



EVIDENCE HANDLING AND 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 Forensic Training Section or the Trace Evidence Section at the Forensic Laboratory that services your area.

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OVERVIEW

The term “primer residue” is often used interchangeably with “gunshot residue” or “GSR”; however, “gunshot residue” refers to *ALL* material generated from the discharge of a firearm. Primer residue is formed by the ignition of a chemical in *the ammunition primer* when a firearm is discharged. This results in the formation of microscopic particles which are blown out of various openings in the firearm as it is fired.

Particles characteristic of percussion primer residue are those that have a spherical or molten appearance and, for Sinoxid-type primers, contain the elements lead (Pb), barium (Ba), and antimony (Sb). Percussion primers are used in firearm and non-firearm sources; there are no known sources other than the detonation of percussion primers that reproducibly generate particles of this type. Particles consistent with percussion primer residue have the same appearance and include several different elemental compositions. This type of particle is associated with the discharge of a firearm but could also originate from numerous non-firearm sources.

Primer residue can be deposited on the hands by circumstances such as: firing a weapon, handling a weapon, being in proximity to the discharge of a weapon, or coming into contact with an object that has primer residue on it. This 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 hands, wiping 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.

Additional information and Section Procedures and Training Manuals can be found on the [DFS website](#).

CAPABILITIES AND SERVICES

ANALYSIS

The Trace Evidence Section analyzes Virginia DFS issued Primer Residue Kits submitted by law enforcement agencies for the presence or absence of particles characteristic of or consistent with primer residue on the hands or other surfaces.

In the laboratory, evidence submitted for primer residue analysis is examined using Scanning Electron Microscopy-Energy Dispersive X-Ray Spectrometry (SEM-EDS).

SUBMISSION CRITERIA

Primer Residue Kits will not be routinely accepted in circumstances where the scientific value of the analysis is limited, as indicated in the table on page 4.

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 with a weapon on their person	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 customer, 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 or if explicitly requested by the medical examiner.

COLLECTION GUIDELINES

Primer residue collection kits contain a moist towelette for wiping off the collecting officer's hands **BEFORE** using the kit to sample a subject's hands for primer residue. Washing hands or wearing gloves is also an option if available. These precautions are the best way to ensure that the collecting officer is not a source of contamination on samples collected from the subject's hands.

PACKAGING

Only Primer Residue Evidence Collection Kits provided by the Virginia Department of Forensic Science will be accepted for analysis, as they must pass quality control testing prior to distribution to agencies. These kits, provided free of charge, can be obtained from the Evidence Receiving Section at your nearest Virginia Department of Forensic Science Laboratory location.

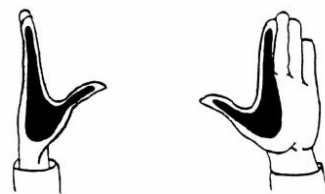
Fill out the Primer Residue Analysis Information Form within the kit to completion as much as possible; any pertinent information about the individual, collection, or circumstances should be included. Once the form is completed, place back into the provided envelope with the sampling devices.



COMMONWEALTH OF VIRGINIA DEPARTMENT OF FORENSIC SCIENCE	
PRIMER RESIDUE EVIDENCE COLLECTION KIT	
FOR LABORATORY USE ONLY	
BAR CODE STICKER	
FROM	
SUBJECT'S NAME:	_____
OFFICER'S NAME:	_____
OFFICER'S BADGE NUMBER:	_____
AGENCY'S NAME:	_____
AGENCY CASE NUMBER:	_____
AGENCY CHAIN OF POSSESSION	
RECEIVED FROM:	_____
DATE:	TIME: AM PM
RECEIVED BY:	_____
DATE:	TIME: AM PM
KEEP KIT SEALED UNTIL RECEIVED BY LABORATORY AT WHICH ALL POSSIBLE	
REV 11/05	

ITEM – PRIMER RESIDUE FROM THE HANDS

METHOD – Photograph the hands and document any blood spatter patterns if present before sampling for primer residue. Always sample the hands of a suspect as soon as possible following the specific instructions included in the Primer Residue Kit provided by DFS.



Always clean your (the collector's) hands and/or wear

gloves before collection of samples. While holding the suspect's hand by the wrist and avoiding touching the surface to be sampled, repeatedly dab the sampling device onto the pointer, web, and thumb areas of the front and back of the hand until the sampling device loses its stickiness. Repeat dabbing for the other hand with the appropriately labeled sampling device. Avoid sampling from wet or bloody areas.

Collect primer residue samples at the scene whenever possible. If collection at the scene is not possible, bag the hands of the suspect with Tyvek® or paper bags before transporting the suspect in a police vehicle.



Secure Tyvek® bags around the wrists of the suspect with the attached drawstring of the bag; secure paper bags around the wrists of the suspect with rubber bands.

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 is within 4 to 6 hours after the shooting event. **DFS will not 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 similar to skin (i.e. 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. Additionally, 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. Questions regarding whether specific clothing items are suitable for analysis can be directed to the Trace Evidence Section.

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, or areas frequently touched, 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 using primer residue analysis the interior position from which the shooter may have fired.

SUBMISSION GUIDELINES

REQUEST FOR LABORATORY EXAMINATION

See the [General Submission of Evidence Section](#) for general information and pictures. The RFLE requesting Primer Residue analysis should accompany the Primer Residue Kit containing the Analysis Information Form.

When submitting multiple items of evidence in a case that includes a Primer Residue Kit for examination, it is recommended that Primer Residue Kit be submitted on a separate RFLE.

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 help identify ammunitions and weapons that may or may not produce primer residue, as well as assist in interpretation of the test results. An examination for primer residue should not be confused with a Firearms Distance Determination examination. 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 victims shot at close range is typically not probative.

NOTE: Inconsistencies between the spelling of names on the Primer Residue Analysis Information Form submitted and what is written on the RFLE can cause delays in reporting. Please ensure names are spelled consistently and accurately.



The form is titled "PRIMER RESIDUE ANALYSIS INFORMATION FORM" and is labeled "FOR LABORATORY USE ONLY". It contains several sections for data entry:

- Header:** PS Laboratory Number and Item Number.
- Collection Information:** Collecting Officer's Name, Collecting Agency's Name, Agency Case No., and checkboxes for Homicide, Suicide, Assault, or Other.
- SUBJECT INFORMATION:** Subject's full name, DOB, Subject is (Living/Deceased), Subject is (Right-handed/Left-handed/Unknown), Any debris on/around subject's hands? (Yes/No), If yes, describe, Location of gunshot wound (if applicable, be specific), Has subject washed/changed hands since shooting? (Yes/No/Unknown), Subject's occupation, and Subject's address.
- SHOOTING INFORMATION:** Date and time shooting occurred, Date, Time, and AM/PM, Place (e.g., in kitchen, parking lot, indoors, outdoors), Type of firearm used, Caliber, Caliber of ammunition used, Manufacturer of ammunition, Number of shots fired, *Show ammunition load (e.g., 10 rounds), and a diagram of a cartridge.
- Footer:** Collecting Officer's Signature, Date, Time, and AM/PM of PIR collection.