



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Evidence Unit Standard Operating Procedures Manual

Appendix E- Microanalysis

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Chemical Analysis

1. Typical chemical analysis examinations performed are:
 - Heavy metal analysis in moonshine (no standard required)
 - Corrosives on clothing, car, etc. (no standard required usually)
 - Dye bombs from a bank robbery
 - Plastics
 - Greases, oils and lubricants
 - Glue
 - Cosmetics
 - Poisons
 - Pepper spray (standard preferred, but not required)
2. Clothing which has been submitted for Gunshot Primer Residue analysis is often confused with the Distance Determination test done by the Firearm/Toolmark Identification Unit. The primary distinction is usually from whom the clothing items were recovered. Victims of shootings are typical of firearms testing for distance determination. Subjects are most often typical of testing form Microanalysis.
3. Any item may be tested for gunshot residue but the item may not be processed with a gunshot residue kit.
4. There are other varieties of chemical analysis, which can be done in Microanalysis. These will be a criminal matter under investigation, not something found on the side of the road, etc.

Typically, the chemical analysis will be a comparison between a source and an item from a crime scene. The standard will be submitted in a separate container as part of the case. A good statement of facts is important in determining the course of analysis.

Gunshot Residue Kits

1. Gunshot residue kits will be accepted for **subjects only**. In unique circumstances, the laboratory may agree to accept evidence from gunshot victims. Such exceptions will be considered on a case-by-case basis. The requested exception must come from the District Attorney General's office on letterhead, and include the reason why the test is probative, subject and victim



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names, and carry an original signature of the District Attorney General or their Assistant District Attorneys General.

2. Gunshot residue kits will receive one exhibit number per kit.
3. Gunshot residue kits will be described in the computer system as:

Gunshot residue kit from John Doe (always indicate the subject/victim name in the description).
4. If a cartridge case is listed as part of the gunshot residue kit, it does not require and additional exhibit number.
5. Police shootings are worked no matter who is listed as the subject or victim and are considered a rush case.
6. For subject clothing **ONLY from** a shooting – add GSR SEM test even if not requested.

Paint Analysis

1. Hit and Run cases – it is permissible to accept wet and bloody clothing from victims in hit and run cases. Microanalysis is looking for subject vehicle paint on the clothing and if the clothing is air dried, the microscopic pieces of paint may be lost. If wet or bloody clothing is submitted to the laboratory for paint analysis, enter the case into LIMS immediately, complete the chain of custody and contact Microanalysis immediately and the clothing will be cared for in the Microanalysis unit.
2. All other samples will be in sealed packaging. Microanalysis discourages the use of envelopes for paint samples because the paint chips may fall out of the corners or get stuck on the sticky area of the envelope.
3. If envelopes are received with paint falling out of the corners, contact someone in Microanalysis immediately so that the evidence can be repackaged. Attempt to do this while the officer is still at the laboratory. If U.S. Mail or other form of delivery service receives evidence of this nature, contact someone from Microanalysis immediately for assistance with repackaging the evidence. If the evidence is repackaged, it will be documented on the request for examination form.



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4. The officer's description will be used when describing the evidence. Distinguish between vehicles when two or more are involved. Example: Paint sample from front corner panel of subject's vehicle. **Be specific of the location from where the sample came from.**
5. If wet clothing is submitted in plastic bags, contact someone from Microanalysis for assistance. **DO NOT USE PLASTIC BAGS**
6. Encourage agencies to use paper bags for packaging evidence.
7. If all the clothes are in one bag, only one exhibit number is necessary. If the clothing is in separate bags, each bag will receive an exhibit number.

Tire Impression Cases

1. Dental Stone casts will never be packaged in plastic bags because they will mold. Contact Microanalysis if casts are received in plastic bags so the casts can be repackaged. If the evidence has to be repackaged without the officer present, a note will be made on the request form.
2. Never accept tires without the vehicle. The tires must be rolled and they must be on the vehicle to do this. If this happens, contact someone in Microanalysis so that a time can be scheduled to assist the officer with printing the tires.
3. When describing the evidence, use the officer's description. Each tire test impression must have a separate exhibit number. If four tires are printed, four exhibit numbers will be assigned.

Example:

Test impression from the front driver's side tire of subject vehicle

Test impression from the rear driver's side tire of subject vehicle

Test impression from the front passenger side tire of subject vehicle

Test impression from the rear passenger side tire of subject vehicle

4. Each cast and photograph must have a separate exhibit number.
5. If there are several tire impressions packaged together, each tire impression must have a separate exhibit number.

Shoe Print/Shoe Track

1. A shoe print is a tread design on something. (paper, tile) (2 dimensional)



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2. A shoe track is a tread design in the ground. A cast is of a shoe track. (3 dimensional)
3. A pair of shoes must be assigned two exhibit numbers. (left, right) When the information is provided describe the shoes as follows: Left shoe from John Doe, Right shoe from John Doe.
4. If the request form list three casts in one box, three exhibit will be assigned. If there are five pieces of paper listed on the request form, five exhibit numbers will be assigned. If the form lists pieces of paper, the evidence will be opened. Contact someone in Microanalysis for assistance.
5. If photographs and negatives are listed on the request form, one exhibit number will be assigned. If other exhibit numbers are needed, they can be added later. If multiple packs of photographs are listed on the request form, each pack will receive an exhibit number.
6. Microanalysis can conduct a physical analysis examination to enhance a shoe print or shoe track to determine the kind of shoe that made it.

Reminder: Dental stone casts are shoe tracks not shoeprints.

