Fingermark Visualisation Manual

Main Authors: Helen Bandey (Editor); Valerie Bowman; Stephen Bleay; Rory Downham; Vaughn Sears

Presented by: Rory Downham
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The Home Office is a government department that:
‘...leads on immigration and passports, drugs policy, crime policy and counter-terrorism and works to ensure visible, responsive and accountable policing in the UK’

CAST: a team of specialists using science and technology to deliver Home Office priorities:

- driving frontline efficiencies with effective technology
- reducing crime with new techniques and sharing best practice
- tackling organised crime and terrorism
- securing our borders
- reaching across the criminal justice system
The role of CAST

- To act as the primary science and technology interface between:
  - Home Office Ministers and policy makers
  - frontline operational decision makers
  - external suppliers of S&T

- Operating where others cannot for reasons of impartiality, national security or market failure

- One of our primary customers is the police
  - guidance

Home Office
The Manual of Fingerprint Development Techniques – a brief history

- **SRDB** – Scientific Research and Development Branch
- **PSDB** – Police Scientific Development Branch
- **HOSDB** – Home Office Scientific Development Branch

1986 – 1st edition

1998 – 2nd edition

New name: ‘Fingermark Visualisation Manual’
Drivers for Change

• Content and style of 2\textsuperscript{nd} edit MoFDT are out-of-date

• Significant changes in the operations of UK police labs
  – ISO 17025 accreditation
    • Mandatory for EU fingerprint laboratories
    • Big emphasis on the \textit{competency} of the practitioner
  – Integrated Forensic Approach

• There was a need for a more radical overhaul
Main Changes

- Format will be electronic and interactive
- The new manual is compiled for those seeking (or already have) ISO 17025 accreditation
- It will be less ‘black and white’
  - We will provide as much information as we can about fingermark visualisation
  - It will provide limited information on integrating forensic processes
  - The practitioner will use this, along with local needs, to produce sensible forensic/fingermark recovery plans
- It aims to set a high minimum standard for good practice
- This is a significant repositioning of the MoFDT
Example

Charts and Process Maturity Levels

- **Low maturity**: There is limited scientific data to support the chart/process and no operational data.
- **Moderate maturity**: The chart/process is supported by some scientific data but elements may be unclear, and operational data may be lacking.
- **High maturity**: The chart/process has been built upon years of scientific research, and the operational data is supportive.
1. About this Manual
   ~25 pages, new chapter

2. Forensic Evidence Recovery
   ~100 pages, new chapter

3. Safe and Effective Implementation of Processes
   ~100 pages, 50% new information, different style

4. Process Selection
   ~75 pages, 50% new information, different style
Chapters 5 - 7
Summary

5. Category ‘A’ Processes
   The big one! ~500 pages, 70% new information, different style

6. Category ‘B-F’ Processes
   ~100 pages, new chapter

7. Integrating Forensic Processes
   ~20 pages, new chapter
Chapter 2
Forensic Evidence Recovery

- Contains general background information about fingermark evidence and its recovery in the wider context of the investigative process and the recovery of other forensic evidence
- Provides background information required for an understanding of the remainder of the Manual

- 5 Sections
  - Section A:
    - The investigative process
    - Preservation of forensic evidence
    - Initial assessment
    - Forensic evidence recovery strategy and plans
    - Constraints and limitations
Chapter 2
Forensic Evidence Recovery

Section B: Understanding fingermarks

Generation

Persistence

Visualising
Introduces the concept of finding marks with optical, chemical and physical processes

Home Office
Chapter 2
Forensic Evidence Recovery

Section C: Fingermark visualisation processes

- Classification of Processes (A-F)
- Category A processes
  - When processes were introduced
  - What they target

