W3 Shooting Reconstruction

Peter J. Diaczuk, Penn State University, 329 Whitmore, State College, PA 16802; Jack Hietpas, PhD*, Penn State University, 329 Whitmore Lab, University Park, PA 16802; Andrew J. Winter, MS*, Middlesex County Prosecutor's Office, 25 Kirkpatrick Street, 3rd Fl, New Brunswick, NJ 08901; and Linda Tran, BS*, Jefferson Parish Sheriff's Office, 1233 Westbank Expressway, Bldg G, Harvey, LA 70058*

After attending this presentation, attendees will learn some of the phenomena that must be taken into consideration when assessing a shooting scene. Several different types of ammunition will be discussed, along with their interactions with several different substrates commonly encountered. Attendees will also become familiar with evidence recognition, documentation, and recovery for laboratory analysis.

This presentation will impact the forensic science community by exploring some of the techniques used in shooting scene reconstruction and subsequent laboratory analysis of related evidence.

The complex nature of a shooting incident may generate a variety of firearm-related evidence, such as the firearm itself, cycled or discharged ammunition components, gunshot residue, trace evidence on a bullet, or impact sites with traces of the bullet's prior presence. Whether considered firearm evidence or trace evidence, this information may have to be integrated by the scientist to be most beneficial.

When a shooting incident takes place and firearm evidence is recovered at the scene, whether in the form of cartridge cases or bullets, it is likely that an examination of these ammunition components will ensue, using the well-established and proven methods of comparison microscopy. Recently, use of comparison microscopy has become the focus of criticism, but it nevertheless provides valuable information for both opaque samples using reflected light and for transparent samples using transmitted light. There are some occasions, however, where the question of which firearm was involved, or which bullet came from what firearm is not in dispute; but instead, questions arise about the specific path of a bullet, the relative positions of the shooter and the victim, the presence of an intervening object, or the sequence of the shots that were fired.

Pulling the trigger of a firearm initiates a series of events that culminates with the discharge of a bullet with considerable energy, along with primer and propellant resides as secondary ejecta. The bullet may not only impact its intended target; it may perforate an intermediate object or objects on its way to the target or it may pass completely through the target and retain sufficient energy to continue downrange and impact an unintended object.

These types of interactions and impacts invariably impart information about the event onto the bullet and onto the impacted substrates. If information from the inadvertent or intended impact is recognized, examined, and deciphered, it can be helpful in developing a more accurate shooting scene reconstruction. This workshop will consider the transfer of material from the substrate to the bullet, per the Locard Exchange Principle, the overall change to both the bullet and substrate from the energy exchange, the potential path the bullet followed, and the possibility of ricochet.

Determining the angle at which a bullet will successfully ricochet is essential information when a shooting investigation involves indirect fire. This information provides the forensic scientist with fundamental data required for the scientific reconstruction and assessment of a shooting scene. Depending upon the substrate, the bullet's design, velocity, construction, and its angle of impact, a bullet may fail to ricochet upon impact, or the bullet will successfully ricochet. Knowledge of bullet behavior with common substrates provides valuable information for

scientific investigation of shooting scenes where bullets have impacted intermediate surfaces. A timely and accurate scene reconstruction is imperative in both the investigative and the adjudicative stages of a shooting incident.

Shooting, Reconstruction, Bullet Path