



Article: Development and Testing of a Fluorescence Standard for Documenting
Ultraviolet Induced Visible Fluorescence (Extended abstract)

Author(s): Jennifer McGlinchey Sexton, Juan Juan Chen and Paul Messier

Topics in Photographic Preservation, Volume 16.

Pages: 105-108

Compiler: Jessica Keister

© 2015, The American Institute for Conservation of Historic & Artistic Works. 1156 15th
St. NW, Suite 320, Washington, DC 20005. (202) 452-9545, www.culturalheritage.org.
Under a licensing agreement, individual authors retain copyright to their work and extend
publication rights to the American Institute for Conservation.

Topics in Photographic Preservation is published biannually by the Photographic
Materials Group (PMG) of the American Institute for Conservation (AIC). A membership
benefit of the Photographic Materials Group, *Topics in Photographic Preservation* is
primarily comprised of papers presented at PMG meetings and is intended to inform and
educate conservation-related disciplines.

Papers presented in *Topics in Photographic Preservation, Vol. 16*, have not undergone a
formal process of peer review. Responsibility for the methods and materials described
herein rests solely with the authors, whose articles should not be considered official
statements of the PMG or the AIC. The PMG is an approved division of the AIC but does
not necessarily represent the AIC policy or opinions.

Development and Testing of a Fluorescence Standard for Documenting Ultraviolet Induced Visible Fluorescence

Jennifer McGlinchey Sexton, Juan Juan Chen and Paul Messier

Presented at the RATS session of the 2014 AIC Annual Meeting in San Francisco, California.

ABSTRACT

Ultraviolet induced visible fluorescence (UV/visible fluorescence) is a non-invasive characterization technique used extensively by conservators across all media and specializations. Among many applications in the field of conservation and beyond, this technique is commonly used to identify variations in surface, reveal previous restorations, date materials, and identify resins and pigments. Documentation of this work provides an important record of cultural material and is a powerful tool for guiding conservation treatment and historical research.

Despite extensive use and application, standardization of UV/visible fluorescence documentation presents challenges due to numerous inherent variables. Variations in hardware, software, radiation sources, filtration, workflows and user interpretation pose significant challenges. As a result, there is little basis for comparing UV/visible fluorescence documentation across institutions and conservation labs.

Addressing this need, reference standards and imaging protocols have been formulated and tested by UV Innovations Inc., (a project of Paul Messier LLC). Under development since 2006, the Target-UV™ and UV-Grey™ are useful for the calibration of documentation equipment and accounting for all significant variables. The system uses a set of grey values, in the form of a UV/visible fluorescent grey card and documentation target, to set white balance and correct exposure. Prototypes were completed in January 2013 and tested to determine efficacy and the potential for standardization. Eight institutions in the US and Europe participated in a round robin blind test. Each site was sent the prototype reference standards, filters, and the same set of items to document using UV/visible fluorescence. Resulting images were compared visually and using RGB data.


Testing confirmed there is a high degree of variability in current approaches to UV/visible imaging and that documentation made to existing standards is almost meaningless in terms of comparison across sites. The test also demonstrated that the calibration of imaging equipment, using the UV-Grey™ and Target-UV™, in conjunction with standardized filtration, provides more accurate documentation of fluorescent color and intensity as well as permitting disparate sites and users to create comparable images. Data derived from the resulting images show a four to five fold reduction in image variability across the test sites. Additional discussion will focus on next steps including potential options for manufacturing and marketing the reference standards

Selected slides from the presentation (full presentation with summary published in RATS Postprints from this meeting):


Development and Testing of a Fluorescence Standard for Documenting Ultraviolet Induced Visible Fluorescence