<table>
<thead>
<tr>
<th>Process</th>
<th>First reported use</th>
<th>First use in UK</th>
<th>First inclusion in Home Office Manual</th>
<th>Latest modification in Home Office Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ninhydrin</td>
<td>1954</td>
<td>Late 1950s</td>
<td>1986</td>
<td>2001</td>
</tr>
<tr>
<td>Powders</td>
<td>Late 1800s</td>
<td>Early 1900s</td>
<td>1986</td>
<td>2013</td>
</tr>
<tr>
<td>Superglue Fuming</td>
<td>Late 1970s</td>
<td>1980</td>
<td>1986</td>
<td>1986</td>
</tr>
</tbody>
</table>
Section C: Fingermark visualisation processes continued…

- Sequential processing
  - Rules and general understanding
- Process Effectiveness
  - Influencing factors
### Process effectiveness: effect of water

<table>
<thead>
<tr>
<th>Process</th>
<th>Indicator</th>
<th>Impact of Water on Process Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Violet 3; Small Particle Reagent</td>
<td><img src="image" alt="Water Icon" /></td>
<td>The effectiveness of these processes is not altered by exposure of the item or surface to water as their target constituents (sebaceous sweat or oily contaminants) remain in the mark.</td>
</tr>
<tr>
<td>Powders</td>
<td><img src="image" alt="Water Icon" /></td>
<td>Powders adhere to a broad range of components within marks including moisture and sebaceous components. Removal of the water-soluble components may have some impact on the effectiveness of the process although the extent is likely to depend upon the age of the mark.</td>
</tr>
<tr>
<td>Superglue Fuming</td>
<td><img src="image" alt="Water Icon" /></td>
<td>Superglue Fuming is generally ineffective on items or surfaces exposed to water as it only targets water-soluble components. Older fingermarks (i.e. those present on the surface for some time prior to exposure to water) are more resistant to damage by exposure to water than fresh fingermarks and may occasionally be developed although there will be more effective processes.</td>
</tr>
<tr>
<td>DFO; Ninhydrin</td>
<td><img src="image" alt="Water Icon" /></td>
<td>These processes are ineffective on items or surfaces exposed to water as they only target water-soluble components. They also target water-soluble components in blood. See <strong>Acid Dyes</strong> for general notes for recovery of marks in blood.</td>
</tr>
</tbody>
</table>

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**Acid Dyes** for general notes for recovery of marks in blood.
Chapter 2
Forensic Evidence Recovery

Section D: Fingermark evidence recovery planning

• Gathering information
• Initial planning and the Manual charts
• Complex scenarios
  – Little is known about the item
  – Multiple types of mark / substrate etc.
• Additional considerations
  – Health and safety
  – Scene or Lab?
  – Time available vs. effort etc.
• Developing the plan…
Developing the plan

What can be learned from the item?

Which processes will still be effective on the item?

How should the processing sequence be modified?

Which Manual Chart should be used?

Which process can be used?

What is known about the history of the item?

What local constraints and limitations of the investigation need to be regarded?

What effect will the plan have on the recovery of other forensic material?

Should the item be treated in the laboratory or at the scene?
Section E: Factors influencing identification

- Communication between practitioners
- Interpretation
  - Substrate effects; deposition pressure; reverse direction marks; distorted marks; enhancement post capture etc.
Chapter 3
Safe and Effective Implementation of Processes

• Divided into three sections;
  • A - Requirements for implementation
    - Training and competence
    - Installation of ‘fixed’ equipment
    - Storage of chemicals & solutions
  • B - Working safely
    - Identification and classification of hazards
    - Personal protective equipment
  • C - Working effectively
    - Maintenance of equipment
    - Guidance on chemical and solution quality
    - Maintaining evidence integrity
    - Imaging

<table>
<thead>
<tr>
<th>Process</th>
<th>Use in wet area</th>
<th>Use in dry area</th>
<th>Use of fume cupboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prep</td>
<td>Prep</td>
<td>Prep</td>
<td>Prep</td>
</tr>
<tr>
<td>Acid Dyes</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Basic Violet 3</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4 – chart development

SMOOTH, NON-POROUS
- glass, paint, varnish and hard plastic mouldings;
- not for some plastics or untreated metals, see CHARTS 4 and 5.