Fiber Analysis

1. If all of the clothes are in one bag, only one exhibit number is necessary. If the clothing is in separate bags, each bag will receive an exhibit number. This applies to shoes also. Same package - one exhibit number, separate packages – two.
2. There must be something from the subject and victim to compare. If there is only something from the victim and forensic biology/latent prints is requested, notify the Forensic Biology and/or the Latent section that the item(s) need to be worked over catch paper. When there is something from both the subject and victim, all of the items will be entered into LIMS for fiber analysis.
3. Advise officers that a fiber analysis can't be done without standards from the subject and victim.

Hair Analysis

1. The TBI Crime Laboratory will process evidence for hair collection to be sent to the FBI Crime Laboratory in the following situations:



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- The TBI Violent Crime Response Team processes a crime scene. It will be up to a Micro analyst on that team to decide to have that evidence entered into LIMS.
 - A vehicle is submitted to the laboratory for processing and hair is requested by the submitting agency.
 - A TBI Agent submits evidence and requests a hair comparison.
2. If there are any questions about hair analysis, contact someone from Microanalysis.
 3. Advise the submitting agency that hair analysis can't be done without standards from the subject and victim.
 4. Number of pulls for hair standards:
At least 30 pulled from various locations on the scalp.
Sexual assault – At least 27 pulled from head and pubic area.
 5. The FBI will only perform hair comparisons after DNA analysis has been completed and the results cannot associate the subject(s) and victim(s).

Fire Debris Analysis

1. Fire debris will be packaged in an airtight container. (metal paint cans or glass mason-type jars)
2. Fire debris evidence will never be accepted in paper bags, plastic bags, boxes, etc. If evidence is received in any container other than metal cans or glass jars, confirm with someone in Microanalysis that the packaging is appropriate or have a Micro analyst repackage the contents. The Micro analyst must seal and initial any repackaging. If the evidence can be repackaged while the officer is at the laboratory, explain the procedure and reason and have him/her complete the transformation. Remind the officer that gloves must be changed between exhibits to avoid cross contamination. Each new packaging must be sealed and labeled by the officer.
3. Each can or jar received will be assigned an exhibit number.
4. A Forensic Scientist in the Microanalysis unit will describe arson cases in LIMS.
5. Grease or oil collected from a fire scene will be worked for chemical analysis.



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6. Cans will only be filled $\frac{1}{2}$ to $\frac{3}{4}$ full of sample so that there is enough headspace left for the accelerants to rise to the top of the can.

Glass Analysis

1. Types of evidence submitted for glass analysis are clothing, shoes, and glass fragments, implements used to break glass, windshields, and windowpanes.
2. A standard **MUST** be submitted to compare the samples against or at least two items to compare to each other. If no standard is submitted, check with someone in Microanalysis before accepting the evidence or entering into LIMS.
3. When fracture analysis or direction of force is requested, confirm with a Micro analyst that the analysis can be performed on the sample submitted. A complete windshield or all of the glass from the broken windowpane will be submitted for analysis.
4. Items may be grouped together under one exhibit number if they are packaged in the same container. Example: clothing packaged in the same paper bag, two shoes in the same package.
5. Items that are packaged separately will receive individual exhibit numbers.
6. Due to the transient nature of this type of evidence, bloody or wet items may be received for analysis. If this type of evidence is submitted, contact someone from Microanalysis for assistance.

Explosive Evidence

When explosive evidence is submitted by hand:

1. Question the submitting agent prior to entry into the building if they are with Tennessee Bomb and Arson.

IF NOT:

- a. Instruct submitting officer to exit the foyer and do not leave.
- b. Inform evidence receiving supervisor, laboratory supervisor, laboratory assistant director and microanalysis personnel.
- c. Call Tennessee Bomb and Arson at 741-3030 & Tennessee Highway Patrol Bomb Squad at 741-2060. If THP is not available, call Metro Nashville Bomb Squad at 862-7740.
- d. Inform submitting officer to wait for arrival of a Bomb Technician.



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- e. Inform a Uniform Officer at extension 4530 and ask that a perimeter be established around evidence receiving area including the undercover parking area/back lot.
 - f. **DO NOT** allow any personnel to exit the building via the evidence receiving door.
2. Only after inspection of explosive by Tennessee Bomb and Arson will a determination be made regarding submission of explosive material to the laboratory.

Evidence submission by mail or other delivery service:

Upon opening a package to retrieve the request form and explosive testing is being requested:

- 1. The package should **NOT** be handled, moved, or opened.
- 2. Inform evidence receiving supervisor, laboratory supervisor, laboratory assistant director and microanalysis personnel.
- 3. Call Tennessee Bomb and Arson at 741-3030 and Tennessee Highway Patrol Bomb Squad at 741-2060. If THP is not available call Metro Nashville Bomb Squad at 862-7740.
- 4. Inform a Uniform Officer at extension 4530 and ask that a perimeter be established around evidence receiving area including the undercover parking area/back lot.
- 5. All employees shall clear their work areas as quickly as possible before evacuating to ensure that no sensitive material is left out. Evidence receiving will lock other evidence in vault and close/lock the gates.
- 6. Supervisors and/or division heads shall be responsible for evacuating evidence receiving, breath alcohol, toxicology, forensic chemistry, microanalysis, vehicle bays and the atrium area. Place signs prohibiting entry into evidence receiving on doorways. **DO NOT** allow any personnel to exit the building via the evidence receiving door.
- 7. All radio transmissions must be discontinued. Use of cell phones must be discontinued. All communication will be made by telephone landlines.
- 8. Only after inspection of explosive by Tennessee Bomb and Arson will a determination be made regarding submission of explosive material to the laboratory.