B115 Chemical Characterization of the Blue Lubricant Coating on Barns XLC Coated X-Bullets

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After attending this presentation attendees will be able to analyze GSR to determine the presence of X-Bullet residue. Barns Bullets is a small manufacturer of specialty bullets for the bullet reloading enthusiast. The Barns XLC Coated X-Bullet has a unique surface coating that reduces friction for better ballistic performance. This presentation describes the analytical methodology and chemical characterization of the X-Bullet coating. Because the use of the X-Bullet is a small percentage of all bullets, identifying the X-Bullet coating in GSR substantially narrows the investigation and strongly supports identifying the weapon used in the crime.

This presentation will impact the forensic community by describing the study of a unique projectile coating. The chemical characterization of the X-Bullet coating will provide the forensic chemist with analytical methodology and a known comparison reference that will help the firearms examiner to identify the suspect weapon and reconstruct the crime scene.

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This presentation primarily impacts the forensic chemist, trace evidence and firearms examiner. The chemical characterization of the X-Bullet coating will provide the forensic chemist with analytical methodology and a known comparison reference that will help the firearms examiner to identify the suspect weapon and reconstruct the crime scene.

The blue colored XLC coating appears to be a "paint-like" polymer binder with a suspected polytetrafluoroethylene (PTFE or Teflon) additive that acts as a lubricant in this application. Organic dyes and/or inorganic pigments and fillers may also be present.

Microscope Examination: A microscopic examination of the coated bullet surface will be performed at low magnification to determine the consistency of application, layer structure and characteristic patterns that result from the application process. Layer structure will be observed at high magnification with a scanning electron microscope to describe the distribution of non-dissolved components. The coating is expected to contain a PTFE component in the form of non-dissolved flakes. The size and percent composition of the PTFE flakes will be determined.

Chemical Composition: The binder that holds the coating together and adheres to the bullet's surface is expected to be a fast drying vinyl or enamel polymer similar to automotive finishes. The polymer will be identified from the surface of the bullet using FTIR in reflectance mode and in transmittance mode with a FTIR microscope. Organic coloring agents will be identified using FTIR or gas chromatography mass spectrometry (GCMS) as appropriate. Elemental composition will be determined with a scanning electron microscope quipped with and EDAX detector.

Gun Shot Residue (GSR): Gun shot residue will be collected at the muzzle and at distances of 6in. 12in. and 18in. from the end of the barrel. The size of the circular GSR pattern will be measured and microscopically examined to describe the burn pattern and the distribution of Teflon flakes. Chemical changes resulting from the heat and pressure of firing will be determined by GCMS.

Barrel Residue: To link recovered bullets and GSR found at the crime scene to the suspected weapon, the barrel residue will be characterized using the tests described above.

Barns XLC X-Bullets, Polytetrafluoroethylene, Blue Lubricant