VISUAL EXAMINATION
- Photograph
- Dry
- Wet
- Allow to dry at room temperature 30°C max.

FLUORESCENCE EXAMINATION
- Photograph
- Small scratches only

VACUUM METAL DEPOSITION
- Photograph

POWders
- Most generally effective process
- Photograph or Lift

SUPERGLUE
- Must be dried to be effective
- Photograph by fluorescence

PHENOL-BASED BASIC VIOLET 3
- Photograph

NON-BASED OR TITANIUM-BASED POWDER SUSPENSION
- Photograph

VACUUM METAL DEPOSITION OPTIONS

SUPERGLUE FUMING
- Generally most effective sequence

SUPERGLUE FLUORESCENT DYE STAINING

POWDER SUSPENSION

BASIC VIOLET 3
- Phenol-based
Chapter 4
Process Selection

– 3 Primary Charts

CHART 1: Non-Porous

CHART 2: Porous

CHART 3: Semi-Porous
Chapter 4
Process Selection

Starting point

I know more about the surface
I want more info about the process
I’m also interested in DNA
My item has been wetted

Chapter 4
Chapter 2
Chapter 5
Chapter 7
Chapter 4
Process Selection

CHART 1: Non-Porous
Processes extensively evaluated by the Home Office and considered suitably effective to be incorporated into processing charts in Chapter 4.

Standard processes for routine operational use. They must be used in preference to other category processes where possible.

**Preparation Processes**
- For the removal of contaminants and/or interfering substances
  - Soot removal
  - Thermal coating removal
- For the separation of surfaces
  - Adhesive tape removal
  - Numberplate splitting

**Visualisation Processes**

**Optical Processes**
- Colour filtration
- Fluorescence examination
- IR Reflection
- Monochromatic Illumination
- Multi-spectral imaging
- UVC Reflection
- Visual examination

**Chemical/Physical Processes**
- Acid dyes
- Basic violet 3
- DFO
- ESDA
- Lifting
- Multimetal deposition
- Ninhydrin
- Physical developer
- Physical developer enhancement
- Powders
- Powder suspensions
- Small particle reagent
- Solvent black 3
- Superglue fluorescent dye staining
- Superglue fuming
- Vacuum metal deposition
Ninhydrin

Alternative Names
Nin

Contents
- Laboratory or Scene? ........................................... 5.Nin.2
- Laboratory use .................................................. 5.Nin.3
- Health and Safety .................................................. 5.Nin.4
- Equipment .......................................................... 5.Nin.5
- Chemicals .......................................................... 5.Nin.6
- Solutions ............................................................ 5.Nin.7
- Processing ........................................................... 5.Nin.8
- Post-Processing .................................................... 5.Nin.9
- Scene use ............................................................ 5.Nin.10
- Additional Considerations ...................................... 5.Nin.11
- Troubleshooting ................................................... 5.Nin.12
- Supplementary Information ..................................... 5.Nin.18

Main Uses
- Latent
- Blood
- Semi-Porous
- Porous

Safety and Effectiveness Summary
The Process
- Ninhydrin can be used safely and effectively in a laboratory.
- The process can be used on all surfaces but precautions are required to mitigate the日后性 nature of the solvent and the effectiveness is significantly reduced with prolonged times being considerably increased.
- The effectiveness may be influenced by the method of applying the solution.
- The effectiveness is linked to the ability to control the temperature and relative humidity of the item or surface post-application. This requires the use of specialist equipment to carry out successfully.

The Item or Surface
- The process is most effective at developing both latent and bloody fingerprints on porous surfaces although it can also be used on semi-porous surfaces.
- Ninhydrin is not effective on items or surfaces that have been wetted, even if they have been subsequently dried.
- It is effective on items or surfaces that have been soaked with petrol or paraffin.

Integrated Use
Ninhydrin may be detrimental to subsequent fingerprint or forensic processing.
- See Chapter 4 for information on its sequential use with other fingerprint visualisation processes.
- See Chapter 7 for information on integration of fingerprint and other forensic processes.

