VIRGINIA DEPARTMENT OF FORENSIC SCIENCE

EVIDENCE HANDLING & LABORATORY CAPABILITIES GUIDE

TRACE EVIDENCE: PRIMER RESIDUE

Contact Information

If you have any questions concerning the Trace Evidence laboratory examination capabilities or evidence handling procedures, please call the Training Section or the Trace Evidence Section at the Forensic Laboratory that services your area.

Laboratory	Section Contact	Phone Number
Central	**Josh Kruger**	**(804) 588-4009**
Eastern	**Brenda Christy**	**(757) 355-5979**
Western	**Anthony Brown**	**(540) 283-5936**

PRIMER RESIDUE OVERVIEW

Primer residue is formed by the ignition of a chemical in the primer when a firearm is discharged. This results in the formation of microscopic particles which are blown out of various openings in the weapon as the weapon is discharged. Generally speaking, a particle characteristic of primer residue is defined as a particle with a spherical or molten appearance (noncrystalline) containing the elements lead (Pb), barium (Ba) and antimony (Sb). Particles consistent with primer residue would have similar morphology and typically include 2 of the 3 elements listed above. Consistent particles are less specific to, but commonly found in, primer residue.

Primer residue can be deposited on the hands by circumstances such as: firing a weapon, handling a weapon, being in the proximity to the discharge of a weapon or coming into contact with an object that has primer residue on it. The examination itself cannot determine the relative likelihood of these listed circumstances.

The absence of primer residue on the hands is consistent with an individual not having fired a weapon. A negative result could also occur from circumstances such as washing the hands, wiping the hands, wearing gloves, sweating profusely, environmental factors including wind and rain, bloody hands, excessive debris on the sample, greater than 4 to 6 hours passing between firing and sampling, or the weapon not producing primer residue on the hands when discharged.

CAPABILITIES AND SERVICES

Ability to determine the presence of particles characteristic of or consistent with primer residue on the hands or other surfaces.

Where the scientific value of the analysis is limited, primer residue kits will not be routinely accepted in circumstances as indicated in the chart below.

Submission Criteria	Justification
Primer residue kits from all gunshot victims, including suicides	It has been demonstrated that microscopic primer residue particles follow the path of the bullet. It is not unusual to find primer residue on the hands of a victim. Primer residue cannot be used for firing distance determinations.
Primer residue kits from inanimate objects	Unlike the collection of primer residue from the hands of living individuals, it is not possible to estimate when the primer residue was deposited on the inanimate object.
Primer residue kits from individuals found in possession of a weapon	Primer residue can be deposited on the hands of an individual by handling a weapon or discharging a weapon. If it has already been established that the individual possessed a weapon this test offers no additional value.

If extenuating circumstances exist, please call the Central Laboratory Trace Evidence Section to discuss the specifics of the case. Following discussion with the investigator, a determination will be made regarding whether an exception to the policy is warranted.

The Department of Forensic Science (DFS) will continue to provide primer residue kits to user agencies and we encourage the collection of primer residue evidence. Please continue to collect primer residue kits from deceased victims at the scene, but only submit them to the laboratory if extenuating circumstances exist.

COLLECTION GUIDELINES

ITEM – Primer residue from the hands

METHOD - Follow the specific instructions included in the primer residue kit provided by DFS. Always sample the hands of a suspect as soon as possible. Collect primer residue samples at the scene whenever possible. If collection at the scene is not possible then bag the hands of the suspect with Tyvek® or paper bags before transporting in a police vehicle.

Secure paper bags around the wrists of the suspect with rubber bands; secure Tyvek® bags around the wrists of the suspect with the attached drawstring of the bag. Always clean **your** hands before collection of samples. Grip the suspect's hand by the wrist and avoid touching the surface to be sampled. If sampling from a dead body avoid wet or bloody areas. Always wear barrier gloves. Always photograph the hands and document any blood spatter patterns if present before sampling for primer residue.

DISCUSSION – Primer residue particles are continually lost from the hands due to normal activity. The optimal window of opportunity for sampling the hands of a **living** individual lasts for up to 4 to 6 hours after the shooting event. DFS will **no longer routinely analyze primer residue samples collected from the hands of a living individual in excess of 8 hours after the shooting event.** If exigent circumstances exist (e.g., individual was asleep or unconscious) indicate that on the Analysis Information Form contained in the collection kit provided by DFS.

ITEM – Primer Residue from clothing

METHOD – Only samples collected from clothing that is similar to skin (leather, vinyl) will be analyzed.

DISCUSSION – Analysis of primer residue particles collected from clothing can be problematic for a number of reasons. There is no way to determine how long primer residue particles may remain on clothing. Studies have shown that clothing may retain primer residue particles even after washing. Fibers collected on the sampling device can cause problems during analysis. For these reasons, only samples collected from nonfibrous clothing will be analyzed for primer residue.

ITEM – Primer Residue from vehicles

METHOD – If a vehicle is suspected to have been used in a "drive by" shooting, samples can be collected to determine the presence of primer residue. Collection should be done from leather, vinyl or plastic surfaces. Avoid sampling fabric surfaces. If the weapon was discharged inside a vehicle a good place to sample would be areas where small amounts of settled dust can be seen. Examples would include the top of the dashboard or steering column. Areas exposed to the wind from an open window are less likely to retain primer residue particles.

DISCUSSION – Use a single Primer Residue kit to sample the areas of interest. Simply strike out "right hand" or "left hand" and write in the area currently being sampled. It is not necessary to submit multiple kits from a single vehicle since it is not possible to determine the position where the shooter was firing from by primer residue analysis.

SUBMISSION REMINDERS

Fill out the Primer Residue Analysis Information Form as completely as possible and make a copy for your records. This information is used at the laboratory to maintain a database on primer residue cases and helps identify ammunitions and weapons that may or may not produce primer residue.

When submitting multiple items of evidence in a case that includes a primer residue kit for examination, it is recommended that the primer residue kit be submitted on a separate Request for Laboratory Examination form (RFLE). This will allow us to expedite the analysis, hopefully providing you with results earlier in the investigation.

An examination for primer residue should not be confused with a firing distance test. The distance from the muzzle of a weapon to the victim **cannot** be determined by testing for primer residue particles on the hands of the victim. Therefore, analyzing samples from the hands of homicide victims shot at close range is typically not probative.