

# Denver Police Department Trace Analysis Unit

Gunshot Primer Residue, A Quantitative Question?

Denver Police Department Crime Laboratory

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This study investigates if a firearm will deposit a reproducible amount of gunshot primer residue to the hands and face of a shooter under a controlled environment for repeat discharges. Two individuals fired the same two firearms, one using a 6" S&W Highway Patrolman with Remington UMC 38 special 130 grain cartridges, and the other using a Glock-17 9 mm with Remington Peters 9 mm Luger 115 grain cartridges. The shooters fired two rounds each on six separate days in the Denver Police Department crime laboratory firing range. The GSR samples were collected by the same analyst within five minutes of discharge. Both shooters were right handed and fired the pistols with a two handed grip.

The samples were examined using a JEOL 5800LV SEM equipped with an automated stage, backscatter electron detector, energy dispersive x-ray spectrometer, and automated GSR analysis software (Oxford ISIS). The automated examination was conducted at 400X magnification on 12mm aluminum stubs topped with carbon tape. Each stub set was collected from each subject's right hand, left hand, and face. The x-ray live time per particle was set at 5 seconds, with a minimum estimated particle size detection of 1 micron.

This study investigated if the revolver or the semi-automatic pistol deposited more or less gunshot primer residue, and if the individual firearm deposited a consistent amount of material over the trial period. The study looked at the number of unique, "three component" particles detected, containing barium, antimony and lead.



**Glock-17 9mm**



**Remington 9mm Luger 115 grain Cartridges**



**S&W Highway Patrolman**



**Remington 38 special 130 grain Cartridges**

**Additional Settings:**

JEOL: 12/24 spot size, WD 10mm, 20kV, BE/C, 100um objective aperture.

ISIS: Process time 4, Window ATW2 10mm<sup>2</sup>, 138eV resolution,

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