More Details

Key Information
- Competent personnel specialising in fingerprint visualisation must be consulted if considering the use of this process.
- It is recommended that all solutions are made prior to using this process for the first time.
- Full process details are given for laboratory use and additional considerations given for scene use.

Process Overview
Ninhydrin reacts with amino acids and possibly other components in latent fingerprints to give a purple product. It also reacts with amine-containing compounds (mainly proteins) in blood.

It is a chemical process that involves the application of a solution to the item or surface followed by use of a specialist oven (if possible) to increase the speed and effectiveness of the reaction.
Chapter 5
Category ‘A’ Process Instructions – New Sections

• Laboratory or Scene?
  – Health and Safety; Effectiveness; Practicality
• Labelling solutions

| HAZARDS** typically associated with prepared SOLVENT BLACK 3 SOLUTIONS (CLP) |
|---|---|---|
| **Solution** | **Symbols** | **Signal Word and Hazard Statements** |
| Working | | ‘DANGER’ |
| | | H226 ‘Flammable liquid and vapour’ |
| | | H336 ‘May cause drowsiness or dizziness’ |

| HAZARDS** typically associated with prepared SOLVENT BLACK 3 SOLUTIONS (CHIP) |
|---|---|
| **Solution** | **Symbols** | **Hazard Statements** |
| Working | | R10 ‘Flammable’ |
| | | R67 ‘Vapours may cause drowsiness and dizziness’ |

• Post-Processing
  – What to do with processed items and left-over solutions
Chapter 5
Category ‘A’ Process Instructions – New Sections

• Scene use of processes
  – Additional considerations and possible solutions
• Troubleshooting
  – Recognition; Cause; Effect; Prevention; Correction

• Supplementary Information
## Chapter 6
### Category ‘B-F’ Processes

**Established processes known to be generally less effective** than alternative options or processes that are likely to offer benefit but have not been fully evaluated by the Home Office.

**Optional processes for occasional operational use.** Possible reasons for use: no other options available; all Category A options have been exhausted; niche application; or lack of equipment for other processes.

### Preparation processes
- Adhesive Tape Removal (Solvent-based)
- Earth/Mud Removal
- Organic Decomposition Residue Removal

### Visualisation Processes
- **Acid Dyes (water-based)**
- DMAC
- Europium Chelate
- Leuco Crystal Violet
- Gun Blueing
- **Indandione**
- **Iodine Fuming & Fix**
- Iodine Solution
- Natural Yellow 3
- Oil Red O
- Palladium Deposition
- Radioactive Sulphur Dioxide
- Scanning Electron Microscopy
- Scanning Kelvin Probe
- **Silver Nitrate**
- **Superglue Fluorescent Dye Staining (propanol-based)**
Chapter 6
Category ‘B-F’ Processes

Processes at a developmental stage exhibiting potential as an effective fingermark recovery process.

Optional processes for occasional operational use. Possible reasons for use: no other options available; all Category A options have been exhausted; niche application.

Preparation processes
- Drugs Removal

Visualisation Processes
- ATR-FTIR
- Basic Violet 2
- Cartridge Electrostatic Recovery and Analysis (CERA)
- Electrochromic Enhancement
- Fluorescent Superglue
- MALDI-MSI
- Nile Red
- Powders (Fluorescent)
- S₂N₂
- SIMS
- Tagged Nanoparticles
- ThermaNin
- Thermal Development
- XRF
Chapter 6
Category ‘B-F’ Processes

D
Processes extensively evaluated by the Home Office and considered unsuitable for incorporating into processing charts in Chapter 5.

Corrective Action Processes. Not generally for routine use but may be used to recover marks in situations where initial selection of processes has undesirable consequences.

- Acid dyes (methanol based)
- Ninhydrin Enhancement (Zinc Toning)

E
Processes that are known to be less effective than alternative processes with no obvious niche application, or those with no reliable data on the success rate and no reason to believe that they are as good as or significantly better than other processes.

