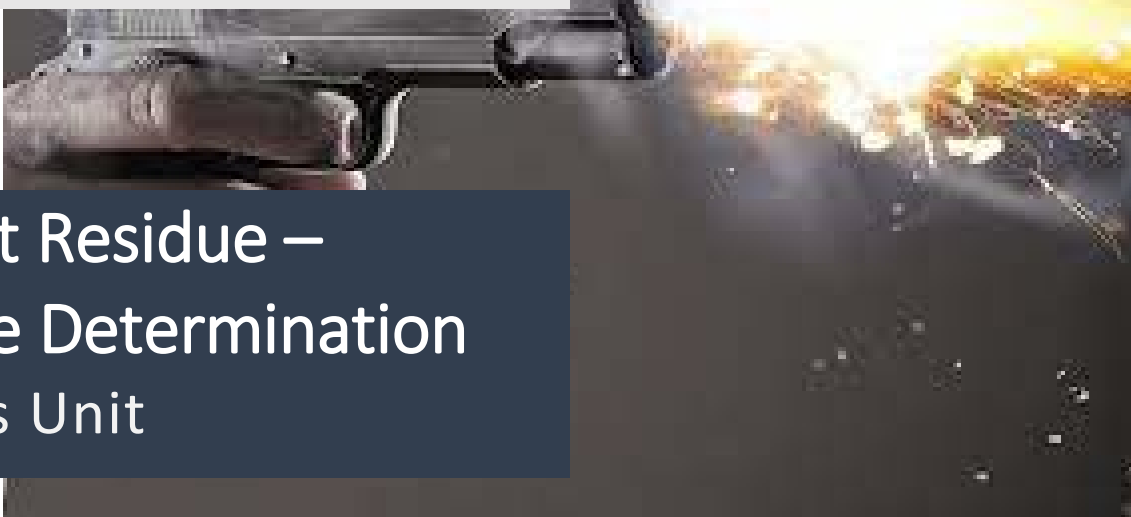


Criminalistics Section

Louisiana State Police Crime Lab



Gunshot Residue – Distance Determination Firearms Unit

WHAT

The use of gunshot residues for determining the distance of the muzzle of a firearm from a target at the time of discharge is a sub discipline of the forensic firearms specialty.

HOW

Burned or partially burned bullet propellants and other gunshot residues are expelled from the muzzle during the firing process and can be used to determine the distance of a muzzle from a garment or other surface at the time of discharge.

When a firearm discharges, the burning of the propellant powder immediately generates a large amount of heat and gas inside the cartridge providing the pressure required to expel the bullet.

After the bullet strikes a surface, gunshot residues are deposited, particularly at close range. These residues may be reproducible and therefore have evidentiary value. Some residues are visible and others require chemical treatment in order to visualize them. Chemical testing and direct observation is done on evidence and then compared to known distance test patterns to determine a muzzle to target distance.

Shotgun pellet spread can also be analyzed to determine the approximate distance from the muzzle to the target. Shotgun pellets will spread further apart as the distance from the muzzle increases.

Once a positive result is established and a pattern developed, the next step in the process involves creating test patterns. Testing substrates are shot at known distances and then the substrates go through the same testing to establish a gunshot residue pattern. The developed known patterns are then compared to the developed pattern on the evidence item.

WHY

Distance of firearm to target can be a critical component of an investigation. This information, once determined, can refute or support witness statements. Often, this information can be used to determine the difference between a justifiable shooting or criminal action and suicide versus homicide.

Gunshot Residue Distance Determination



Staffing

The firearms unit currently has two people authorized in Gunshot Residue Distance Determination.

Interesting Facts

Gunshot residues are composed of the following:

- Primer residues from the combustion of the cartridge priming mixture when the primer was struck by the firing pin
- Residues resulting from the burning of the gunpowder
- Material generated by the interaction of the bullet with the inside of the barrel
- Unburned and partially burned gunpowder

The same ammunition and firearm is needed for the most accurate analysis of Gunshot residue and distance determination.

Some potential obstacles in this testing are rough handling of the victim's clothes, wet weather and other environmental conditions, large amounts of dried blood, and intermediate objects.

Sources of testing ammunition may include

- Evidence ammunition from the case, per laboratory protocol,
- Purchased ammunition same brand, stock number, with the same powder, projectile and primer components)
- Reference ammunition (same brand, stock number, with the same powder, projectile, and primer components.