Main Points

- Need for Standardization
- Target Development
- Testing
- Current Prototype



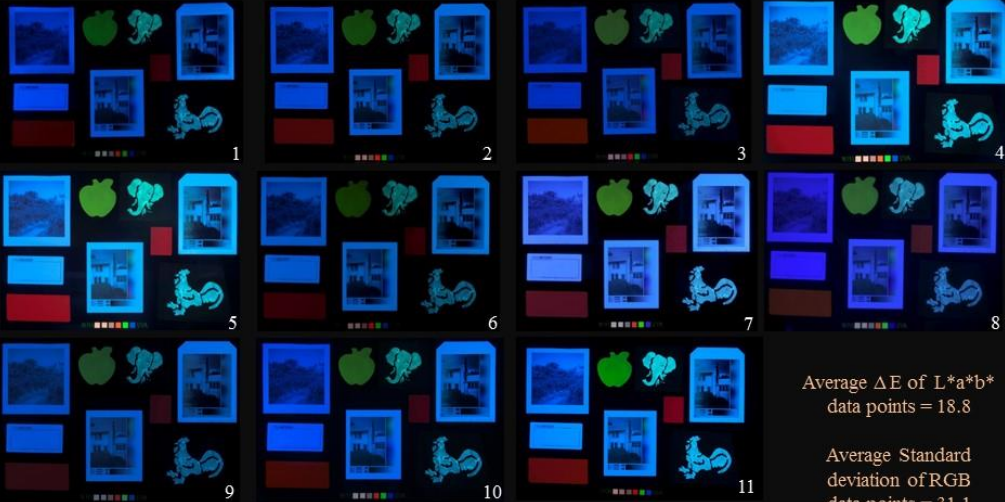
Target-UV and UV-Grey, seen with UV radiation and normal light, recto



Target-UV and UV-Grey, normal light, verso

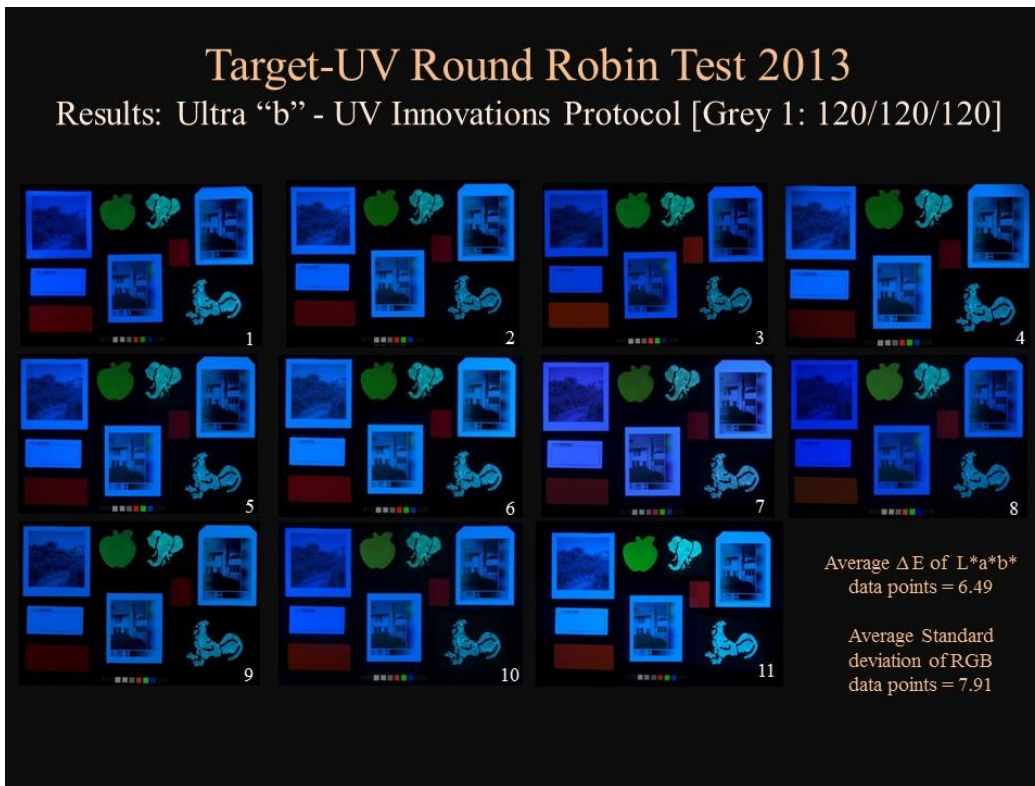
Target-UV Round Robin Test 2013

Results: Ultra “a” - User workflow: i.e. “judging by eye”



Average ΔE of $L^*a^*b^*$ data points = 18.8

Average Standard deviation of RGB data points = 31.1



Target-UV Round Robin Test 2013

Conclusions

- There is a high degree of variability in the current UV-visible documentation protocols and workflows at the institutions included in this test
- Calibration with the UV-Grey card and Target-UV standards and workflow, allows disparate sites and users to create images with similar results
 - Visual comparisons and data show a significant reduction in variability among the testing sites
- Image processing software proved to be another significant variable

Jennifer McGlinchey Sexton

Conservator
Paul Messier, LLC

Jiuan Jiuan Chen

Assistant Professor of Conservation Imaging and Technical Examination
Art Conservation Department at Buffalo State College

Paul Messier

Conservator
Paul Messier, LLC