Processes with no known operational benefits.

- Acid dyes
- Amino acid reagents
- Fat and lipid reagents
- Fuming and evaporation processes
- Haem reagents
- Powders and powder suspensions

F
Processes with known health and safety issues. The process uses chemicals and/or conditions that expose operators to unacceptable health hazards.

Processes should not be used for health and safety reasons.
Chapter 7
Integrating Forensic Processes

• 13 forensic disciplines
  – Ballistics; body fluids; CCTV; digital forensics; DNA; documents; drugs; fibres; footwear marks; glovemarks; hairs; toolmarks; trace evidence

• **Awareness** of the forensic discipline to practitioners specialising in fingermark recovery

• Stress the need to:
  – consult competent practitioners
  – develop a joint forensic evidence recovery plan
Chapter 7
Integrating Forensic Processes

• Page layout
  – Overview of the forensic discipline
    • Transfer; recovery; analysis (where possible)
  – Important notes on XXX evidence
  – Effect of fingermark processes on XXX
  – Effect of XXX processes on fingermarks
  – Maximising fingermark and XXX evidence
Appendices and other bits

- Appendix 1
  - Example Fingermark Recovery Plans
- Appendix 2
  - Fingermark Research
- Glossary
- Index
Sample Fingermark Visualisation Manual Pages

The following six pages are static images, not interactive pages as will be present in the electronic manual...
Copy to come. Copy to come. Copy to come.

Further information and possible modifications to Chart 1 for:

<table>
<thead>
<tr>
<th>Chart</th>
<th>Substrate</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Glass and Ceramics</td>
<td>xx</td>
</tr>
<tr>
<td>1.2</td>
<td>Rigid Plastics</td>
<td>xx</td>
</tr>
<tr>
<td>1.3</td>
<td>Plastic Packaging (hard)</td>
<td>xx</td>
</tr>
<tr>
<td>1.4</td>
<td>Unplasticised PVC</td>
<td>xx</td>
</tr>
<tr>
<td>1.5</td>
<td>Plastic Packaging (soft)</td>
<td>xx</td>
</tr>
<tr>
<td>1.6</td>
<td>Expanded Polystyrene</td>
<td>xx</td>
</tr>
<tr>
<td>1.7</td>
<td>Currency (polymeric)</td>
<td>xx</td>
</tr>
<tr>
<td>1.8</td>
<td>Plasticised PVC (vinyl)</td>
<td>xx</td>
</tr>
<tr>
<td>1.9</td>
<td>Plastic Packaging (clingfilm)</td>
<td>xx</td>
</tr>
<tr>
<td>1.10</td>
<td>Rubber</td>
<td>xx</td>
</tr>
<tr>
<td>1.11</td>
<td>Wax and Waxed Surfaces</td>
<td>xx</td>
</tr>
<tr>
<td>1.12</td>
<td>Gloss Painted Surfaces</td>
<td>xx</td>
</tr>
<tr>
<td>1.13</td>
<td>Untreated Metal</td>
<td>xx</td>
</tr>
<tr>
<td>1.14a</td>
<td>Adhesives with non-porous backings: light</td>
<td>xx</td>
</tr>
<tr>
<td>1.14b</td>
<td>Adhesives with non-porous backings: dark</td>
<td>xx</td>
</tr>
</tbody>
</table>

Key:
- Most effective processes
- General impact of water on process effectiveness, Read full details.
- General impact of age of mark on process effectiveness, Read full details.
- General impact of surface roughness on process effectiveness, Read full details.

1 Superglue Fuming is one of the most effective processes only when it is followed with Superglue Fluorescent Dye Staining.
Unplasticised PVC (uPVC)

General information

Unplasticised polyvinyl chloride (uPVC) is essentially a subset of the group of rigid plastics outlined in Chart 1.2. It is separated from them partly because of the high occurrence of this type of material at crime scenes (it is the principal constituent of frames for double-glazed doors and windows) and partly because it has been observed to behave slightly differently to other rigid polymers when treated using visualisation processes.

