



Forensic Chemistry Section

Bloodstain Pattern Analysis and Interpretation Method

1. Scope

This document outlines the methods for conducting bloodstain pattern analysis and interpretation on physical evidence items, photographs, bodies, vehicles and crime scenes. The significance of a particular pattern may not be apparent during the initial examination; therefore proper documentation of the bloodstain patterns is critical in those early stages. Consider the fact that the scope of the examination may change as additional information is gathered through the course of the investigative process. *This method and the related terminology will only be used by fully trained Bloodstain Pattern Analysts. Chemists without full BPA certification are trained to characterize bloodstains using size, shape, and distribution description to facilitate stain selection and subsequent testing.*

2. Safety

- 2.1 Disposable lab coats and disposable gloves will be worn during reagent preparation and handling and during the examination of evidence.
- 2.2 Reagents will be prepared in a laboratory total exhaust hood.
- 2.3 Safety glasses and disposable face masks will be available for use when heavily blood stained items are being processed.

3. Initial Analysis

- 3.1 Bloodstain pattern analysis will be conducted when determination of the location and orientation of individuals is necessary, determination of the sequence of events is necessary, or when needed to refute or corroborate the statements made by witnesses, victims and / or suspects. Not every bloodstain case will require bloodstain pattern analysis.
- 3.2 The analyst will be familiar with ASB Technical Report 033, "Terms and Definitions in Bloodstain Pattern Analysis," and will reference all characterized stains with appropriate taxonomy.
- 3.3 The analyst should request appropriate investigative material prior to completing the analysis. These may include, but are not limited to:
 - reports of victim, witness and / or suspect interviews
 - medical examiner reports
 - crime laboratory reports from other laboratory sections
 - crime scene photographs and sketches
 - other relevant documents



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Any investigative material utilized in the course of the analysis will be documented in the case notes as well as the final laboratory report.

- 3.4 Bloodstains on items, clothing, vehicles or at scenes will be located using visual and/or stereomicroscopic examination as well as presumptive chemical testing techniques. Chemical development for suspected latent bloodstains should also be considered.
- 3.4.1 Minute stains measuring approximately 1-5 mm should be examined with a stereomicroscope to differentiate between spatter or transfer. The examiner will consider fabric type and weave characteristics when making these determinations.
- 3.4.2 Due to the minute nature of some bloodstains (<1 mm) stereomicroscopic examinations should be conducted on dark colored or heavily printed items.
- 3.4.3 The examiner may choose to utilize infrared photography to reduce the background colors on dark items resulting in bloodstains becoming more apparent.
- 3.5 The presence of minute stains and even the absence of some stains can be of significance and will be noted.
- 3.6 The size, shape and distribution of the overall bloodstain pattern should be considered.
- 3.7 When applicable, the analyst may choose to determine the angle of impact or the area of origin of a stain or stains.

Angle of impact is calculated using the formula:

$$i = \arcsin (\text{width} / \text{length})$$

Area of origin of a stain or stains is calculated using the formula:

$$\tan i = (\text{height}/\text{distance})$$

4. Documentation

- 4.1 The locations of stains or stain patterns are documented using traditional 35 mm, infrared and / or digital photographic methods. Digital photographs as part of the case notes are recommended.
- 4.1.1 Metric units are used for recording measurements
- 4.1.2 Metric scales, at the mm level, are incorporated in the photographs.
- White scales are used on light colors



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- Dark scales are used on dark colors

- 4.1.3 The photographs should include an overall / mid-range shot of the item with the scales in place and a close-up shot of the stain.
- 4.2 The photograph should be taken at a perpendicular or 90 degree angle to the stain.
- 4.3 Stains which are going to be swabbed, removed, or altered for DNA analysis or other testing should be photographed prior to removal.
- 4.4 Observations that help characterize a stain should be noted.
- 4.5 The general appearance of the blood is noted, i.e. diluted, air bubble rings, etc.

5. Interpretation

- 5.1 Significant stains and / or patterns may be placed into one of the following general categories or a combination of categories:

<u>PASSIVE</u>	<u>TRANSFER</u>	<u>PROJECTED</u>	<u>MISCELLANEOUS</u>
Clot Drip Flow Pool Saturation Stain Serum Separation	Pattern transfer Swipe Wipe	Arterial Cast-off Spatter Expiratory Splash Spine	Fly spot Capillary Void Skeletonized

- 5.2 The size of the stains can be used to help determine the relative proximity between a target surface and an active mechanism.
- 5.3 The analyst may choose to conduct an experiment to make general observations about the mechanisms utilized to produce a particular bloodstain pattern. These experiments should follow typical scientific methodology:
 - Establish a hypothesis
 - Consider the variables
 - Conduct the experiments
 - Collect the data
 - Record the results
 - Determine the conclusion



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The experiment should include photographic documentation to illustrate the results. The experiment results should be reported.

- 5.4 The report will include stain and / or pattern characterizations based on ASB Technical Report 033.
- 5.5 Any terminology used in the report will be defined in the report.