## D47 Operational Issues With Forensic Light Sources: A Comparison of Effectiveness for Semen Identification

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After attending this presentation, attendees will have a greater awareness of the training required for alternate light source operation.

This presentation will impact the forensic community and/or humanity by demonstrating how critical alternate light source operation is for effective evidentiary discovery at a crime scene.

Unadulterated semen samples were placed on 5 by 7 inch pieces of white cotton in 100% and 1% concentrations to simulate a more realistic range of sample types that might be observed at crime scenes. The samples were viewed using a Mini Crimescope, an Omni Chrome, an UltraLite, and an Inova X5 unit at 300-400 nm and 435-470 nm with an Evident orange barrier filter. Two issues became paramount to the comparison: the use of different wavelengths for each color of light, and the utilization of conventional bulbs versus LEDs. Research indicated units using a range of UV wavelengths (300- 400 nm) produced less fluorescence than units that employed a fixed UV wavelength (i.e. 400 nm). Photographic evidence showed neither conventional bulbs nor LEDs held any distinct advantage.

Distance was evaluated by viewing and photographing both semen samples at 300-400 nm and 435-470 nm from 3 inches to 10 feet; photographing is not recommended beyond 8 feet. Results found distance was negligible for 100% specimens. However the 1% specimens were saturated by the light beam at 3 inches, subsequently drowning out the stain. By increasing the illumination distance, the 1% sample gradually faded and eventually became non-visible between 8 to 10 feet. At 36 inches the 100% sample was most easily viewed at 435- 470 nm, whereas the 1% sample was most easily viewed at 300-400 nm, with optimal viewing at 1 to 3 feet for both samples. This illustrates the need to test various wavelengths with an evidentiary sample to maximize viewing effectiveness.

Viewing contrasts for 100% and 1% semen samples were examined using the Mini Crimescope and the UltraLite units with Evident, Melles Griot, and Tiffen orange filters at 300-400 nm, and 435-470 nm. The Evident plate provided optimal contrast for the 100% and 1% sample under 435-470 nm by creating a bright fluorescence on a dark substrate; this held true with both the Mini Crimescope and the UltraLite units. It is interesting to note the 100% sample viewed at 435-470 nm with the Tiffen orange filter provided better *color* contrast by creating an orange fluorescence and making the white cotton substrate appear blue. At 300- 400 nm, the Evident and Tiffen filter provided equal contrast for the 1% sample using both the Mini Crimescope and UltraLite units. All filters provided equal contrast for the 100% sample viewed at 300-400 nm using the UltraLite, however Evident and Tiffen filters were equally favorable using the Mini Crimescope. An additional point of interest regarding wavelength and barrier combination was the manufacturer recommendation of using clear barrier goggles with a 300-400 nm wavelength. Contrary to the recommendation, results favored an orange filter for wavelengths between 300-515 nm.

A laboratory study of the practical application of forensic light sources with regard to common usage errors during evidence recovery will be presented. It is the opinion of the authors that comprehensive training be encouraged to troubleshoot the aforementioned issues, as well as any unforeseen circumstances that may arise.

**Alternate Light Source, Barrier Filter, Flourescence**

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