The material is prone to ageing effects and surfaces exposed to outdoor environments may become increasingly weathered, becoming matt in appearance and having powdery surface layers.

These items sometimes feature the following symbol that may assist in identification:

![Symbol]

**Typical items:**
Door and window frames, fascia boards, trunking, guttering and drain pipes

**Additional Category B-C processes**

Additional considerations for these substrates:
1. Black magnetic powder is generally the most effective powder.
2. It is unknown which sequential route is the most effective.
3. Higher degrees of background staining can occur with dyes. Test a small area before treating the whole item. Black magnetic powder, or VMD (gold/zinc) represent alternative superglue enhancement processes where dye staining is not viable.
Solvent Black 3

Alternative Names
SB3, Sudan Black

Contents

Laboratory Use ........................................... 5 SB3.3
Health and Safety ........................................... 5 SB3.4
Labeling Solutions ........................................... 5 SB3.5
Solutions ..................................................... 5 SB3.6
Processing .................................................... 5 SB3.7
Post-Processing ............................................. 5 SB3.8
Additional Considerations .................................. 5 SB3.9
Troubleshooting ............................................ 5 SB3.10

Main Uses
- Latent
- Blood
- Grease

Non-Porous
Semi-Porous
Porous

STOP

Important Information

- Competent personnel specializing in fingerprint visualization must be consulted if considering the use of this process.
- It is recommended that all sections are read prior to using this process for the first time.
- This section contains process instructions for one Category A Solvent Black 3 formulation based on PGME. This replaces the ethanol-based formulation given in previous editions of this Manual.
- Full process details are given for laboratory use and additional considerations given for scene use.

Process Overview
Solvent Black 3 is a dye which stains grease and oil contaminated fingerprints, and the fatty constituents of sebaceous sweat in latent fingerprints. It is effective on non-porous substrates, and the resultant marks are visible and blue-black in colour.

It is a chemical process that involves exposing the item or surface to a staining solution followed by a water wash.

More Details

Safety and Effectiveness Summary
The Process
- Solvent Black 3 can be used safely and effectively in the laboratory and at scenes.
- Solvent Black 3 is most effective on grease contamination.

The Item or Surface
- Solvent Black 3 is most appropriate for use on non-porous surfaces. This process may produce background staining, particularly if the surface has some porosity.
- Marks on dark and patterned surfaces may be very difficult to visualize.

Integrated Use
Solvent Black 3 may be detrimental to subsequent fingerprint or forensic processing.

- See Chapter 4 for information on its sequential use with other fingerprint visualization processes.
- See Chapter 7 for information on integration of fingerprint with other forensic processes.
Solutions

**Solvent Black 3 (SB3) Working Solution**

10g Solvent Black 3
500ml 1-Methoxy-2-propanol (PGME)
500ml water

For other quantities see Ready Reckoner.

---

**Ready Reckoner for Solvent Black 3**

<table>
<thead>
<tr>
<th></th>
<th>Quantity of SB3 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 L</td>
<td>10 g</td>
</tr>
<tr>
<td>2 L</td>
<td>20 g</td>
</tr>
<tr>
<td>5 L</td>
<td>50 g</td>
</tr>
<tr>
<td>SB3</td>
<td>500 ml</td>
</tr>
<tr>
<td>PGME</td>
<td>1 L</td>
</tr>
<tr>
<td>Water</td>
<td>2.5 L</td>
</tr>
</tbody>
</table>

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*a** Solvent Black 3 working solution must be prepared in a fume cupboard or well-ventilated area.

*b** Follow Standard method for solution preparation. In addition, the Solvent Black 3 working solution should be stirred for at least one hour. A saturated solution will form. Some particulate matter will remain in suspension or as a sediment (this may be difficult to observe due to the blue-black solution colour) and should be transferred with the solution for storage.

