



# **TENNESSEE BUREAU OF INVESTIGATION**

## *Forensic Services Division*

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### **Violent Crime Response Team Standard Operating Procedures**

#### **Microanalysis**

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## **5 Microanalysis or Trace Evidence**

### **5.1 Scope**

Trace Evidence, such as fibers, glass, paint and impression evidence, may be used to associate an individual to a crime scene or to another individual.

In this manual, impression evidence present on “hard surfaces” will be referred to as two-dimensional impression and patterns impressed into “soft, pliable material” will be considered three-dimensional impressions.

### **5.2 Location**

A strong flashlight is one of the best tools in the search and location of trace evidence.

### **5.3 Documentation**

Pattern evidence for comparison shall be marked and photographed using a ruler included in the photograph. Refer to VCRT 10-34 Comparison Photography for further information.

### **5.4 Collection of Trace Evidence or Standards**

#### **5.4.1 Hairs and Fibers**

Refer to VCRT 10.20 Collecting Standards for the testing procedure.

##### **5.4.1.1 Clothing Containing Suspected Glass Evidence**

An individual who breaks a window with force may have very small particles of glass on his/her clothing. It is not uncommon to find minute glass particles on the soles of shoes, the tops of shoes, and the cuffs or lower portion of pants. Such clothing items should be collected, with care taken not to shake or handle the clothing more than necessary. Refer to VCRT 10.32 Collecting Items of Clothing for the procedure. Refer to VCRT 10.26 Collecting Glass Evidence for further information.

#### **5.4.2 Paint**

Refer to VCRT 10.27 Collecting Paint Evidence for the procedure.

#### **5.4.3 Collecting Known Trace Evidence Samples**



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If the fiber source is not easily transported, such as upholstery or carpeting, cut a representative samples from various areas of the item. Collect samples from areas that are visually different (e.g. different colored areas, faded areas due to sunlight, worn sections, etc.).

Refer to VCRT 10.20 Collecting Standards for the procedure and packaging.

#### **5.4.4 Physical Match Evidence**

Violent crimes may result in pieces of broken glass, plastic, or metal that may be compared back to the item from which the piece may have originated. Pieces or fragments of broken material should be collected, and possible sources should be considered when searching for additional evidence at crime scenes.

Duct tape or other forms of ligature may also exhibit physical characteristics that lend themselves to physical match comparisons. Ligatures and bindings should not be untied. If removal is necessary, minimize the number of cuts to the bindings. The VCRT member should mark the cut area, for example with tape and their initials. It is preferred that a medical examiner remove bindings and ligatures.

Exercise care when handling fractured pieces to ensure preservation of the fractured edges.

#### **5.4.5 Fire Debris Collection**

It is highly recommended that fire debris evidence be collected by the State Fire Marshal's Office, State Bomb and Arson because of their expertise at locating the point of origin for a fire. If needed, the VCRT member may refer to VCRT 10.28 Collecting Fire Debris for evidence collection considerations.

#### **5.4.6 Lifting and Enhancing Footwear and Tire Tread Pattern**

Two-dimensional impressions of the outsoles of footwear and tread design of tires can be left on surfaces in materials such as dust or dirt.

Latent two-dimensional patterns can also be developed by the use of powders.

Visible patterns in substances such as blood may be further enhanced using chemical processes.

The VCRT member will attempt to locate this type of evidence at a crime scene and collect the evidence using the appropriate technique. Refer to VCRT 10.13 Electrostatic

**TENNESSEE BUREAU OF INVESTIGATION**  
*Forensic Services Division*

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**Microanalysis**

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Lifter for the procedure. Refer to VCRT 10.24 Gelatin Lifters for the procedure. Refer to VCRT 10.6 Leucocrystal Violet for the procedure in enhancing patterns in blood.

Footwear and Tire impressions shall be marked and photographed using a ruler included in the photograph prior to any attempts at lifting or enhancing. Refer to VCRT 10.34 Comparison Photography for further information.

#### **5.4.7 Casting Footwear and Tire Impressions**

Three dimensional impressions in material such as loose soil or mud can be cast (using dental stone), packaged and transported to the laboratory. Footwear and tire impressions shall be marked and photographed using a ruler included in the photograph prior to any attempts at casting. Refer to VCRT 10.34 Comparison Photography for further information.

Dental stone can be used in snow with the application of snow print wax.

Refer to VCRT 10.14 Casting with Dental Stone for casting and packaging procedures.

#### **5.4.8 Elimination Footwear and Tire Impressions**

It may be necessary to make elimination prints of shoes and tires that were legitimately at the crime scene. Refer to VCRT 10.20 Collecting Standards for the procedure in making elimination shoe prints. Refer to VCRT 10.25 Examining a Vehicle for the procedure for making a tire test impression.

It may also be necessary to submit elimination footwear to the laboratory for further examination. If a tire impression comparison is requested, then the entire vehicle will need to be submitted to the laboratory.

#### **5.4.9 Gunshot Residue (GSR)**

Gunshot Residue (GSR) is the test for determining if a person could have discharged a firearm. The presence of GSR's could indicate that a person had discharged a firearm, handled a recently fired firearm, or been near a firearm discharge when it occurred. The test involves detecting residue from the primer of a cartridge that may be deposited on the surface of a person's hands when the weapon is fired. Under normal circumstances, GSR will not be done on victims of apparent gun shot wounds. Refer to VCRT 10.12 for the procedure for collecting GSR.