Findings of the Technical Working Group on Biological Evidence Preservation

National Commission on Forensic Science
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Shannan R. Williams, MPP
Forensic Science Research Project Manager
Special Programs Office
National Institute of Standards and Technology
“In order for qualified forensic science experts to testify competently about forensic evidence, they must first find the evidence in a usable state and properly preserve it.”

- NAS Report
What does your evidence room look like?
“Bad” Evidence Rooms
“Bad” Evidence Rooms
“Good” Evidence Rooms
“Good” Evidence Rooms
NIST/NIJ Technical Working Group on Biological Evidence Preservation

Group Charge:
To create best practices and guidance to ensure the integrity, prevent the loss, and reduce the premature destruction of biological evidence after collection through post-conviction proceedings.
TWG Membership

Sue Ballou, Program Manager, Forensics Program, NIST
Phylis Bamberger, Retired Judge, Taskforce for Wrongful Convictions, New York State Bar Association
Rebecca Brown, Police Advocate, Innocence Project
Larry Brown, Property Manager, Los Gatos/Monte Sereno PD
Dennis Davenport, Senior Crime Scene Investigator, Commerce City PD
Rock Harmon, Consultant, DNARock
Ted Hunt*, Chief Trial Attorney, Jackson County Prosecutor’s Office
Cynthia Jones, Associate Professor of Law, American University
Ralph Keaton, Executive Director, ASCLD/LAB
William Kiley, IAPE
Margaret Kline, Research Biologist, NIST
Karen Lanning, Unit Chief, Evidence Control Unit, FBI
Gerry Laporte, Program Manager, Office of Investigative and Forensic Sciences, NIJ
Joe Latta, Exec. Director, IAPE
Linda Ledray, Director, Resource Center, SANE-SART
Randy Nagy, VP Sales and Marketing, Bode Technology
Brian Ostrom, Criminalist, Portland Metro Forensic Laboratory
Yvette Sanchez-Owens, Commanding Officer, Scientific Investigation Division, LAPD
Lisa Schwind, Unit Head, Forensic Service and Education, Office of the Public Defender, State of Delaware
Stephanie Stoiloff, Commander, Forensic Services Bureau, Miami-Dade Police Department
Mark Stolorow, Director, OLES, NIST
TWG Staff and Other Contributors

Staff
Shannan Williams, Project Manager, NIST
Melissa Taylor, Senior Forensic Science Research Manager, NIST
Jennifer L. Smither, Technical Editor, Science Applications International Corporation
John Swarr, Research Assistant, Booz Allen Hamilton

Reviewers/Contributors
Rockne Harmon, Forensic/Cold Case Consultant, DNARock
Anuj Mehta, Subject Matter Expert in AIT, Booz Allen Hamilton
Jeff Irland, Subject Matter Expert in AIT, Booz Allen Hamilton
Jack Ballentyne, New York Forensic Science Commission/DNA Subcommittee
Kathleen Brown*, Nurse Professor, University of Pennsylvania, School of Nursing
John Paul Jones*, Deputy Director of OSAC Affairs, NIST
Dan Katz*, Deputy Director, Maryland State Crime Lab
Jonathan Gould*, Professor, American University
David Loftis, Managing Attorney, Innocence Project
Kenneth Melson, Professional Lecturer in Law, George Washington University Law School
Mitch Morrissey*, District Attorney, Denver Justice Council
Jeffrey Nye*, Biological Program Coordinator, Michigan State Police
Ron Reinstein*, Judge, Superior Court of Arizona
Altatf Rahamatulla, Policy Analyst, Innocence Project
Peter Vallone*, Research Chemist, Biomolecular Measurement Division, NIST
TWG Outputs Overview

• Three reports published since 2012
• Reports sought to:
  – Understand practical challenges and provide specific best practices
  – Promote advanced technologies to improve tracking and storage of evidence
  – Facilitate implementation by considering applicable rules, law, and policy
TWG Outputs


http://www.nist.gov/forensics/evidence-management.cfm
Key Recommendations

• In the *Handbook*, the TWG recommends:
  – Specific **environmental storage guidelines** for long and short term storage of biological evidence types based on scientific literature review
  – Standardization of **packaging, labeling, and shelving** for improved retrieval
  – Practices to improve **safety** in handling biological materials which can be hazardous
  – Protocols for the **disposition** of biological evidence
### Short and Long Term Storage Matrices

#### Table III-1: Short-Term Storage Conditions Matrix

<table>
<thead>
<tr>
<th>Type of Evidence</th>
<th>Frozen</th>
<th>Refrigerated</th>
<th>Temperature Controlled</th>
<th>Room Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Blood³</td>
<td>Never</td>
<td>Best</td>
<td>Best</td>
<td>Acceptable</td>
</tr>
<tr>
<td>Urine</td>
<td>Best</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet Bloody Items (if cannot be dried)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hair</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swabs with Biological Material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal Smears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feces</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buccal Swabs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table III-2: Long-Term Storage Conditions Matrix

