

# Evaluation of the Long-Term Permanence of Digital Photographic Prints and Photobook Pages

Henry Wilhelm, Kabenla Armah, Barbara C. Stahl, and Carol Brower Wilhelm, The Center for the Image.org with Wilhelm Imaging Research, Inc. (USA)

## Abstract

*From the earliest examples of human-created images – such as depictions of Bison and other animals that were painted from 14,000 to 40,000 years ago the walls of the Altamira cave in Cantabria, Spain – images and texts have been preserved as physical objects. The Dead Sea Scrolls, which are more than 2,000 years old and consist of carbon based ink inscribed on parchment, lay hidden in caves in the Qumran area near the Dead Sea in Israel until they were discovered in 1946. Preserved in earthen jars in the low-humidity desert environment, the Dead Sea Scrolls are important historical examples of records made with intrinsically long-lasting materials. In the digital age, for the first time in human history, most images and textual information are no longer being preserved as physical objects. Instead, digital images and other records are stored as coded electronic files using the ever-changing technology of hard drives, solid-state flash memory, and magnetic tape systems. Archivists refer to such records as “machine-readable records,” which require very specific software and electronic hardware preserved with the digital records to enable future retrieval, viewing, and printing in the future. In contrast, photographic prints and photobooks are physical objects that require neither special hardware nor software to be viewed. Archivists call these “human-readable records.” Like the Dead Sea Scrolls, images and texts made with inherently stable materials, can be preserved, accessed, and viewed for thousands of years into the future without any technological aids. This paper discusses the evolution of accelerated aging tests for traditional and digital photographic prints and photobook pages, beginning with the classic 1970 paper by Peter Z. Adelstein, C. Loren Graham, and Lloyd E. West, “Preservation of Motion-Picture Color Films Having Permanent Value,” published in the Journal of the SMPTE, which describes the application of predictive accelerated multi-temperature Arrhenius test to evaluate the dark storage permanence properties of color films stored at different temperatures, Utilizing data from accelerated aging tests, guidance is provided in the selection of the longest lasting materials to produce digital photographic prints and photobook pages. When carefully displayed and stored, these printed images and texts – like the Dead Sea Scrolls – can last far into the future.*

## Author Biography

Henry Wilhelm is president and director of research at Wilhelm Imaging Research, Inc. Through its website, the company publishes print permanence data for desktop and large-format inkjet printers, silver-halide color papers, and digital presses. WIR test methods have become the worldwide de facto standard for print permanence evaluation and have been used by Canon, Epson, HP, Kodak, and other OEMs as well as by many manufacturers of inkjet fine art and photo papers.

Wilhelm Imaging Research with The Center for the Image also provides consulting services to museums, archives, and commercial collections on sub-zero cold storage for the very long-term preservation of still photographs, motion pictures, books, newspapers, magazines, and other paper documents.

Wilhelm has authored or co-authored more than 25 technical papers presented at conferences sponsored by the Society for Imaging Science and Technology (IS&T) and the Imaging Society of Japan (ISJ) in the United States, Europe, and Japan.

Henry Wilhelm was one of the founding members of the American National Standards Institute (ANSI) Committee IT-3, which was established in 1978. For the past 25 years he has served as Secretary of the group, now known as ISO Working Group 5/Task Group 3 (a part of ISO Technical Committee 42). Together with Yoshihiko Shibahara of Fuji Photo Film Ltd. In Japan, Wilhelm serves as Co-Chair of the Indoor Light Stability Test Methods Technical Subcommittee of ISO WG-5/TG-3.

With contributing author Carol Brower Wilhelm, he wrote “The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures,” published in 1993. The complete 758-page book is available in PDF form without charge from <[www.wilhelm-research.com](http://www.wilhelm-research.com)>. Since the book was posted on the WIR website in 2003, more than one-half million copies have been downloaded worldwide.

Wilhelm is the recipient of the Photoimaging Manufacturers and Distributors Association (PMDA) “2007 Lifetime Achievement Award” for his work on the evaluation of the permanence of traditional and digital color photographs. In 2011, Wilhelm received an honorary Doctor of Science Degree from Grinnell College.

This paper was presented at the 4th International Symposium on Technologies for Digital Photo Fulfillment, held Jan. 6-7, 2013, at Bally's in Las Vegas, Nevada.

©2013 Society for Imaging Science and Technology (IS&T). All rights reserved. No part of this paper may be reproduced in any form without the written permission of the Society. Contributions are reproduced from copy submitted by authors; no editorial changes have been made. [info@imaging.org](mailto:info@imaging.org); [www.imaging.org](http://www.imaging.org)

ISSN: 2169-4672