SWGFAST

Validation of Research and Technology

The purpose of validation is to ensure the integrity of all techniques and procedures used for the development of friction ridge detail in order to establish confidence in those techniques and procedures for the examiner and the scientific and legal communities.

1. VALIDATION

General considerations for validation of technical techniques or procedures for the development of friction ridge detail

1.1 Validation is the process used by the scientific community to acquire the necessary information to assess the ability of a technique or procedure to reliably obtain a desired result. Validation determines the conditions under which results can be obtained and determines the limitations of the technique or procedure. The validation process identifies the critical aspects of the technique or procedure that must be carefully controlled and monitored.

1.2 Prior to the implementation of the technique or procedure, validation testing must be conducted.

1.3 Once a technique or procedure has been validated, appropriate documentation must be available. (Refer to Appendices and Section 1.7).

1.4 The validation process includes:

1.4.1 Literature research: Review of publications, academic materials, safety procedures and protocols, etc. involving the technique or procedure being validated.

1.4.2 Standard samples: The samples should be selected to represent the type of specimens to be routinely analyzed by the technique or procedure.

1.4.3 Consistency: The methods tested and results must show the same outcome on each test.

1.4.4 Reproducibility: The test must be reproducible by another individual using the original test documentation.

1.4.5 Environmental Studies: When applicable, evaluate the method using known samples exposed to a variety of environmental conditions.

1.5 Validation of Established Technique or Procedure (see Appendices A and B)

1.5.1 Internal Validation

Prior to implementing an existing technique or procedure, the reliability of the technique or procedure must be demonstrated. This internal validation

must include:

1.5.1.1 The techniques and procedures must be tested using similar samples and conditions as those being examined.

1.5.1.2 If a modification has been made, the modification must be compared to the original technique or procedure using identical samples.

1.5.1.3 Consistency and reproducibility must be determined by repetitive analyses, preferably by different individuals.

1.6 Validation of New or Innovative Techniques or Procedures (see Appendix C)

1.6.1 Internal Validation

Prior to implementing a new or innovative technique or procedure, the reliability of the technique or procedure must be demonstrated. This internal validation must include:

1.6.1.1 The techniques and procedures must be tested using similar samples and conditions as those being examined.

1.6.1.2 If a modification has been made, the modification must be compared to the original technique or procedure using identical samples.

1.6.1.3 Consistency and reproducibility must be determined by repetitive analyses, preferably by different individuals.

1.6.2 External Validation

Validation studies must have been completed by a scientific, scholastic, and/or professional organization other than that of the immediate organization prior to the implementation of the technique or procedure.

1.7 All validation must be documented

1.7.1 Documentation must be sufficient to ensure that any qualified individual could evaluate what was done and replicate the validation process.

1.7.2 Documentation must be in the form of either laboratory notes, reports, laboratory books or log books, which should include references, personal communications, etc.

1.7.3 Documentation of external validation must identify the name and professional affiliation of the person(s) conducting the study, date, as well as the research question, procedures, results and conclusion(s).

APPENDIX A

The following is an example of a guideline for validation testing of an **established technique or procedure**, using a formulation prepared by the tester or a member of the testing organization.

Purpose: Detection of latent prints on specific surface type or specific component of latent print residue.

Materials: Chemicals, lab ware and incidental materials required for preparation and use.

Safety: Review all safety procedures prior to beginning validation testing, including preparation, application, storage and disposal of chemical and biohazard materials.

Formula: State formula being used.

Procedure: To include step by step methods used in testing the technique or procedure, as well as time increments, environmental conditions (i.e., humidity, heat, atmospheric), formulations, amounts and materials, when applicable.

Results: Descriptive observation(s) of the test.

Conclusion: Discussion or evaluation of the results and effect(s) of the technique or procedure on the development of latent prints or above stated purpose.

Reference: List source(s) for procedure, technique and formulation.

Validation: List name of individual(s) who conducted validation, their title, agency of individual(s) and date of validation.

Attached is an example of a validation test.

VALIDATION TEST EXAMPLE FOR APPENDIX A

Purpose: Test ninhydrin solution for developing latent prints on paper

Materials: Ninhydrin crystals, acetone, beakers, measuring scale, weigh boats, magnetic stirrer and bar, storage bottle, tray, forceps and safety equipment.

Formula: 6 grams of ninhydrin crystals dissolved in 1 liter of acetone, yielding a 0.6% concentration.

Procedure: Follow all prescribed safety procedures.

1. Weigh out 6 grams of ninhydrin crystals and empty into a beaker containing 1 liter of acetone and stir until dissolved.
2. Pour ninhydrin solution into storage bottle.
3. Place fingerprints on the type of paper similar to that being processed in casework.
4. Pour sufficient amount of ninhydrin solution into tray.
5. Dip test paper using forceps into ninhydrin solution and saturate paper with the solution.
6. Allow to air dry, five minutes.
7. Place test paper in a humidity chamber (set at 80% humidity at 50 degrees C.) for 1 hour.
8. Dispose of used ninhydrin solution in accordance with prescribed safety standards.

Results: Latent prints developed on the test paper.

Conclusion: The solution and procedure tested developed latent prints, and is, therefore, valid for use in the development of latent prints on paper.

Reference: Federal Bureau of Investigation, The Science of Fingerprints, page 180, 1973.

Personal communication, Chemist James McBride, Aldona County Sheriff's Department Criminalistics Laboratory, 8-27-98.