*c** Solvent Black 3 Solution is dark blue.

a) Follow Standard method for solution labelling. In addition, Solvent Black 3 working solution should be labelled according to the information in Solvent Black 3 Health and Safety.

b) Solvent Black 3 working solution has a guideline expiry date of one month after preparation if stored at room temperature, after which the intensity of staining reduces.

a) See Good Laboratory Practice: Chemicals.
**Solvent Black 3**

**Processing**

**Preparation**
- **(1) Work area**
  - a) SB3 working solution must be used in a fume cupboard or well-ventilated area.
- **(2) Equipment and Solutions**
  - a) Pour an appropriate amount of SB3 working solution into a suitable dish or vessel. If using a wash-bottle, ensure that no undissolved solid is transferred as this will block the nozzle.
  - b) For dipping items: remove any metallic-looking film that appears on the surface of the SB3 working solution before use with blotting or tissue paper.
  - a) Apply SB3 working solution to the item by suitable means such as immersion or pouring. Exposure times are normally between ten seconds and one minute depending upon the susceptibility of the surface to background stain.
  - b) If immersing the item, the SB3 working solution should be replenished as necessary.
  - a) Rinse item until excess dye has been removed from the background using suitable means, such as cold running water from a tap, or garden spray unit for larger items.
  - b) For larger items, do not allow rinse water to run onto adjacent sections that are yet to be treated (see strategy for treating large areas).
  - a) See Drying of items.

**Processing**
- **(3) Expose item to SB3 working solution**
- **(4) Rinse item**
- **(5) Dry item**
  - a) Visual marks are coloured blue-black.
  - b) There are many non-destructive optical processes that can be considered when examining and imaging marks in addition to Visual Examination, particularly for low contrast marks or marks on dark or patterned surfaces.
  - c) Mark up visible marks appropriately and capture image immediately. Fingermarks developed with this process will fade, sometimes within minutes.
  - d) After examination, items can be retreated if necessary, but effectiveness will be dependent upon the level of background staining.

**Strategy for treating large areas**
Solvent Black 3 is easier to use on small areas (< 30 cm x 30 cm). Areas larger than this should be treated section by section. When applying Solvent Black 3 in this way the aim, whether applying to vertical or horizontal surfaces, is to prevent SB3 working solution and rinse water from running or splashing onto adjacent sections which are yet to be treated. Any visualised fingermarks should be imaged before the next section is treated.

**Example:** Treating a large, vertical surface.

SB3 working solution is applied in sections from the bottom up. In this way, excess dye solution runs down over areas already treated (any fingermarks found on those areas will have already been imaged).

After application of SB3 working solution, the area is rinsed with water. The rinse water flows down over section A (treated previously). Any marks developed in section B will be imaged before section C is treated.
Solutions
Solvent Black 3 formulations

Two Solvent Black 3 solutions have previously been recommended for operational use by CAST, one based on ethanol and the other on PGME. The ethanol-based formulation was only suitable for use in a laboratory because of its flammability, whereas the PGME-based formulation can be used both in a laboratory and at scenes provided that appropriate precautions are taken. Tests indicated that the performance of the PGME-based formulation is closely equivalent to if not better than the ethanol-based formulation in a laboratory environment, and therefore the ethanol-based formulation was withdrawn because it was felt that it offered no operational benefits.

The dyeing process of Solvent Black 3 is illustrated schematically on the right.

Schematic illustration of the Solvent Black 3 process: a) Solvent Black 3 molecules in solvent with limited solubility; b) lipophilic component of Solvent Black 3 molecule preferentially dissolving into lipids in fingerprint ridges; c) fingerprint after drying, leaving dyed ridges.
What and When?

• What
  – Interactive PDF, suitable for use on PCs, laptops, tablets etc.
  – Suitable for printing

• When
  – UK launch event scheduled for Jan 2014
  – Implementation to UK police forces to follow

• Availability and Cost
  – It will be available to non-UK police organisations
  – Costs and logistics
    • depends on Home Office decision on cost recovery
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Thank you for listening

Questions?

Rory Downham
Rory.Downham5@homeoffice.gsi.gov.uk