<table>
<thead>
<tr>
<th>Type of Evidence</th>
<th>Frozen</th>
<th>Refrigerated</th>
<th>Temperature Controlled</th>
<th>Room Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Blood</td>
<td>Never (liquid)</td>
<td>Acceptable (liquid)</td>
<td>Acceptable (dried)</td>
<td></td>
</tr>
<tr>
<td>Urine</td>
<td>Best</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Biological Stained Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bones</td>
<td></td>
<td></td>
<td>Best (dried)</td>
<td>Acceptable</td>
</tr>
<tr>
<td>Hair</td>
<td></td>
<td></td>
<td>Best</td>
<td></td>
</tr>
<tr>
<td>Swabs with Biological Material</td>
<td></td>
<td></td>
<td>Best</td>
<td></td>
</tr>
<tr>
<td>Vaginal Smears</td>
<td></td>
<td></td>
<td>Best</td>
<td></td>
</tr>
<tr>
<td>Feces</td>
<td></td>
<td></td>
<td>Best</td>
<td></td>
</tr>
<tr>
<td>Buccal Swabs</td>
<td></td>
<td></td>
<td>Best</td>
<td></td>
</tr>
<tr>
<td>DNA Extracts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Short and Long Term Storage Matrices

Biological evidence should be stored in one of the following conditions, depending on the type of evidence, and if known, the type of analysis that will be conducted:

- **frozen**: temperature is maintained thermostatically at or below –10 °C (14 °F)
- **refrigerated**: temperature is maintained thermostatically between 2 °C and 8 °C (36 °F and 46 °F) with less than 25 % humidity
- **temperature controlled**: temperature is maintained thermostatically between 15.5 °C and 24 °C (60 °F to 75 °F) with less than 60 % humidity
- **room temperature**: temperature is equal to the ambient temperature of its surroundings; storage area may lack temperature and humidity control methods

http://www.nist.gov/forensics/evidence-management.cfm
Key Recommendations

• In *RFID in Forensic Evidence Management*, the authors discuss:
  – Automated identification technologies such as **RFID and barcoding and capabilities** applicable to law enforcement
  – **Barriers** to implementation
  – **Return on Investment** of implementing RFID in property and evidence room
  – **A way forward** for law enforcement agencies implementing AIT
RFID Return on Investment

First Year Cost of Solution
Total Annual Savings

Pay Back 4.4 years
Pay Back 2.2 years
Pay Back 1.4 years
Pay Back 1.1 years
Pay Back 0.9 years
Pay Back 0.8 years
Pay Back 0.8 years
Pay Back 0.9 years
Pay Back 0.8 years

Number of Tracked Evidence Items

Pg. 27
The Need for Standards

- Evidence Labeling
- Evidence Numbering
- Data Exchange

Pg. 28-33
Law enforcement agencies should work to optimize the use of AIT technologies such as RFID by enhancing agency coordination, data exchange methods, process management, and automation. A Capability Maturity Model is a tool used to aid in the improvement of business processes that is often used in software development, but applicable to many sectors. Maturity, in this context, refers to the level at which an organization’s behaviors and processes can produce reliable and sustainable outcomes. (Paulk, Curtis, Chrissis, & Weber 1993) Figure 7-8 depicts a Capability Maturity Model in the context of forensic evidence management. It can be used by law enforcement agencies to assess their property and evidence management capabilities and highlights the areas that an organization can focus on to improve the maturity of its evidence management processes and systems. A capability that is optimizing its processes integrates mechanisms for continuous improvement (data on performance of systems and personnel) and utilizes appropriate innovations in technology. Each step describes the elements needed to eventually achieve optimization of business processes. Using the Capability Maturity Model, for example, the majority of law enforcement agencies across the nation, from a property and evidence management capability maturity perspective, would be categorized as ad hoc. Agency coordination is limited, data are exchanged via manual paper-based systems, many processes are undocumented, and inventories are conducted with no AIT. For example, a police department in Texas that uses a log book to manage inventory and does not leverage any technology would be categorized as ad hoc. However, an organization in New York that is using an evidence management system enabled with barcode readers to help track and manage property and evidence and has documented processes and procedures would be categorized as defined. Implementing an automated identification technology alone will not fully optimize the processes used to manage forensic evidence. Due to the nature of forensic evidence, law enforcement agencies must also consider the level of agency coordination, the methods used to exchange data, and the management of processes in addition to the level of automation in order to improve evidence management. Addressing each of these areas can facilitate improvements throughout the system instead of within one agency alone.