Validation testing conducted by Lee Render, Fingerprint Specialist with Avalong Police Department on 8-29-98.

APPENDIX B

The following is an example of a guideline for validation testing of an **established technique or procedure**, using a commercially prepared product.

Purpose: Detection of latent prints on specific surface type or specific component of latent print residue using a commercially prepared product.

Materials: Commercially prepared product and incidental materials required for use.

Safety: Review all safety procedures prior to beginning validation testing, including preparation, application, storage and disposal of chemical and biohazard materials.

Formula: State product and manufacturer's supplied information.

Procedure: To include step by step methods used in testing the technique or procedure, as well as time increments, environmental conditions (i.e., humidity, heat, atmospheric), formulations, amounts and materials, when applicable.

Results: Descriptive observation(s) of the test.

Conclusion: Discussion or evaluation of the results and effect(s) of the technique or procedure on the development of latent prints or above stated purpose.

Reference: List source(s) for procedure, technique and formulation.

Validation: List name of individual(s) who conducted validation, their title, agency of individual(s) and date of validation.

Attached is an example of a validation test.

VALIDATION TEST EXAMPLE FOR APPENDIX B

The following is an example of a guideline for validation testing of an **established** technique or procedure, using a commercially prepared solution.

Purpose: Test commercially prepared ninhydrin solution for developing latent prints on paper.

Materials: Commercially prepared ninhydrin solution in an aerosol can, forceps and safety equipment.

Formula: State product and manufacturer's supplied information.

Procedure: Follow all prescribed safety procedures.

1. Place fingerprints on the type of paper similar to that being processed in casework.
2. Spray test paper with ninhydrin solution, allowing paper to become saturated with the solution.
3. Allow to air dry, ten minutes.
4. Heat test paper using an electric steam iron (set at the cotton setting), one minute.

Results: Latent prints developed on the test paper.

Conclusion: The development of latent prints on the test paper demonstrates the validity of the procedure and solution used.

Reference: Material Safety Data Sheet, Commercial Products, Inc., provided by seller of product, received 7-19-98.

Federal Bureau of Investigation, The Science of Fingerprints, page 181, 1973.

Validation: Conducted by Allyn Smythe, Latent Print Examiner, Penten Parrish Crime Lab on 7-31-98.

APPENDIX C

The following is an example of a guideline for validation testing of **a new or innovative technique or procedure** being implemented or being considered for implementation for use in latent print development.

Purpose: Detection of latent prints on specific surface type or specific component of latent print residue.

Literature: To include studies and academic research in the explanation of the technique, to include descriptive data and research procedure and findings.

Materials: Chemical(s) or product and incidental materials required for use.

Safety: Review all safety procedures prior to beginning validation testing, including preparation, application, storage and disposal of chemical and biohazard materials.

Formula: State name of technique or procedure.

Procedure: To include step by step methods used in testing the technique or procedure, as well as time increments, environmental conditions (i.e., humidity, heat, atmospheric), formulations, amounts and materials, when applicable.

Results: Descriptive observation(s) of the test.

Conclusion: Discussion or evaluation of the results and effect(s) of the technique or procedure on the development of latent prints or above stated purpose.

Reference: List source(s) for procedure, technique and formulation.

Validation: List name of individual(s) who conducted validation, their title, agency of individual(s) and date of validation.

Attached is a listing of examples of validation tests in the form of published articles for peer review.

VALIDATION TEST EXAMPLES FOR APPENDIX C

Allred, C.E.; Menzel, E.R. A Novel Europium-Bioconjugate Method for Latent Fingerprint Detection. *For. Sci. Inter.* **1997**, *85* (2), 83-94.

Almog, J.; Hirshfeld, A.; Klug, J.T. Reagents for the Chemical Development of Latent Fingerprints: Synthesis and Properties of Some Ninhydrin Analogues. *J. For. Sci.* **1982**, *27* (4), 912-917.

Brennan, J.; Bramble, S.; Crabtree, S.; Wright, G. Fuming of Latent Fingerprints Using Dimethylaminocinnamaldehyde. *J. For. Ident.* **1995**, *45* (4), 373-380.

Burns, D.S. Sticky-Side Powder: The Japanese Solution. *J.For. Ident.* **1994**, *44* (2), 133-138.

Cantu, A.A.; Leben, D.A.; Ramotowski, R.; Kopera, J.; Simms, J.R. Use of Acidified Hydrogen Peroxide to Remove Excess Gun Blue from Gun Blue-Treated Cartridge Cases and to Develop Latent Prints on Untreated Cartridge Cases. *J. For. Sci.* **1998**, *43* (2), 294-298.

Mashiko, K.; German, E.R.; Motojima, K.; Colman, C.D. RTX: A New Ruthenium Tetroxide Fuming Procedure. *J.For. Ident.* **1991**, *41* (6), 429-436.

Pounds, C.A.; Phil, M.; Grigg, R.; Mongkolaussavaratana, T. The Use of 1,8-Diazafluoren-9-one (DFO) for the Fluorescent Detection of Latent Fingerprints on Paper: A Preliminary Evaluation. *J. For. Sci.* **1990**, *35* (1), 169-175.

Ramotowski, R.;, Cantu, A.A.; Joullie, M.M.; Petrovskaia, O. 1,2-Indaediones: A Preliminary Evaluation of a New Class of Amino Acid Visualizing Compounds. *Fingerprint Whorld* **1997** *23* (90), 131-140.