the deterioration of the unprotected photograph emulsion may have been moisture and heat. Encapsulation provided some insulation against heat.

After recommending to the Photo Lab that the aerial photographs at the Information Centers be encapsulated in acrylic plastic (plexiglas), maps were placed in service in October 1980, sandwiched and sealed between two sheets of plexiglas.

The Technical Services' Photo Lab reported on February 9, 1981 that there had been no deterioration of the photographs in the over three months use in the field.

A less expensive alternative to the use of plexiglas would be to use a 1 mil thickness of Tedlar plastic film. A 1 mil thickness of ultraviolet-stabilized Tedlar film that is transparent and coated on one side with a transparent pressure sensitive adhesive is available from General Formulations, Sparta, Michigan in 27-in. width rolls at a cost of 20 to 25 cents per square foot. The cost of plexiglas is at least four times greater.