Figure 7-8: Property and evidence management capability maturity model.
3. Biological Evidence Preservation: Considerations for Policy Makers

(Published April 2015)

http://www.nist.gov/forensics/evidence-management.cfm
Overview

• While **43 states and the District of Columbia** have enacted statutes related to the preservation of biological evidence, policies and procedures can be enacted in states that currently have no laws and for those States looking to make improvements.

• Policy brief intended to provide guidance to legislators, advocates, and managers within criminal justice agencies that influence policy.

• Uses examples from existing State statutes, and a thorough examination of current trends, law, scientific literature and the expertise of the membership.

• Does not endorse any particular state statute.
Biological Evidence Definition

• To ensure that evidence is properly preserved, all potential handlers must have a clear understanding of what constitutes biological evidence.

• Defining biological evidence in a statute can prevent ambiguity within jurisdictions and among the various agencies that may potentially handle biological evidence.
Biological Evidence Definition

• Recommendation 1:
Policy makers should define biological evidence as follows: “Evidence commonly recovered during a criminal investigation in the form of skin, hair, tissue, bones, teeth, blood, semen, or other bodily fluids, which may include samples of biological materials, or evidence items containing biological material.”

Automatic Evidence Retention

• The majority of statutes (31 out of 43) contain provisions that require states to automatically preserve biological evidence.

• However, a few other state statutes require that biological evidence be retained with the qualification that some form of petition or court order is made.

• In the absence of an automatic retention policy, however, there is a period of time in which the evidence can be legally destroyed before a petition for testing is filed. This time may last for years and can result in the unwarranted destruction of evidence that could be tested and found to be exculpatory.
Automatic Evidence Retention

- **Recommendation 2:**
  Policy makers in each state should establish statutes, rules, or policies that require the automatic retention of biological evidence by government entities from the time of collection through the recommended timeframes set forth in Table 3-1.
# Retention Timetables

<table>
<thead>
<tr>
<th>Crime Categories (NIBRS)¹</th>
<th>CASE STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Open²</td>
</tr>
<tr>
<td>Homicide Offenses</td>
<td>Retain indefinitely</td>
</tr>
<tr>
<td>Sexual Offenses</td>
<td></td>
</tr>
<tr>
<td>Assault Offenses, Kidnapping/Abduction, Robbery</td>
<td>At a minimum, retain for the length of the statute of limitations</td>
</tr>
<tr>
<td>All Other Group A &amp; B Offenses</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Conditions

Among the states with biological evidence preservation laws, only 15 include a requirement that biological evidence be properly stored.

“Evidence shall be preserved in a manner reasonably calculated to prevent contamination or degradation of any biological evidence that might be present, subject to a continuous chain of custody, and securely retained with sufficient official documentation to locate the evidence.”

Environmental Conditions

• Recommendation 4:
Policy makers in each state should establish statutes, rules, or policies that require biological evidence be stored in appropriate environmental conditions, based on known scientific practices, in order to prevent its loss, degradation, or contamination.
A Mechanism for Accountability/Enforcement

• Of the 43 biological evidence preservation statutes examined, only six states address the issue of evidence management in their statutes with mandates and/or directions relating to the promulgation of regulations and/or standards regarding preservation.
A Mechanism for Accountability/Enforcement

“(b)The director of the crime laboratory within the department of state police, in consultation with the forensic sciences advisory board established by section 184A of chapter 6, shall promulgate regulations governing the retention and preservation of evidence or biological material by any governmental entity. The regulations shall include standards for maintaining the integrity of the materials over time, the designation of officials at each governmental entity with custodial responsibility and requirements for contemporaneously recorded documentation of individuals having and obtaining custody of any evidence or biological material.

(Massachusetts) Mass. Gen. Laws. Ch. 278A § 16(b) (2011)
A Mechanism for Accountability/Enforcement

Recommendation 5:

• Policy makers in each state should designate an authority with a statutory bound responsibility, such as a statewide commission(s) or working group(s), to establish and enforce standards consistent with best forensic scientific practices for the proper retention, preservation, cataloging, and retrieval of biological evidence applicable to criminal investigations, criminal prosecutions, and post-conviction proceedings.
Other Topics Covered

- Bulk Evidence
- Early Disposition
- Remedies for Denial of Access
All of the documents discussed are available at:

http://www.nist.gov/forensics/evidence-management.cfm
THANK YOU!

Shannan R. Williams, MPP
Shannan.Williams@NIST.gov
301-975-8021
BACK-UP
"Given the power of DNA evidence, it is hard to believe that it is not in the best interest of the criminal justice system to do all it can to preserve this evidence using the best method available."

- Theresa Spear

CAC News, 1st QTR 2014
To Freeze or Not to Freeze Biological Evidence

TWG did not to recommend that all biological evidence be frozen for the following reasons:

1. *Scientific research and current trends in DNA analysis.*

2. *Evidence is often held in multiple locations throughout its lifecycle.*

3. *Lengthy retention times required by legislation make freezing all biological evidence types extremely costly.*